

San Diego, California

*San Diego Convention Center and
Marriott Marquis San Diego Marina*

January 10–13, 2018

Wednesday–Saturday

Meeting #1135

Joint Mathematics Meetings, including the 124th Annual Meeting of the AMS, 101st Annual Meeting of the Mathematical Association of America (MAA), annual meetings of the Association for Women in Mathematics (AWM) and the National Association of Mathematicians (NAM), and the winter meeting of the Association of Symbolic Logic (ASL), with sessions contributed by the Society for Industrial and Applied Mathematics (SIAM).

AMS Associate Secretary: Georgia Benkart Announcement issue of *Notices*: October 2017

Program first available on AMS website: To be announced

Deadlines

For organizers: Expired

For abstracts: September 26, 2017

The scientific information listed below may be dated. For the latest information, see www.ams.org/meetings/national.html.

Joint Invited Addresses

Gunnar Carlsson, Stanford University, *Topological Modeling of Complex Data* (AMS-MAA Invited Address); Wednesday, 11:10 am.

Moon Duchin, Tufts University, *Political Geometry: Voting districts, “compactness,” and ideas about fairness*,

MAA-AMS-SIAM Gerald and Judith Porter Public Lecture); Saturday, 3:00 pm.

André Neves, University of Chicago, *Minimal surfaces, volume spectrum, and Morse index* (AMS-MAA Invited Address); Friday, 11:10 am.

Jill Pipher, Brown University, *Title to be Announced* (AWM-AMS Noether Lecture); Thursday, 10:05 am.

Joint Prize Session

In order to showcase the achievements of recipients of the various prizes, the AMS and MAA are co-sponsoring this event at 4:25 pm on Thursday. A cash bar reception will immediately follow. All participants are invited to attend. The AMS, MAA, and SIAM will announce the JPBM Communications Award winner. The AMS, MAA, and SIAM will award the Frank and Brennie Morgan Prize for Outstanding Research in Mathematics by an Undergraduate Student. The AMS and SIAM will announce the George David Birkhoff Prize in Applied Mathematics. The AMS will announce the Levi L. Conant Prize, the Frank Nelson Cole Prize in Number Theory, AMS Award for Distinguished Public Service, Bertrand Russell Prize, Chevalley Prize in Lie Theory, the Ulf Grendander Prize in Stochastic Theory and Modeling, Albert Leon Whiteman Memorial Prize, and the Leroy P. Steele Prizes. The MAA will award the Beckenbach Book Prize, the Euler Book Prize, Deborah and Franklin Tepper Haimo Awards for Distinguished College or University Teaching of Mathematics, the Chauvenet Prize, and the Yueh-Gin Gung and Dr. Charles Y. Hu Award for Distinguished Service to Mathematics. The AWM will present the Louise Hay Award for Contributions to Mathematics Education, the M. Gweneth Humphreys Award for Mentorship of Undergraduate Women in Mathematics, the AWM-Sadosky Research Prize in Analysis, and the AWM-Microsoft Research Prize in Algebra and Number Theory.

124th Meeting of the AMS

AMS Invited Addresses

Federico Ardila, San Francisco State University, *Algebraic structures on polytopes*; Thursday, 2:15 pm.

Robert Bryant, Duke University, *Title to be announced* Saturday, 9:00 am (Retiring Presidential Address).

Ruth Charney, Brandeis University, *Searching for hyperbolicity*, Thursday, 3:20 pm.

Cynthia Dwork, Harvard University, *Title to be announced*; (AMS Josiah Willard Gibbs Lecture), Wednesday, 8:30 pm.

Avi Wigderson, Princeton University, *Title to be announced* (AMS Colloquium Lectures: Lecture I), Wednesday, 1:00 pm.

Avi Wigderson, Princeton University, *Title to be announced* (AMS Colloquium Lectures: Lecture II); Thursday, 1:00 pm.

Avi Wigderson, Princeton University, *Title to be announced* (AMS Colloquium Lectures: Lecture III); Friday, 1:00 pm.

Dana Randall, Georgia Institute of Technology, *Emergent phenomena in random structures and algorithms*, Friday, 10:05 am.

Edris Titi, Texas A&M University, *Title to be announced*; Wednesday, 10:05 am.

AMS Special Sessions

If you are volunteering to speak in a Special Session, you should send your abstract as early as possible via the abstract submission form found at jointmathematicsmeetings.org/meetings/abstracts/abstract.pl?type=jmm.

Some sessions are cosponsored with other organizations. These are noted within the parenthesis at the end of each listing, where applicable.

A Showcase of Number Theory at Liberal Arts Colleges, **Adriana Salerno**, Bates College, and **Lola Thompson**, Oberlin College, Wednesday afternoon.

Accelerated Advances in Mathematical Fractional Programming, **Ram Verma**, International Publications USA, and **Alexander Zaslavski**, Israel Institute of Technology, Thursday morning.

Advances in Applications of Differential Equations to Disease Modeling, **Libin Rong**, Oakland University, **Elissa Schwartz**, Washington State University, and **Naveen K. Vaidya**, University of Missouri—Kansas City, Wednesday and Friday mornings.

Advances in Difference, Differential, and Dynamic Equations with Applications, **Elvan Akin**, Missouri University S&T, and **John Davis**, Baylor University, Saturday afternoon.

Advances in Operator Algebras, **Marcel Bischoff**, Vanderbilt University, **Ian Charlesworth**, University of California, Los Angeles, **Brent Nelson**, University of California, Berkeley, and **Sarah Reznikoff**, Kansas State University, Friday afternoon and Saturday morning.

Advances in Operator Theory, Operator Algebras, and Operator Semigroups, **Asuman G. Aksoy**, Claremont McKenna College, **Zair Ibragimov**, California State University, Fullerton, **Marat Markin**, California State University, Fresno, and **Ilya Spitkovsky**, New York University, Abu Dhabi, Thursday morning and afternoon.

Algebraic, Analytic, and Geometric Aspects of Integrable Systems, Painlevé Equations, and Random Matrices, **Vladimir Dragovic**, University of Texas at Dallas, **Anton Dzhamay**, University of Northern Colorado, and **Sevak Mkrtchyan**, University of Rochester, Wednesday and Thursday afternoons.

Algebraic, Discrete, Topological and Stochastic Approaches to Modeling in Mathematical Biology, **Olcay Akman**, Illinois State University, **Timothy D. Comar**, Benedictine University, **Daniel Hrozcik**, Chicago State University, and **Raina Robeva**, Sweet Briar College, Thursday and Friday mornings.

Alternative Proofs in Mathematical Practice, **John W. Dawson, Jr.**, Pennsylvania State University, York, Saturday morning.

Analysis of Fractional, Stochastic, and Hybrid Dynamic Systems, **John R. Graef**, University of Tennessee at Chattanooga, **Gangaram S. Ladde**, University of South Florida, and **Aghalaya S. Vatsala**, University of Louisiana at Lafayette, Saturday morning.

Analysis of Nonlinear Partial Differential Equations and Applications, **Tarek M. Elgindi**, University of California, San Diego, and **Edriss S. Titi**, Texas A&M University and Weizmann Institute of Science, Wednesday afternoon, Thursday morning and afternoon.

Applied and Computational Combinatorics, **Torin Greenwood**, Georgia Institute of Technology, and **Jay Pantone**, Dartmouth College, Wednesday morning and afternoon.

Arithmetic Dynamics, **Robert L. Benedetto**, Amherst College, **Benjamin Hutz**, Saint Louis University, **Jamie Juul**, Amherst College, and **Bianca Thompson**, Harvey Mudd College, Wednesday morning and Friday afternoon.

Beyond Planarity: Crossing Numbers of Graphs (a Mathematics Research Communities Session), **Axel Brandt**, Davidson College, **Garner Cochran**, University of South Carolina, and **Sarah Loeb**, College of William and Mary, Thursday morning and afternoon.

Bifurcations of Difference Equations and Discrete Dynamical Systems, **Arzu Bilgin** and **Toufik Khyat**, University of Rhode Island, Saturday morning.

Boundaries for Groups and Spaces, **Joseph Maher**, CUNY College of Staten Island, and **Genevieve Walsh**, Tufts University, Thursday, Friday, and Saturday morning.

Combinatorial Commutative Algebra and Polytopes, **Robert David**, Michigan State University, and **Liam Solus**, KTH Royal Institute of Technology, Wednesday and Friday afternoon.

Combinatorics and Geometry, **Federico Ardila**, San Francisco State University, **Anastasia Chavez**, MSRI and University of California, Davis, and **Laura Escobar**, University of Illinois at Urbana-Champaign, Thursday and Friday morning.

Commutative Algebra in All Characteristics, **Neil Epstein**, George Mason University, **Karl Schwede**, University of Utah, and **Janet Vassilev**, University of New Mexico, Thursday morning and afternoon.

Computational Combinatorics and Number Theory, **Jeremy F. Alm**, Illinois College, and **David Andrews** and **Rob Hochberg**, University of Dallas, Saturday afternoon.

Connections in Discrete Mathematics: Graphs, Hypergraphs, and Designs, **Amin Bahmanian**, Illinois State University, and **Theodore Molla**, University of Illinois at Urbana-Champaign, Saturday afternoon.

Differential Geometry, **Vincent B. Bonini** and **Joseph E. Borzellino**, Cal Poly San Luis Obispo, **Bogdan D. Suceava**, California State University, Fullerton, and **Guofang Wei**, University of California, Santa Barbara, Wednesday afternoon and Saturday morning.

Diophantine Approximation and Analytic Number Theory in Honor of Jeffrey Vaaler, **Shabnam Akhtari**, University of Oregon, and **Lenny Fukshansky**, Claremont McKenna College, Friday afternoon and Saturday morning.

Discrete Dynamical Systems and Applications, **E. Cabral Balreira**, **Saber Elaydi**, and **Eddy Kwessi**, Trinity University, Wednesday and Thursday morning.

Discrete Neural Networking and Applications, **Murat Adivar**, Fayetteville State University, **Michael A. Radin**, Rochester Institute of Technology, and **Youssef Raffoul**, University of Dayton, Thursday afternoon and Friday morning.

Dynamical Algebraic Combinatorics, **James Propp**, University of Massachusetts, Lowell, **Tom Roby**, University of Connecticut, **Jessica Striker**, North Dakota State University, and **Nathan Williams**, University of California Santa Barbara, Friday morning and Saturday afternoon.

Dynamical Systems: Smooth, Symbolic, and Measurable (a Mathematics Research Communities Session), Kathryn Lindsey, Boston College, Scott Schmieding, Northwestern University, and Kurt Vinhage, University of Chicago, Thursday morning and afternoon.

Dynamical Systems with Applications to Mathematical Biology (Code: SS 79A), **Guihong Fan**, Columbus State University, **Jing Li**, California State University, Northridge, **Chunhua Shan**, University of Toledo, Saturday afternoon.

Emergent Phenomena in Discrete Models, **Dana Randall**, Georgia Institute of Technology, and **Andrea Richa**, Arizona State University, Friday afternoon.

Emerging Topics in Graphs and Matrices, **Sudipta Mallik**, Northern Arizona University, **Keivan Hassani Monfared**, University of Calgary, and **Bryan Shader**, University of Wyoming, Saturday morning and afternoon.

Ergodic Theory and Dynamical Systems, **Julia Barnes**, Western Carolina University, **Rachel Bayless**, Agnes Scott College, **Emily Burkhead**, Duke University, and **Lorelei Koss**, Dickinson College, Wednesday afternoon and Friday morning.

Extremal Problems in Approximations and Geometric Function Theory, **Ram Mohapatra**, University of Central Florida, Saturday afternoon.

Financial Mathematics, Actuarial Sciences, and Related Fields, **Albert Cohen**, Michigan State University, **Nguyet Nguyen**, Youngstown State University, **Oana Mocioalca**, Kent State University, and **Thomas Wakefield**, Youngstown State University, Wednesday morning and afternoon.

Fractional Difference Operators and Their Application, **Christopher S. Goodrich**, Creighton Preparatory School, and **Rajendra Dahal**, Coastal Carolina University, Saturday morning.

Free Convexity and Free Analysis, **J. William Helton**, University of California, San Diego, and **Igor Klep**, University of Auckland, Friday morning and Saturday afternoon.

Geometric Analysis, **Davi Maximo**, University of Pennsylvania, **Lu Wang**, University of Wisconsin—Madison, and **Xin Zhou**, University of California Santa Barbara, Friday and Saturday afternoons.

Geometric Analysis and Geometric Flows, **David Glickenstein**, University of Arizona, and **Brett Kotschwar**, Arizona State University, Wednesday morning and afternoon.

History of Mathematics, **Sloan Despeaux**, Western Carolina University, **Jemma Lorenat**, Pitzer College, **Clemency Montelle**, University of Canterbury, **Daniel Otero**, Xavier University, and **Adrian Rice**, Randolph-Macon College, Wednesday morning and afternoon, Thursday afternoon, and Friday morning.

Homotopy Type Theory (a Mathematics Research Communities Session), Simon Cho, University of Michigan, Liron Cohen, Cornell University, and Edward Morehouse, Wesleyan University, Thursday morning and afternoon.

If You Build It They Will Come: Presentations by Scholars in the National Alliance for Doctoral Studies in the Mathematical Sciences, **Edray Goins** and **David Goldberg**, Purdue University, and **Phil Kutzko**, University of Iowa, Friday morning and afternoon.

Interactions of Inverse Problems, Signal Processing, and Imaging, **M. Zuhair Nashed**, University of Central Florida, **Willi Freeden**, University of Kaiserslautern, and **Otmar Scherzer**, University of Vienna, Thursday and Saturday afternoons.

Markov Chains, Markov Processes and Applications, **Alan Krinik** and **Randall J. Swift**, California State Polytechnic University, Friday afternoon.

Mathematical Analysis and Nonlinear Partial Differential Equations, **Hongjie Dong**, Brown University, **Peiyong Wang**, Wayne State University, and **Jiuyi Zhu**, Louisiana State University, Wednesday and Thursday mornings.

Mathematical Fluid Mechanics: Analysis and Applications, **Zachary Bradshaw** and **Aseel Farhat**, University of Virginia, Wednesday morning and afternoon.

Mathematical Information in the Digital Age of Science, **Patrick Ion**, University of Michigan, **Olaf Teschke**, zbMath Berlin, and **Stephen Watt**, University of Waterloo, Wednesday morning, Thursday afternoon, and Friday morning.

Mathematical Methods in Genomics, **David Koslicki**, Oregon State University, Wednesday morning and afternoon.

Mathematical Modeling and Analysis of Infectious Diseases, **Kazuo Yamazaki**, University of Rochester, Wednesday and Thursday afternoon.

Mathematical Modeling of Natural Resources, **Shandelle M. Henson**, Andrews University, and **Natali Hritonenko**, Prairie View A&M University, Friday morning and afternoon.

Mathematical Modeling, Analysis and Applications in Population Biology, **Yu Jin**, University of Nebraska—Lincoln, and **Ying Zhou**, Lafayette College, Thursday afternoon and Saturday morning.

Mathematical Problems in Ocean Wave Modeling and Fluid Mechanics, **Christopher W. Curtis**, San Diego State University, and **Katie Oliveras**, Seattle University, Saturday afternoon.

Mathematical Relativity and Geometric Analysis, **James Dilts** and **Michael Holst**, University of California, San Diego, Friday morning and afternoon.

MEETINGS & CONFERENCES

Mathematics Research from the SMALL Undergraduate Research Program, **Colin Adams**, **Frank Morgan**, and **Cesar E. Silva**, Williams College, Saturday morning and afternoon.

Mathematics of Gravitational Wave Science, **Andrew Gillette** and **Nikki Holtzer**, University of Arizona, Wednesday morning and afternoon.

Mathematics of Quantum Computing and Topological Phases of Matter, **Paul Bruillard**, Pacific Northwest National Laboratory, **David Meyer**, University of California San Diego, and **Julia Plavnik**, Texas A&M University, Thursday and Saturday afternoons.

Metric Geometry and Topology (Code: SS 77A), **Christine Escher**, Oregon State University, **Catherine Searle**, Wichita State University, Thursday and Saturday afternoons.

Modeling in Differential Equations—High School, Two-Year College, Four-Year Institution, **Corban Harwood**, George Fox University, **William Skerbitz**, Wayzata High School, **Brian Winkel**, SIMIODE, and **Dina Yagodich**, Frederick Community College, Wednesday morning and afternoon.

Multi-scale Modeling with PDEs in Computational Science and Engineering: Algorithms, Simulations, Analysis, and Applications, **Salim M. Haidar**, Grand Valley State University, Thursday and Saturday mornings.

Network Science, **David Burstein**, Swarthmore College, **Franklin Kenter**, United States Naval Academy, and **Feng Shi**, University of North Carolina at Chapel Hill, Wednesday morning and Friday afternoon.

New Trends in Celestial Mechanics, **Richard Montgomery**, University of California Santa Cruz, and **Zhifu Xie**, University of Southern Mississippi, Thursday and Saturday afternoon.

Nilpotent and Solvable Geometry, **Michael Jablonski**, University of Oklahoma, **Megan Kerr**, Wellesley College, and **Tracy Payne**, Idaho State University, Wednesday morning and afternoon.

Noncommutative Algebras and Noncommutative Invariant Theory, **Ellen Kirkman**, Wake Forest University, and **James Zhang**, University of Washington, Friday morning and afternoon.

Nonlinear Evolution Equations of Quantum Physics and Their Topological Solutions, **Stephen Gustafson**, University of British Columbia, **Israel Michael Sigal**, University of Toronto, and **Avy Soffer**, Rutgers University, Friday morning and afternoon.

Novel Methods of Enhancing Success in Mathematics Classes, **Ellina Grigorieva**, Texas Womans University, and **Natali Hritonenko**, Prairie View A&M University, Thursday morning.

Open and Accessible Problems for Undergraduate Research, **Michael Dorff**, Brigham Young University, **Allison Henrich**, Seattle University, and **Nicholas Scoville**, Ursinus College, Thursday morning and afternoon.

Operators on Function Spaces in One and Several Variables, **Catherine Bénéteau**, University of South Florida, and **Matthew Fleeman** and **Constanze Liaw**, Baylor University, Wednesday morning and afternoon.

Orthogonal Polynomials and Applications, **Abey Lopez-Garcia**, University of South Alabama, and **Xiang-Sheng Wang**, University of Louisiana at Lafayette, Wednesday afternoon.

Orthogonal Polynomials, Quantum Probability, and Stochastic Analysis, **Julius N. Esunge**, University of Mary Washington, and **Aurel I. Stan**, Ohio State University, Saturday afternoon.

Quantum Link Invariants, Khovanov Homology, and Low-dimensional Manifolds, **Diana Hubbard**, University of Michigan, and **Christine Ruey Shan Lee**, University of Texas at Austin, Thursday and Saturday mornings.

Quaternions, **Terrence Blackman**, Medgar Evers College, City University of New York, and **Johannes Familton** and **Chris McCarthy**, Borough of Manhattan Community College, City University of New York, Wednesday and Thursday afternoons.

Recent Trends in Analysis of Numerical Methods of Partial Differential Equations, **Sara Pollock**, Wright State University, and **Leo Rebholz**, Clemson University, Thursday afternoon and Friday morning.

Research by Postdocs of the Alliance for Diversity in Mathematics, **Aloysius Helminck**, University of Hawaii—Manoa, and **Michael Young**, Iowa State University, Wednesday and Thursday mornings.

Research from the Rocky Mountain-Great Plains Graduate Research Workshop in Combinatorics, **Michael Ferrara**, University of Colorado Denver, **Leslie Hogben**, Iowa State University, **Paul Horn**, University of Denver, and **Tyrrell McAllister**, University of Wyoming, Friday afternoon.

Research in Mathematics by Early Career Graduate Students, **Michael Bishop**, **Marat Markin**, **Khang Tran**, and **Oscar Vega**, California State University, Fresno, Saturday afternoon.

Research in Mathematics by Undergraduates and Students in Post-Baccalaureate Programs, **Tamas Forgacs**, CSU Fresno, **Darren A. Narayan**, Rochester Institute of Technology, and **Mark David Ward**, Purdue University (AMS-MAA-SIAM), Wednesday morning, Thursday afternoon, Saturday morning and afternoon.

Set Theory, Logic and Ramsey Theory, **Andrés Caicedo**, Mathematical Reviews, and **José Mijares**, University of Colorado, Denver (AMS-ASL), Wednesday morning, Thursday morning and afternoon.

Set-theoretic Topology (Dedicated to Jack Porter in honor of 50 years of dedicated research), **Nathan Carlson**, California Lutheran University, **Jila Niknejad**, University of Kansas, and **Lynne Yengulalp**, University of Dayton, Saturday morning and afternoon.

Special Functions and Combinatorics (in honor of Dennis Stanton's 65th birthday), **Susanna Fishel**, Arizona State University, **Mourad Ismail**, University of Central Florida, and **Vic Reiner**, University of Minnesota, Wednesday, Thursday, and Saturday mornings.

Spectral Theory, Disorder and Quantum Physics, **Rajinder Mavi** and **Jeffery Schenker**, Michigan State University, Thursday and Saturday afternoon.

Stochastic Processes, Stochastic Optimization and Control, Numerics and Applications, **Hongwei Mei**, University

of Central Florida, **Zhixin Yang** and **Quan Yuan**, Ball State University, and **Guangliang Zhao**, GE Global Research, Thursday and Friday morning.

Strengthening Infrastructures to Increase Capacity Around K-20 Mathematics, **Brianna Donaldson**, American Institute of Mathematics, and **William Jaco** and **Michael Oehrtman**, Oklahoma State University, Friday afternoon.

Structure and Representations of Hopf Algebras: a session in honor of Susan Montgomery, **Siu-Hung Ng**, Louisiana State University, and **Lance Small** and **Henry Tucker**, University of California, San Diego, Wednesday morning and afternoon, and Thursday afternoon.

Theory, Practice, and Applications of Graph Clustering, **David Gleich**, Purdue University, and **Jennifer Webster** and **Stephen J. Young**, Pacific Northwest National Laboratory, Thursday and Saturday afternoons.

Topological Data Analysis, **Henry Adams**, Colorado State University, **Gunnar Carlsson**, Stanford University, and **Mikael Vejdemo-Johansson**, CUNY College of Staten Island, Wednesday afternoon, Friday and Saturday mornings.

Topological Graph Theory: Structure and Symmetry, **Jonathan L. Gross**, Columbia University, and **Thomas W. Tucker**, Colgate University, Wednesday morning and Friday afternoon.

Visualization in Mathematics: Perspectives of Mathematicians and Mathematics Educators, **Karen Allen Keene**, North Carolina State University, and **Mile Krajcevski**, University of South Florida, Friday and Saturday mornings.

Women in Symplectic and Contact Geometry and Topology, **Bahar Acu**, Northwestern University, **Ziva Myer**, Duke University, and **Yu Pan**, Massachusetts Institute of Technology (AMS-AWM), Friday morning and afternoon.

AMS Sessions for Contributed Papers

There will be sessions of ten-minute contributed talks. Although an individual may present only one contributed paper at a meeting, any combination of joint authorship may be accepted, provided no individual speaks more than once on the program. Contributed papers will be grouped together by related subject classifications into sessions.

Submission of Abstracts for AMS Sessions

Authors must submit abstracts of talks through joint mathematicsm meetings.org/meetings/abstracts/abstract.pl?type=jmm. Indicate the number of authors for the paper, click on the "New Abstract" button, and you will be taken to the submission form. Simply follow the step-by-step instructions (read them carefully) until you receive your unique abstract receipt number. No submission is complete until you are given this number. **The deadline for all submissions is September 26, 2017.** Late papers cannot be accommodated. Please email abs-coord@ams.org if you have questions. If you make an inquiry about your specific abstract, please include your abstract receipt number.

Other AMS Sessions

MAA-SIAM-AMS Hrabowski-Gates-Tapia-McBay Session, organized by **Ricardo Cortez**, Tulane University; Wednesday, 9:00–10:20 am. The Hrabowski-Gates-Tapia-McBay Session is named after four influential scientists of color: (1) Freeman Hrabowski, President of the University of Maryland at Baltimore County; (2) James S. Gates, University of Maryland, College Park; (3) Richard Tapia, Rice University; and (4) Shirley McBay, President of Quality Education for Minorities (QEM). Through multiple mechanisms, these Sessions expect to facilitate and accelerate the participation of scientists in the building of sustainable communities of mathematicians and mathematical scientists. In particular, the intention is to systematically recruit, welcome, encourage, mentor, and support individuals from underrepresented groups in the USA. This year the session will consist of a lecture at 9:00 am given by **Talithia Williams**, Harvey Mudd College, *Mathematics for the Masses*, and a short panel discussion after the talk at 9:50 am. The 2018 panel will focus on Access to Quality Mathematics by All. Panelists and attendees will discuss issues related to removing roadblocks in mathematics education (e.g., Tracking, placement, 'weed out' courses, etc) as well as hiring or award selection practices that tend to favor the majority groups that have influence. Panelists will also address the question: What are the roles and responsibilities do mathematicians and mathematics educators have in creating a just and accessible system? Panelists will include **Ron Buckmire**, NSF; **James Alvarez**, University of Texas at Arlington; and **Talithia Williams**, Harvey Mudd College. This event is sponsored by the MAA Committee on Minority Participation in Mathematics, SIAM and the AMS.

AMS Committee on Meetings and Conferences: Collaborative Research Communities in Mathematics, Wednesday, 2:00–3:30 pm. The aim of this panel is to discuss various models of collaborative research communities in mathematics. An example of such a community is the Mathematical Research Communities (MRC) Program. his program has been run by the American Mathematical Society since 2008, with the intention of bringing together peridocctoral stage mathematicians (near Ph. D. degree) to work in a collaborative environment and helping nurture research, professional relationships and career paths. Amongst topics the panel will discuss are: best practices from successful research collaboration programs; raising awareness of the MRC program within the mathematical community and practical advice for writing successful MRC proposals.

AMS Committee on the Profession Panel Discussion: Paths to Collaboration with Scientists, Wednesday, 4:30–6:00 pm

AMS Education and Diversity Department Panel: Strategies for Diversifying Graduate Mathematics Programs, organized by **Helen G. Grundman**, American Mathematical Society; Wednesday, 6:00–7:30 pm. Graduate programs wanting to diversify may find that there are very few students from underrepresented groups who satisfy

their admissions criteria. This panel will discuss ways in which admissions criteria may be leading us away from strong students with non-standard records, ways to find and recruit these students, and methods for increasing the success rate of these “undervalued” applicants, both through helping the students adapt to the programs and through helping the programs adapt to the students. Moderator for this panel will be **Helen G. Grundman**, American Mathematical Society. Panelists are **Edray Goins**, Purdue University, **Richard Laugesen**, University of Illinois, **Richard McGehee**, University of Minnesota, and **Katrin Wehrheim**, University of California, Berkeley.

AMS Informational Session: Report on the findings of the 2015 CBMS survey of undergraduate mathematical and statistical sciences in the US, organized by **Jim Maxwell**, American Mathematical Society; Thursday, 11:00 am–12:00 pm. Presenter for this session will be **Ellen Kirkman**, Wake Forest University.

AMS Committee on Education Panel Discussion: Preparing mathematics students for non-academic careers, organized by **Erica Flapan**, Pomona College; **Manmohan Kaur**, Benedictine University; **Douglas Mupasiri**, University of Northern Iowa and **Diana White**, University of Colorado—Denver; Thursday, 1:00–2:30 pm.

AMS-MAA Joint Committee on TAs and Part-Time Instructors Panel: Teaching-Focused Faculty at Research Institutions, organized by **Angela Kubena**, University of Michigan; **Jean Marie Linhart**, Central Washington University; **Tom Roby**, University of Connecticut; and **Michael Weingart**, Rutgers University; Thursday, 2:30–3:55 pm. It is increasingly common that a portion of the teaching at research universities is done by full-time teaching-focused faculty (TFF). These faculty are not asked to do research but instead are asked to take on an expanded role in helping the department carry out its teaching. This session will discuss issues around this development, from how such faculty may be supported to issues of evaluating faculty whose primary role is teaching and integrating them into a department culture that is focussed on research. Moderator for this panel will be **Tom Roby**, University of Connecticut. Panelists are **Amy Cohen**, Rutgers University, **John Eggers**, University of California San Diego, **Ellen Golstein**, Boston College, **Robin Gottlieb**, Harvard University, and **Amit Savkar**, University of Connecticut. This panel is sponsored by the AMS-MAA Joint Committee on TAs and Part-Time Instructors.

AMS Forum, sponsored by the US National Committee for Mathematics: ICM 2018 in Rio de Janeiro—The First International Congress of Mathematicians in the Southern Hemisphere, organized and presented by **Marcelo Viana**, Instituto Nacional de Matemática Pura e Aplicada will present; Thursday, 7:30–8:30 pm.

Grad School Fair, Friday, 8:30–10:30 am. Here is the opportunity for undergrads to meet representatives from mathematical sciences graduate programs from universities all over the country. January is a great time for juniors to learn more, and college seniors may still be able to refine their search. This is your chance for one-stop

shopping in the graduate school market. At last year’s meeting over 300 students met with representatives from 60 graduate programs. If your school has a graduate program and you are interested in participating, for US\$125 a table will be provided for your posters and printed materials (**registration for this event must be made by a person already registered for the JMM**), and you are welcome to personally speak to interested students. Complimentary coffee will be served. Co-sponsored by the AMS and MAA.

AMS Panel: Historical Chief Editors of the Notices, organized by **Frank Morgan**, American Mathematical Society; Friday, 9:00–10:30 am. A panel of the current and past chief editors of the AMS Notices—**Hugo Rossi**, **Harold Boas**, **Andy Magid**, and **Frank Morgan**—offer brief remarks and take questions.

AMS-MAA Joint Committee on TAs and Part-Time Instructors Panel: Panel on The Experiences of Foreign Graduate Students as GTAs, organized by **John Boller**, University of Chicago, **Solomon Friedberg**, Boston College, **Edward Richmond**, Oklahoma State University; Friday, 1:00–2:30 pm. Foreign graduate students make up a significant fraction of all math graduate students. When they serve as GTAs, these students must not only learn how to take on the role of teacher, but must do so in a system and culture that are unfamiliar to them. The goal of this session is to highlight the unique challenges that foreign graduate students encounter as GTAs so that the math community can better help them succeed. The panelists will draw from their own previous experiences as students living in the US for the first time as graduate students, and will offer their perspectives on what is most helpful in supporting similar students as they take on teaching responsibilities in the US. The moderator for this panel will be **Solomon Friedberg**, Boston College. Panelists will be composed of current graduate students and recent PhDs who lived in North America for the first time as graduate students. This panel is sponsored by the AMS-MAA Joint Committee on TAs and Part-Time Instructors.

Current Events Bulletin, organized by **David Eisenbud**, Mathematical Sciences Research Institute; Friday, 1:00 pm–5:00 pm. Speakers in this session follow the model of the Bourbaki Seminars in that mathematicians with strong expository skills speak on work not their own. Written versions of the talks will be distributed at the meeting and will also be available online at www.ams.org/ams/current-events-bulletin.html after the conclusion of the meeting.

AMS Committee on Science Policy Panel Discussion: Funding at Federal Agencies & Advocacy for Grassroots Support, organized by **Scott Wolpert**, University of Maryland; Friday, 2:30–4:00 pm. Panelists are **Charlie Toll**, National Security Agency and **Michael Vogelius**, Rutgers University.

Congressional Fellowship Session, organized by **Karen Saxe**, American Mathematical Society; Friday, 4:30–6:30 pm. This fellowship provides a public policy learning experience, demonstrates the value of science-government interaction and brings a technical background and external

perspective to the decision-making process in Congress. Learn more about this program and speak with current and former AMS Fellows. **Margaret Callahan**, AMS Congressional Fellow 2017–2018, will speak at this session. Application deadline for the 2018–2019 AMS Congressional Fellowship is **February 15, 2018**.

Who Wants to Be a Mathematician Championship, organized by **Michael A. Breen**, American Mathematical Society, and **William T. Butterworth**, DePaul University; Saturday, 1:00 pm–2:45 pm. Show your support for top high school students from the US, Canada, and the UK in the first international *Who Wants to Be a Mathematician* as they compete for a US\$5,000 first prize for themselves and US\$5,000 for their school's math department. Semifinals are at 1:00 pm and finals are at 2:00 pm. Come match wits with the contestants and support their mathematical achievement.

Other AMS Events

Council, Tuesday, 1:30 pm.

Business Meeting, Saturday, 11:45 am. The secretary notes the following resolution of the Council: Each person who attends a business meeting of the Society shall be willing and able to identify himself as a member of the Society. In further explanation, it is noted that each person who is to vote at a meeting is thereby identifying himself as and claiming to be a member of the American Mathematical Society. The Society has a Committee on the Agenda for Business Meetings. The purpose is to make business meetings orderly and effective. The committee does not have legal or administrative power. It is intended that the committee consider what may be called “quasipolitical” motions. The committee has several possible courses of action on a proposed motion, including but not restricted to:

- (a) doing nothing,
- (b) conferring with supporters and opponents to arrive at a mutually accepted amended version to be circulated in advance of the meeting,
- (c) recommending and planning a format for debate to suggest to a business meeting,
- (d) recommending referral to a committee, and
- (e) recommending debate followed by referral to a committee.

There is no mechanism that requires automatic submission of a motion to the committee. However, if a motion has not been submitted through the committee, it may be thought reasonable by a business meeting to refer it rather than to act on it without benefit of the advice of the committee.

In order that a motion for this business meeting receive the service offered by the committee in the most effective manner, it should be in the hands of the AMS Secretary by **December 13, 2017**.

AMS Short Course on Discrete Differential Geometry

This two-day course will take place on Monday and Tuesday before the meeting actually begins. It is organized by **Keenan Crane**, **Carnegie Mellon University**.

The emerging field of discrete differential geometry (DDG) studies discrete analogs of smooth geometric objects, providing an essential link between analytical descriptions and computation. In recent years it has unearthed a rich variety of new perspectives on applied problems in computational anatomy/biology, computational mechanics, industrial design, computational architecture, and digital geometry processing at large. The basic idea behind discrete differential geometry (DDG) is that a discrete object like a polyhedron is not merely an approximation of a smooth one, but rather a differential-geometric object in its own right. In contrast to traditional discretization which focuses on eliminating approximation error only in the limit of refinement (e.g., by taking smaller and smaller finite differences), DDG places an emphasis on so-called “mimetic” discretization where key properties of a system are guaranteed to be exactly preserved, no matter how fine or coarse the discretization. For instance, just as algorithms for simulating mechanical systems might seek to exactly preserve energy or momentum, structure-preserving discretizations of geometry might seek to exactly preserve quantities like total curvature. More broadly, DDG focuses on the discretization of differential geometric objects that do not naturally fall under the umbrella of traditional numerical analysis. This course provides an overview of recent themes in DDG, including both mathematical developments and examples of how DDG is applied in practice.

Lecture topics will include *Discrete Laplace Operators*, by **Max Wardetzky**, University of Göttingen; *Discrete Parametric Surfaces* by **Johannes Wallner**, Technische Universität Graz; *Discrete Mappings* by **Yaron Lipman**, Weizmann Institute; *Discrete Conformal Geometry* by **Keenan Crane**, Carnegie Mellon University; and *Optimal Transportation on Discrete Domains* by **Justin Solomon**, Massachusetts Institute of Technology.

There are separate registration fees to participate in this course. Advanced registration fees for members, US\$114; non-member, US\$175; student, unemployed, or emeritus, US\$62. If you choose to register on-site, the fees for members are US\$148; nonmembers US\$205, and students/unemployed or emeritus members US\$83. On-site registration will take place on Monday, January 8, 2017, at the San Diego Convention Center. Please see the complete Short Course article on page 1016 of this issue or go to www.ams.org/meetings/short-courses/short-course-general.

NSF-EHR Grant Proposal Writing Workshop

Developing a Competitive Proposal for NSF-EHR, lead by **Ron Buckmire**, National Science Foundation and **Lee Zia**, National Science Foundation; Monday, January 8 (two days before the first day of the JMM), 3:00 pm–

6:00 pm. Workshop goals are to familiarize participants with current direction/priorities in EHR; familiarize participants with key EHR education research and development programs; consider common issues of competitive proposals; and prepare participants to write a competitive proposal. There is no registration fee for this workshop, but attendees must register separately in advance. Please contact the AMS Washington Office at 401-455-4116 or amsdc@ams.org for further information.

Department Chairs Workshop

This annual one-day workshop for department chairs and leaders is held on Tuesday, 8:00 am–6:30 pm, the day before the JMM actually begins, and is led by **Malcolm Adams**, University of Georgia, **Krista Maxson**, University of Science & Arts of Oklahoma, **Irina Mitrea**, Temple University and **Douglas Mupasiri**, University of Northern Iowa.

What makes a chair different than any other engaged faculty member in the department? This workshop will examine the chair's role in leading a department. The day will be structured to include and encourage networking and sharing of ideas amongst participants. There will be four sessions within this workshop. Session 1, led by **Krista Maxson**, will discuss the view from the top: what responsibilities, duties and expectations do Deans, Provosts and other chief academic officers have for their chairs? Session 2, led by **Malcolm Adams**, will discuss improving students' experience. Possible topics include curriculum and research opportunities, student recruitment and diversity, program assessment, career counseling, and also personnel issues such as faculty development and incentives, and the increasing numbers of non-tenure track faculty. Session 3, led by **Irina Mitrea**, will discuss outreach and communication: building effective internal partnerships. Possible topics include collaborations with other departments, working with university offices such as Honors programs, government relations offices, career and internship offices, development office, and the dean and upper administration. Session 4, led by **Doug Mupasiri**, will discuss outreach and communication: building effective external partnerships. Possible topics include collaborations with local businesses, local school systems, and other regional or national efforts.

There is a separate registration and fee to participate. For further information, please contact the AMS Washington Office at 401-455-4116 or amsdc@ams.org

101st Meeting of the MAA

MAA Invited Addresses

László Babai, University of Chicago, *Groups, graphs, algorithms: The Graph Isomorphism problem*, Wednesday, 3:20 pm.

William Cook, University of Waterloo, *Information, computation, optimization: connecting the dots in the traveling salesman problem*, Thursday, 9:00 am.

Alissa Crans, Loyola Marymount University, *Quintessential quandle queries*; Wednesday, 2:15 pm.

Maria Klawe, Harvey Mudd College, *Transforming learning: building confidence and community to engage students with rigor*; Saturday, 10:05 am.

James Tanton, MAA Mathematician at Large, *HOW MANY DEGREES ARE IN A MARTIAN CIRCLE? And other human—and nonhuman—questions one should ask about everyday mathematics*; Friday, 1:00 pm (Lecture for Students).

Tadashi Tokieda, University of Cambridge, *Toy models*; Friday, 9:00 am.

Presentations by MAA Teaching Award Recipients

Friday, 2:30–3:50 pm, organized by MAA Secretary **Barbara Faires**, Westminster College, and MAA President **Deanna Hausperger**, Carleton College. Winners of the Deborah and Franklin Tepper Haimo Awards for Distinguished College or University Teaching will give presentations on the secrets of their success. Speakers for this session will be **Hortensia Soto**, University of Northern Colorado and **Ronald Taylor**, Berry College.

MAA Invited Paper Sessions

Trends in Mathematical and Computational Biology, organized by **Raina Robeva**, Sweet Briar College, **Timothy Comar**, Benedictine University and **Carrie Eaton**, Unity College; Wednesday, 8:00–10:50 am. Mathematical and computational biology encompasses a diverse range of biological phenomena and quantitative methods for exploring those phenomena. The pace of research at this junction continues to accelerate and substantial advancements in problems from gene regulation, genomics, RNA folding, evolution, infectious disease dynamics, neuroscience, growth and control of populations, ecological networks, drug resistance modeling, and medical breakthroughs have increasingly ensued from utilizing mathematical and computational approaches. The session samples from this diversity of important questions from biology and medicine and their mathematical treatments. Speakers will present novel research at a level appropriate for general mathematics audience. This session is sponsored by SIGMAA on Mathematical and Computational Biology (BIO SIGMAA).

Teaching for Equity and Broader Participation in the Mathematical Sciences, organized by **Darryl Yong**, Talithia Williams, **Rachel Levy**, and **Lisette de Pillis**, Harvey Mudd College; Wednesday, 2:15–5:35 pm. Inquiry based learning, cooperative problem-solving activities, and other forms of active teaching strategies have been demonstrated to produce more equitable student learning outcomes. This is one of the reasons that the Conference Board of the Mathematical Sciences has called on higher-education institutions, mathematics departments, and mathematics faculty to ensure that effective active learning is incorporated into post-secondary mathematics classrooms. In this interactive session, mathematics

education researchers will share current thinking on teaching practices to pursue, and which pitfalls to avoid, to best promote equity and broader participation in the mathematical sciences.

MAA Instructional Practices Guide, organized by **Doug Ensley**, MAA, **Martha Abell**, Georgia Southern University, and **Lew Ludwig**, Denison University; Thursday, 8:00–10:50 am. For several years, members of the mathematics and mathematics education communities have been developing the MAA Instructional Practices Guide (IP Guide), which serves as a companion guide to the MAA CUPM Curriculum Guide. In this session, specific sections of the IP Guide and its implementation will be presented by members of the development team from the three main areas of the IP Guide, Classroom Practices, Design Practices, and Assessment Practices. This session will help in the dissemination efforts so that the mathematics and mathematics education communities can become more familiar with the IP Guide and make use of the effective and evidence-based instructional practices included.

Quandle Questions, organized by **Alissa Crans**, Loyola Marymount University, and **Sam Nelson**, Claremont McKenna College; Thursday, 1:00–4:20 pm. Recent exciting advances have been made in the study of knot invariants, a field with strong connections to physics, biochemistry, and other areas. In particular, much work has been done in quandle theory, an analogue of group theory in which axioms capture the essential properties of group conjugation and algebraically encode the Reidemeister moves from classical knot theory. New developments in this area has enabled us to relate knot theory to other branches of mathematics including number theory, Lie theory, and statistical physics, employ tools beyond the traditional ones from algebraic topology, and develop a rich algebraic theory through an investigation of the self-distributive properties of the quandle operation. This MAA Invited Paper Session accompanies **Alissa Crans'** invited address on the same topic.

Research in Improving Undergraduate Mathematical Sciences Education: Examples Supported by the National Science Foundation's IUSE: EHR Program, organized by **Ron Buckmire**, **Sandra Richardson**, and **Lee Zia**, National Science Foundation, Directorate for Education and Human Resources, Division of Undergraduate Education (DUE); Friday, 8:00–10:50 am. This session will highlight research from ongoing IUSE-funded projects, with a focus on the study of the teaching and learning of undergraduate mathematical sciences. Session topics will include research findings from one or more of the following themes related to undergraduate mathematical sciences education: (1) Systemic structures to support effective teaching and broadening participation; (2) Curricular and pedagogical innovations to strengthen student experiences in mathematical sciences learning; and (3) Effective use of digital tools and other sources as teaching and learning resources. Because some projects are in early stages of project development and analysis, research findings may be preliminary.

Polyhedra, Commemorating Magnus J. Wenninger, organized by **Vincent Matsko**, University of San Francisco; Friday, 1:00–3:50 pm. In February 2017, one of the world's most respected polyhedron model builders, Magnus J. Wenninger, passed away. His work was instrumental in inspiring many mathematicians, artists, and geometers to build polyhedron models as well as conduct research into classical polyhedra. This session commemorates Magnus's expertise as a model builder, his remarkable ability to connect those interested in polyhedra, and his warm, generous nature.

As a result of Coxeter's work, an interest in looking at classical ideas—for example, stellations of polyhedra and uniform polytopes in four dimensions—from a more advanced mathematical standpoint has surged. With the advent of increasingly sophisticated computer software, an interest in using mathematical tools to create virtual polyhedra has grown enormously. Talks in this session will reflect this revitalization of an interest in classical geometry.

Research in Undergraduate Mathematics Education: Highlights from the Annual SIGMAA on RUME Conference, organized by **Megan Wawro**, Virginia Polytechnic Institute, **Stacy Brown**, California State Polytechnic University, Pomona, and **Aaron Weinberg**, Ithaca College; Friday, January 6, 8:00–10:50 am. The 2018 MAA Invited Paper Session on Research in Undergraduate Mathematics Education will showcase 5 exemplary research papers that were presented at the 20th Annual SIGMAA on RUME Conference, which took place in San Diego, CA in February 2017. The invited papers were chosen to represent a diverse range of high quality research in this area.

Differential Equations and Their Applications to Neuroscience, organized by **Pengcheng Xiao**, University of Evansville, and **Lixia Duan**, North China University of Technology; Saturday, 1:00–4:15 pm. Neuronal systems are featured by nonlinear and complex patterns in spatial and temporal dimensions. These phenomena carry significant biological information and regulate down-stream biological mechanisms. Understanding the mechanisms underlying such events by quantitative modeling represents a mathematical challenge of current interest. Yet all these systems share the similar dynamical system issues in ordinary/partial differential equation such as bifurcation, stability, oscillations, stochastic noise as well as issues in determining model parameters from experimental data sets and computational errors of the models. This IPS offers a forum to exchange the state of the art theoretical advances related to this promising area as well as computational tools.

Accessible Problems in Modern Number Theory, organized by **Jeremy Rouse**, Wake Forest University, and **Kate Thompson**, De Paul University; Saturday, 9:00–11:50 pm. Number theory is a subject with many simple-to-state and open problems, while also playing host to a number of striking developments in the past few years. The goal of this session is to put a focus on mathematics that is accessible to undergraduate students with a reasonable

background, but which also is closely connected to current number theory research.

MAA Minicourses

MAA Minicourses are open only to persons who register for the Joint Meetings and pay the Joint Meetings registration fee in addition to the appropriate minicourse fee. The MAA reserves the right to cancel any minicourse that is undersubscribed. Participants should read the descriptions of each minicourse thoroughly as some require participants to bring their own laptops and special software; laptops will not be provided in any minicourse. The enrollment in each minicourse is limited to 50; the cost is US\$100.

Minicourse #1. *Introduction to Process Oriented Guided Inquiry Learning (POGIL) in Mathematics Courses*, presented by **Catherine Beneteau**, University of South Florida, **Jill E. Guerra**, University of Arkansas Fort Smith and **Laurie Lenz**, Marymount University; Part A, Wednesday, 9:00–11:00 am, and Part B, Friday, 9:00–11:00 am. This workshop-style minicourse will introduce faculty to the guided inquiry instructional method called POGIL (Process Oriented Guided Inquiry Learning). Participants will use hands-on activities to learn the crucial elements in a successful POGIL classroom. In particular, the workshop will provide participants with an introduction to facilitation techniques and an opportunity to reflect on how facilitation can enhance or interfere with student learning, as well as how facilitation strategies can be critical in the development of student process skills. The participants will have the opportunity to examine a POGIL Calculus I activity and be introduced to the way the learning structure that is integrated into all POGIL activities is implemented in a mathematics specific activity. By the end of the course, participants will be familiar with the basics of the particular approach to guided inquiry that POGIL takes, and will be trained to begin implementing guided inquiry activities in their own mathematics classrooms.

Minicourse #2. *Teaching Introductory Statistics Using the Guidelines from the American Statistical Association*, presented by **Carolyn K. Cuff**, Westminster College; Part A, Wednesday, 9:00–11:00 am, and Part B, Friday, 9:00–11:00 am. This minicourse, intended for instructors new to teaching statistics, exposes participants to the big ideas of statistics and the Guidelines for Assessment and Instruction in Statistics Education recommendations. It considers ways to engage students in statistical thinking, and emphasizes the contrast between conceptual and procedural understanding in the first statistics course. Participants will engage in many of the classic activities that all statistics instructors should know. A set of approximately 6–8 hands-on classroom-ready activities will be given to participants. The activities have been chosen so that they require minimal adaptation for a wide variety of classrooms, use freely available applets and other software and are easy to implement. Each activity includes goals, key ideas, prerequisite skills and concepts, connection to other statistical concepts, objectives, known student

difficulties and assessment questions. Internet sources of real data, activities, and best practices articles will be examined. Participants will find out how they can continue to learn about the best practices for the first course in Statistics by becoming involved in statistics education related conferences, newsletters, and groups. This course is sponsored by the SIGMAA on Statistics Education (SIGMAA STAT ED).

Minicourse #3. *Flipping your Mathematics Course using Open Educational Resources*, presented by **Sarah Eichhorn**, University of California, Irvine, **David Farmer**, American Institute of Mathematics, **Jim Fowler**, The Ohio State University and **Petra Taylor**, Dartmouth University; Part A, Wednesday, 2:15–4:15 pm, and Part B, Friday, 1:00–3:00 pm. The flipped classroom is an instructional strategy in which instructional content is delivered outside of class (often online) and classroom time is utilized for activities traditionally done as homework. Open educational resources (OERs) are openly licensed, online course materials that can be freely used by instructors and students. Participants in this minicourse will learn to design a flipped mathematics course using OERs. The minicourse will be run in a flipped instructional style, allowing participants to experience learning in this format and see a variety of implementation techniques.

Upon completion of this minicourse, participants will be able to apply best practices in flipped classroom design, identify appropriate OER materials for their mathematics courses, design assessments to check for knowledge of pre-class content, facilitate an active, problem-solving based classroom session, and utilize OER materials from the Curated Courses project and provide meaningful feedback for the continuous improvement of these community resources.

Minicourse #4. *How to Run Successful Math Circles for Students and Teachers*, presented by **Jane Long**, Stephen F. Austin State University, **Brianna Donaldson**, American Institute of Mathematics, **Gabriella Pinter**, University of Wisconsin—Milwaukee and **Diana White**, University of Colorado Denver and National Association of Math Circles; Part A, Wednesday, 2:15–4:15 pm, and Part B, Friday, 1:00–3:00 pm. Math Circles are a unique form of outreach through which mathematics professionals share their passion for mathematics with K–12 students and teachers. During a Math Circle, participants explore, create and communicate substantive mathematics, increase their problem-solving skills, and perhaps most importantly, develop a deeper enjoyment of the subject. Including all types of Math Circles, there are currently over 250 Math Circles across the United States. In this minicourse, participants will experience Math Circle activities and discuss related topics including effective facilitation of sessions, recruiting, logistics, and successful Math Circle models. Participants should be well on their way to starting their own Math Circle after this course. This course is sponsored by the SIGMAA on Math Circles for Students and Teachers (SIGMAA MCST).

Minicourse #5. *Reach the World: Writing Math Op-Eds for a Post-Truth Culture*, presented by **Kira Hamman**, Pennsylvania State University, Mont Alto and **Francis Su**, Harvey Mudd College; Part A, Wednesday, 2:15–4:15 pm, and Part B, Friday, 1:00–3:00 pm. The degeneration of public discourse and the proliferation of fake news is cause for great concern among people who value facts, evidence, and civility. As mathematicians, we are in a unique position to combat this troubling trend with quantitative information, but to be effective we need to be able to reach a general audience. One way to do that is by writing opinion for popular print and online media. Learn to choose compelling topics and angles, distill relevant quantitative information, write at an appropriate level, and get your work into the hands of people who will publish it. Participants will also draft an opinion piece during this minicourse.

Minicourse #6. *Directing Undergraduate Research*, presented by **Aparna Higgins**, University of Dayton; Part A, Thursday, 9:00–11:00 am, and Part B, Saturday, 9:00–11:00 am. This minicourse is designed for faculty who are new to directing undergraduate research. It will cover many aspects of facilitating research by undergraduates, such as getting students involved in research, finding appropriate problems, deciding how much help to provide, and presenting and publishing the results. Similarities and differences between research conducted during summer programs and research that can be conducted during the academic year will be discussed. Although the examples used will be primarily in the area of discrete mathematics, the strategies discussed can be applied to any area of mathematics.

Minicourse #7. *Starter Kit for Teaching Modeling—First Differential Equations Course*, presented by **Brian Winkel**, SIMIODE, Cornwall, NY, **Rosemary Farley**, Manhattan College, **Therese Shelton**, Southwestern University, **Patrice Tiffany**, Manhattan College and **Holly Zullo**, Westminster College; Part A, Thursday, 9:00–11:00 am, and Part B, Saturday, 9:00–11:00 am. We offer this minicourse in support of colleagues who wish to start using rich modeling resources to teach differential equations. Our method uses actual experience with classroom materials and discussions on how to initiate such practices in participants' courses. We put participants in the role of students early in a differential equations course in which modeling is the driving force. We offer tested and successful modeling scenarios which engage students and bring forth differential equation notions and concepts through modeling.

Minicourse #8. *Teaching Statistics using R and RStudio*, presented by **Randall Pruim**, Calvin College; Part A, Thursday, 9:00–11:00 am, and Part B, Saturday, 9:00–11:00 am. R is a freely available language and environment for statistical computing and graphics that has become popular in academia and in many industries. But can it be used with students? This minicourse will introduce participants to teaching applied statistics courses using computing in an integrated way. The presenter has been using R to teach statistics to undergraduates at all levels for the last decade

and will share an approach and some favorite examples. Topics will include workflow in the RStudio environment, providing novices with a powerful but manageable set of tools, data visualization, basic statistical inference using R, and resampling. Much of this will be facilitated using the mosaic package. The minicourse is designed to be accessible to those with little or no experience teaching with R, and will provide participants with skills, examples, and resources that they can use in their own teaching. Participants should bring a laptop to the session. Each participant will be given access to an RStudio server account, so it is not necessary to have R or RStudio installed on the laptop. A web browser and internet capability should suffice. This course is sponsored by the SIGMAA on Statistics Education (SIGMAA STAT ED).

Minicourse #9. *Teaching Undergraduate Mathematics via Primary Source Projects*, presented by **Diana White**, University of Colorado Denver, **Janet Barnett**, Colorado State University–Pueblo, **Kathy Clark**, Florida State University, **Dominic Klyve**, Central Washington University, **Jerry Lodder**, New Mexico State University and **Danny Otero**, Xavier University Part A, Thursday, 1:00–3:00 pm and Part B, Saturday, 1:00–3:00 pm. Mathematics faculty and educational researchers are increasingly recognizing the value of the history of mathematics as a support to student learning. Despite these benefits, there are significant challenges to incorporating primary sources directly into the classroom. This mini-course will introduce participants to an approach which brings history into the mathematics classroom via guided reading projects based on original sources. Participants will have the opportunity to experience this teaching avenue by placing themselves in the role of student as they work together in groups through two specific projects. Following this opportunity to grapple with original sources within a guided reading format, participants will discuss how to implement these Primary Source Projects (PSPs) projects in the undergraduate mathematics classroom. An overview of the general pedagogical benefits of this particular approach to using original sources with students will also be provided. Finally, participants will learn about a seven-institution, ongoing collaborative NSF-funded effort that is designing, testing, and researching the impact of over 50 newly developed PSPs, including opportunities for instructors to receive ongoing implementation support by becoming a site-tester. This course is sponsored by the SIGMAA on the History of Mathematics (HOM SIGMAA).

Minicourse #10. *Incorporating Mathematical and Statistical Forensics Activities into the Undergraduate Mathematics Classroom*, presented by **Eugene Fiorini**, **James Russell**, and **Gail Marsella**, Muhlenberg College; Part A, Thursday, 1:00–3:00 pm, and Part B, Saturday, 1:00–3:00 pm. Participants will learn about incorporating mathematical and statistical forensic activities into their classrooms, discuss how to coordinate with other STEM departments, and will conduct some activities themselves. The workshop will have three sections: (1) a short over-

view of curricular goals, what is forensic science, how to coordinate with other STEM fields, and how forensic activities can enhance student learning; (2) activities and discussions in small groups on specific projects including blood spatter analysis, print analysis, estimating time of death, cyber and environmental forensics, among others; and (3) a conclusion including a discussion on a final exam staged crime scene.

Minicourse #11. *Authoring Integrated Online Textbooks with MathBook XML*, presented by **Karl-Dieter Crisman**, Gordon College and **Mitchel T. Keller**, Washington and Lee University; Part A, Thursday, 1:00–3:00 pm, and Part B, Saturday, 1:00–3:00 pm. In this minicourse participants will learn how to effectively author online textbooks with the AIM-sponsored MathBook XML (MBX, mathbook.pugetsound.edu/), as well as to begin creating their materials such as lab manuals or formal course notes with this tool. The idea is to harness the power of embedded online interaction, including WeBWork problems, Sage computational cells, and extensive hyperlinking to have online (and print) texts in subjects from Calculus to Abstract Algebra. After learning the basics, participants will try their hands at creating a small supplement to one of their own classes using MBX, experiencing the “write once, read anywhere” philosophy that creates output in print, pdf, web pages, and computational notebooks. In both cases, the presenters’ own texts (one in discrete math, one in number theory) will be used as case studies of how to create a project like this or to convert an existing LaTeX or html project. No previous experience with any of these tools is necessary; you should be ready to try a few necessary command line tools. You will need to bring a wireless-enabled laptop, and will receive instructions regarding software in pre-workshop correspondence.

MAA Contributed Papers

The MAA Committee on Contributed Paper Sessions solicits papers pertinent to the sessions listed below. Contributed Paper Session presentations are limited to fifteen minutes, except in the general session where they are limited to ten minutes. Each session room is equipped with a computer projector and a screen. Please note that the days and times scheduled for these sessions remain tentative. Several of these sessions have specific suggestions for the appropriateness of submissions. Potential submitters are advised to read the full descriptions of these sessions at jointmathematicsm meetings.org/meetings/national/jmm2018/JMM2018_MAA_Call_for_Papers.pdf.

The deadline for submission of abstracts is Tuesday, September 26, 2017

MAA Contributed Paper Sessions with Themes

The Advancement of Open Educational Resources, organized by **Benjamin Atchison**, Framingham State University; Friday morning. Sponsored by the MAA Committee on Technologies in Mathematics Education (CTIME) and the SIGMAA on Mathematics Instruction Using the WEB (WEB SIGMAA).

Arts and Mathematics: The Interface, organized by **Douglas Norton**, Villanova University; Wednesday morning and afternoon. Sponsored by the SIGMAA on Mathematics and the Arts (SIGMAA ARTS).

Attracting, Involving, and Retaining Women and Underrepresented Groups in Mathematics—Righting the Balance, organized by **Meghan De Witt**, St Thomas Aquinas College, **Semra Kiliç-Bahi**, Colby-Sawyer College and **Francesca Bernardi**, University of North Carolina at Chapel Hill; Saturday morning. Sponsored by the MAA Committee on the Participation of Women.

Discrete Mathematics in the Undergraduate Curriculum—Ideas and Innovations in Teaching, organized by **Elise Lockwood**, Oregon State University, **John Caughman**, Portland State University and **Art Duval**, University of Texas El Paso; Wednesday afternoon.

Environmental Modeling in the Classroom, organized by **Ellen Swanson**, Centre College and **Emek Kose**, St Mary’s College of Maryland; Thursday morning. Sponsored by the SIGMAA for Environmental Mathematics (SIGMAA EM).

Flipped Classes: Implementation and Evaluation, organized by **Joel Kilty**, **Alex M. McAllister**, and **John H. Wilson**, Centre College; Wednesday afternoon.

Good Math from Bad: Crackpots, Cranks, and Progress, organized by **Samuel R. Kaplan**, University of North Carolina Asheville and **Elizabeth T. Brown**, James Madison University; Friday afternoon.

Humanistic Mathematics, organized by **Eric Marland**, Appalachian State University and **Gizem Karaali**, Pomona College; Thursday morning. Sponsored by MAA subcommittee on Curriculum Renewal Across the First Two Years (CRAFTY) and the Journal of Humanistic Mathematics.

Implementing Recommendations from the Curriculum Foundations Project, organized by **Susan Ganter**, Embry-Riddle Aeronautical University, **Mary Beisiegel**, Oregon State University, **Janet Bowers**, San Diego State University, **Tao Chen**, City University of New York - LaGuardia Community College and **Caroline Maher-Boulis**, Lee University; Wednesday afternoon. Sponsored by the MAA Committee for Curriculum Renewal Across the First Two Years (CRAFTY).

Innovative and Effective Online Teaching Techniques, organized by **Sharon Mosgrove** and **Doug Scheib**, Western Governors University; Friday afternoon.

Innovative and Effective Ways to Teach Linear Algebra, organized by **David Strong**, Pepperdine University; **Gil Strang**, Massachusetts Institute of Technology, **Megan Wawro**, Virginia Polytechnic Institute and **Sepideh Stewart**, University of Oklahoma; Thursday morning.

Innovative Curricular Strategies for Increasing Mathematics Majors, organized by **Eric S. Marland**, Appalachian State University, **Stuart Boersma**, Central Washington University and **Victor Piercey**, Ferris State University; Wednesday morning. Sponsored by MAA subcommittee on Curriculum Renewal Across the First Two Years (CRAFTY).

Innovative Mathematical Outreach in Alternative Settings, organized by **Jennifer Switkes**, California State

Polytechnic University, Pomona, and **Hector Rosario**, University of North Carolina, Chapel Hill; Thursday afternoon.

Innovative Teaching Practices in Number Theory, organized by **Thomas Hagedorn**, The College of New Jersey, **Patrick Gault**, University of Arizona and **Mark Kozek**, Whittier College; Thursday afternoon.

Integrating Research into the Undergraduate Classroom, organized by **Shannon R. Lockard**, Bridgewater State University and **Timothy B. Flowers**, Indiana University of Pennsylvania; Wednesday afternoon.

Inquiry-Based Teaching and Learning, organized by **Brian P. Katz**, Augustana College, **Eric Kahn**, Bloomsburg University and **Victor Piercey**, Ferris State University; Friday morning and afternoon. Sponsored by the SIGMAA on Inquiry-Based Learning (IBL SIGMAA).

Lightning Talks and E-Posters: Me and My Gadgets, Teaching with Technology, organized by **Karl Schmitt**, Valparaiso University, **John Travis**, Mississippi College, **Michael B. Scott**, California State University and **Tom Hagedorn**, The College of New Jersey; Saturday morning. Sponsored by the Committee on Technology in Mathematics Education (CTIME) and the SIGMAA on Mathematics Instruction Using the WEB (WEB SIGMAA).

Math Circle Topics with Visual or Kinesthetic Components, organized by **Amanda Katharine Serenevy**, Riverbend Community; Thursday afternoon. Sponsored by the SIGMAA on Math Circles for Students and Teachers (SIGMAA MCST).

Mathematical Experiences and Projects in Business, Industry, and Government (BIG), organized by **Bill Fox**, Naval Postgraduate School, and **Allen Butler**, Wagner Associates; Friday morning. Sponsored by the SIGMAA on Business, Industry, and Government (BIG SIGMAA).

Mathematical Knowledge for Teaching Grades 6–12 Mathematics, organized by **Bonnie Gold**, Monmouth University, **David C. Carothers**, James Madison University, and **Yvonne Lai**, University of Nebraska—Lincoln; Thursday morning. Sponsored by the MAA Committee on the Mathematical Education of Teachers (COMET).

Mathematical Themes in a First-Year Seminar, organized by **Pamela Pierce** and **Jennifer Bowen**, The College of Wooster; Friday afternoon.

Mathematics and Sports, organized by **Drew Pasteur**, College of Wooster, and **John David**, Virginia Military Institute; Wednesday afternoon.

Meaningful Modeling in the First Two Years of College, organized by **Stuart Boersma**, Central Washington University, and **Jason Douma**, University of Sioux Falls; Saturday afternoon. Sponsored by MAA Mathematics Across the Disciplines (MAD) Subcommittee and the MAA Curriculum Renewal Across the First Two Years (CRAFTY) Subcommittee.

Philosophy of Mathematics as Actually Practiced, organized by **Bonnie Gold**, Monmouth University (emerita), **Sally Cockburn**, Hamilton College and **Thomas Drucker**, University of Wisconsin—Whitewater; Friday morning. Sponsored by the SIGMAA for the Philosophy of Mathematics (POM SIGMAA).

Quantitative Literacy Across the Curriculum, organized by **Andrew J. Miller**, Belmont University, **Victor Piercey**, Ferris State University, **Catherine Crockett**, Point Loma Nazarene University and **John Curran**, Eastern Michigan University; Saturday morning. Sponsored by the SIGMAA on Quantitative Literacy (SIGMAA QL).

Research in Undergraduate Mathematics Education (RUME), organized by **Megan Wawro**, Virginia Polytechnic Institute, **Aaron Weinberg**, Ithaca College and **Stacy Brown**, California State Polytechnic University; Thursday morning and afternoon. Sponsored by the SIGMAA on Research in Undergraduate Mathematics Education (SIGMAA RUME).

Revitalizing Complex Analysis, organized by **Russell W. Howell**, Westmont College; Saturday morning.

The Scholarship of Teaching and Learning in Collegiate Mathematics, organized by **Jacqueline Dewar**, Loyola Marymount University, **Tom Banchoff**, Brown University, **Curt Bennett**, Loyola Marymount University, **Pam Crawford**, Jacksonville University, **Edwin Herman**, University of Wisconsin—Stevens Point, and **Lew Ludwig**, Denison University; Wednesday morning and afternoon.

Scholarship on Teaching and Learning in Statistics Education, organized by **Stacey Hancock**, Montana State University, **Sue Schou**, Idaho State University, and **Soma Roy**, California Polytechnic State University; Saturday afternoon. Sponsored by the SIGMAA on Statistics Education (SIGMAA STAT ED).

Teaching Abstract Algebra: Topics and Techniques, organized by **Kristi Meyer**, Wisconsin Lutheran College, and **Jessie Lenarz**, St. Catherine University; Saturday morning.

The Teaching and Learning of Undergraduate Ordinary Differential Equations, organized by **Christopher S. Goodrich**, Creighton Preparatory School, and **Beverly H. West**, Cornell University; Friday afternoon. Sponsored by the Community of Ordinary Differential Equations Educators (CODEE).

Technology and Resources for Teaching Statistics, organized by **Karl Schmitt**, Valparaiso University, **Sue Schou**, Idaho State University, **Stacey Hancock**, Montana State University and **Soma Roy**, California Polytechnic State University; Friday afternoon. Sponsored by the SIGMAA on Statistics Education (SIGMAA STAT ED) and the MAA Committee on Technology in Mathematics Education (CTIME).

Trends in Undergraduate Mathematical Biology Education, organized by **Timothy D. Comar**, Benedictine University; Thursday morning. Sponsored by the SIGMAA on Mathematical and Computational Biology (BIO SIGMAA).

20th Anniversary—The EDGE (Enhancing Diversity in Graduate Education) Program: Pure and Applied Talks by Women, organized by **Shanise Walker**, Iowa State University, and **Laurel Ohm**, University of Minnesota; Thursday morning and afternoon.

Using Mathematics to Study Problems from the Social Sciences, organized by **Jason Douma**, University of Sioux Falls; Thursday afternoon. Sponsored by the MAA Mathematics Across the Disciplines (MAD) Subcommittee.

General Contributed Paper Sessions, organized by **Tim Comar**, Benedictine University, and **James Reid**, University of Mississippi; Wednesday, Thursday, Friday, and Saturday, mornings and afternoons. These sessions accept contributions in all areas of mathematics, curriculum, and pedagogy. When you submit your abstract you will be asked to classify it according to the following scheme: Assessment; History or Philosophy of Mathematics; Interdisciplinary Topics in Mathematics; Mathematics and Technology; Mentoring; Modeling and Applications; Outreach; Teaching and Learning Developmental Mathematics; Teaching and Learning Introductory Mathematics; Teaching and Learning Calculus; Teaching and Learning Advanced Mathematics; Algebra; Analysis; Applied Mathematics; Geometry; Graph Theory; Linear Algebra; Logic and Foundations; Number Theory; Probability and Statistics; Topology; and Other Topics.

See also the AMS-MAA-SIAM Special Session on *Research in Mathematics by Undergraduates and Students in Post-Baccalaureate Programs* on Wednesday morning, Thursday afternoon, Saturday morning and afternoon in the “AMS Special Session” listings. The organizers for this session are **Tamas Forgacs**, California State University Fresno, **Darren A. Narayan**, Rochester Institute of Technology, and **Mark David Ward**, Purdue University.

Submission Procedures for MAA Contributed Paper Abstracts

Abstracts may be submitted electronically at jointmathematicsmeetings.org/meetings/abstracts/abstract.pl?type=jmm. Simply fill in the number of authors, click “New Abstract,” and then follow the step-by-step instructions. **The deadline for abstracts submission is Tuesday, September 26, 2017.**

Each participant may make at most one presentation in an MAA Contributed Paper Session, either a presentation in one of the themed sessions or a presentation in one of the general sessions. If your paper cannot be accommodated in the themed session for which it was submitted, it will automatically be considered for the general contributed paper sessions. The organizer(s) of your session will automatically receive a copy of the abstract, so it is not necessary for you to send it directly to the organizer. All accepted abstracts are published in a book that is available to registered participants at the meeting. Questions concerning the submission of abstracts should be addressed to abs-coord@ams.org.

MAA Panels, Posters, and Other Sessions

MAA Panel: How do we use assessment? What do we learn from it and how does it help us make related changes?, organized by **Beste Gucler**, University of Massachusetts Dartmouth, and **Gulden Karakok**, University of Northern Colorado; Wednesday, 8:00–9:20 am. The purpose of this panel is to inform the audience about recent research-based efforts on the development and use of assessments in undergraduate mathematics. The intended audience is mathematics and

mathematics education faculty members. The session will focus on assessment of learning, teaching, and programs through the expertise of four panelists. Each panelist will present for 15 minutes; the remaining 20 minutes will consist of discussions between the panelists and audience. Dr. Marilyn Carlson will focus on the analysis of calculus final exams including what is known about the foundational ideas in precalculus needed for understanding key ideas of calculus. Dr. Pablo Mejia-Ramos will talk about the development and validation of reliable assessments for undergraduate students’ comprehension of mathematical proofs that they read. Dr. Sandra Laursen will focus on methods for characterizing teaching in undergraduate mathematics classrooms based on recent research and program evaluation studies. She will discuss how the goals of such characterizations depend on the study goals. Dr. William Martin will talk about his experience on assessment in mathematics departments; development and implementation of assessment systems for units with programs in education. Panelists are **Marilyn Carlson**, Arizona State University, **Pablo Mejia-Ramos**, Rutgers University, **Sandra Laursen**, University of Colorado Boulder and **William Martin**, North Dakota State University

MAA-SIAM-AMS Hrabowski-Gates-Tapia-McBay Session, organized by **Ricardo Cortez**, Tulane University; Wednesday, 9:00–10:20 am. The Hrabowski-Gates-Tapia-McBay Session is named after four influential scientists of color: (1) Freeman Hrabowski, President of the University of Maryland at Baltimore County; (2) James S. Gates, University of Maryland, College Park; (3) Richard Tapia, Rice University; and (4) Shirley McBay, President of Quality Education for Minorities (QEM). Through multiple mechanisms, these Sessions expect to facilitate and accelerate the participation of scientists in the building of sustainable communities of mathematicians and mathematical scientists. In particular, the intention is to systematically recruit, welcome, encourage, mentor, and support individuals from underrepresented groups in the USA. This year the session will consist of a lecture at 9:00 am given by **Talithia Williams**, Harvey Mudd College, **Mathematics for the Masses**, and a short panel discussion after the talk at 9:50 am. The 2018 panel will focus on **Access to Quality Mathematics by All**. Panelists and attendees will discuss issues related to removing roadblocks in mathematics education (e.g., Tracking, placement, ‘weed out’ courses, etc) as well as hiring or award selection practices that tend to favor the majority groups that have influence. Panelists will also address the question: What are the roles and responsibilities do mathematicians and mathematics educators have in creating a just and accessible system? Panelists will include **Ron Buckmire**, National Science Foundation, **James Alvarez**, University of Texas at Arlington and **Talithia Williams**, Harvey Mudd College. This event is sponsored by the MAA Committee on Minority Participation in Mathematics, SIAM and the AMS.

MAA Panel: Mathematicians’ Work in Creating Open Education Resources for K-12, organized by **William McCallum**, University of Arizona, Wednesday, 9:35–10:55 am.

Since the writing of the Common Core State Standards in Mathematics, mathematicians have played a central role in a number of projects dedicated to producing freely available curriculum for K–12 aligned to the standards, including Engage NY/Eureka Math, the Utah Middle School Math Project, and the Illustrative Mathematics middle school curriculum. Leads from each of these projects will address questions about the role of mathematicians in writing K–12 curriculum, such as: Do mathematicians bring a particular sensibility to this work that makes the end product distinctive? What is the nature of the collaboration between mathematicians and other experts, such as classroom teachers and mathematics education researchers? What general lessons can be drawn from mathematicians' experience in this work that can inform future collaborations? What are the implications for teacher preparation classes? What are the constraints and affordances of working with open licenses? Panelists are **Scott Baldridge**, Louisiana State University, **Hugo Rossi**, University of Utah and **Kristin Umland**, Illustrative Mathematics.

MAA Panel: What Every Student Should Know about the JMM, organized by **Violeta Vasilevska**, Utah Valley University; Wednesday, 9:35–10:55 am. Navigating a large conference can be overwhelming, even for those who have previously attended such an event. Panelists **Joyati Debnath**, Winona State University, **Michael Dorff**, Brigham Young University, and **Frank Morgan**, Williams College, will provide guidance for students attending the Joint Mathematics Meetings, including answers to some common questions: How do I get the most out of the program? What sessions are especially for students? What other events should I be on the lookout for? Will I understand any of the invited addresses or should I not bother attending them? If I am presenting a poster, where do I go to set it up? How can I get some cool, free math stuff? Students and their faculty mentors are encouraged to attend. Panelists are **Joyati Debnath**, Winona State University, **Michael Dorff**, Brigham Young University and **Frank Morgan**, Williams College. This panel is sponsored by the MAA Committee for Undergraduate Student Activities and Chapters (CUSAC).

MAA Panel: Ethics, Morality and Politics in the Quantitative Literacy Classroom, organized by **Ethan Bolker**, University of Massachusetts Boston, and **Maura Mast**, Fordham University; Wednesday, 2:15–3:35 pm. If you mine the daily news for examples to use in your Quantitative Literacy class you will soon need answers to pedagogical questions like these that rarely come up in Calculus or College Algebra:

- How do you navigate a discussion of topics that touch on politics without bringing in your personal views?
- When they do show (as they will), how do you prevent students from thinking that they should agree with you in order to get a good grade?
- How do you encourage reasoned answers when there are “facts”—alternative or otherwise—that students think they know?

- How do you avoid arbitrarily defined “balance” when controversies arise that numbers could resolve?
- How do you deal with anecdotal arguments based on personal experience that may not hold up to quantitative or statistical analysis, while still respecting students' views, perspectives and opinions?
- How do you address questions like “What is a fair tax policy?” that come with an implicit moral dimension?

The panelists will talk about their successes (and failures) dealing with classroom moments that prompt these questions. Members of the audience may submit their own examples and classroom situations for the panelists to discuss. Moderator for this panel will be **Ethan Bolker**, University of Massachusetts Boston. Panelists are **David Lavie Deville**, Northern Arizona University, **Kseija Simic-Muller**, Pacific Lutheran University, **Gizam Karaali**, Pomona College, **David Kung**, St. Mary's College of Maryland and **Rob Root**, Lafayette College. This panel is sponsored by SIGMAA QL.

MAA Panel: NSF Funding Opportunities to Improve Learning and Teaching in the Mathematical Sciences, organized by **Ron Buckmire**, **Sandra Richardson**, and **Lee Zia**, Division of Undergraduate Education, NSF, **Karen King**, Division of Research on Learning, NSF, **Tara Smith**, Division of Graduate Education, NSF, and **Swatee Naik**, Division of Mathematical Sciences, NSF, Wednesday, 2:15–4:00 pm. A number of NSF divisions offer a variety of grant programs that support innovations in learning and teaching in the mathematical sciences. These programs will be discussed along with examples of successful projects. Anticipated budget highlights and other new initiatives for the next fiscal year, as appropriate, will also be presented. Panelists are **Ron Buckmire**, **Sandra Richardson**, and **Lee Zia**, Division of Undergraduate Education, NSF, **Karen King**, Division of Research on Learning, NSF, **Tara Smith**, Division of Graduate Education, NSF, and **Swatee Naik**, Division of Mathematical Sciences, NSF.

MAA Panel: A Mathematician Teaches Statistics: The Road Less Traveled, organized by **Stacey Hancock**, Montana State University; Wednesday, 3:10–5:10 pm. With the recent rapid growth in statistics programs and the large number of required statistics courses in other disciplines, many statistics instructors do not have a graduate degree in statistics. Especially at smaller institutions without separate statistics departments, trained mathematicians who may not have taken a data analysis course are commonly asked to teach applied statistics courses, either voluntarily or involuntarily. Our panel will host several members of the mathematics and statistics community from a variety of institutions that were trained in mathematics and transitioned to teaching statistics. Panelists will share their journey and experiences in successfully transitioning from teaching mathematics to statistics, including how teaching statistics differs from teaching mathematics and advice for other mathematicians that find themselves in the same situation. Panelists are **Patti Frazer Lock**, St. Lawrence College, **Chris Oehrlein**, Oklahoma City Community College, **Sue**

Schou, Idaho State University and **Charilaos Skiadas**, Hanover College. This panel is sponsored by the SIGMAA on Statistics Education.

Town Hall Meeting: National Changes in Education: 2018, a New World, Wednesday, 4:00–5:00 pm. The MAA Committee on the Mathematical Education of Teachers invites you to join us for informal discussions about changes in the national educational landscape. 2017 rocked the educational world and there are surely more changes to come as the current president continues to implement his vision. Bring your thoughts, ideas, and an open mind for a roundtable discussion. This session is sponsored by the MAA Committee on Faculty and Departments. This session is sponsored by the MAA Committee on the Mathematical Education of Teachers (COMET).

MAA Panel: Implicit Bias and Its Effects in Mathematics, organized by **Semra Kilic-Bahi**, Colby-Sawyer College, **Maura Mast**, Fordham College at Rose Hill, **Naomi Cameron**, Lewis & Clark College, **Andrew Cahoon**, Colby-Sawyer College and **Charles Doering**, University of Michigan; Wednesday, 4:15–5:35 pm. Implicit bias occurs when someone explicitly rejects stereotypes and prejudices, but unconsciously holds negative (mostly) associations. People are not hiding their prejudices, but rather, they just do not know they have these unconscious feelings or thoughts that affect their decision-making and behavior. Social scientists are identifying implicit biases as one of the most pervasive barriers to equal opportunities for minorities and women in today's society. This panel discussion addresses how implicit bias might manifest and affect our classrooms, departments, and campuses in terms of academic and scholarly opportunities and evaluations. Panelists are **Ron Buckmire**, National Science Foundation, **Jenna P. Carpenter**, Campbell University, **Lynn Garrioch**, Colby-Sawyer College, **Joanna Kania-Bartoszynska**, National Science Foundation and **Francis Edward Su**, Harvey Mudd College. This panel is sponsored by the MAA Committee on the Participation of Women in Mathematics; Committee on the Minority Participation in Mathematics; Association for Women in Mathematics; National Association of Mathematicians; and the Joint Committee on the Participation of Women in Mathematics.

MAA Panel: Communicating Mathematics to a Wider Audience, organized by **Joel Cohen**, University of Maryland and **Paul Zorn**, St. Olaf College; Thursday, 9:00–10:20 am. Panelists will address questions like the following: How can we mathematicians better tell our stories? How can we speak to government decisionmakers and the general public about the importance, applicability, and beauty of our subject? What can we learn from social scientists about principles of effective communication to broad audiences? Panelists to be announced. This panel is sponsored by the MAA Science Policy Committee.

MAA Session for Chairs: Bridging the Gap, organized by **Catherine Murphy**, Purdue University Northwest, **Linda Braddy**, Tarrant County College Northeast Campus and **Daniel Maki**, Indiana University Bloomington; Thursday, 9:00–10:20 am. One of the major responsibilities of department

chairs is serving as a communication link between faculty and dean/other academic administrators. In this time of significant change in higher education, this role is even more important. The four panelists are either current or recent chairs of mathematics departments who will share how they “bridge the gap,” that is advocate for faculty as well as provide faculty with the information needed to understand and address issues/mandates from administration. About a third of this session will be devoted to conversations among attendees and with panelists. Attendees are encouraged to share their questions, concerns and expertise. Panelists are **Michael Dorff**, Brigham Young University, **Lewis Ludwig**, Denison University, **Alycia Marshall**, Anne Arundel Community College and **Karen Saxe**, Macalester College.

MAA Poster Session: Mathematical Outreach Programs, organized by **Betsy Yanik**, Emporia State University; Friday, 10:00 am–12 noon. This poster session is designed to highlight special programs which have been developed to encourage students to maintain an interest in and commitment to succeeding in mathematics. These programs might include such activities as after school clubs, weekend activities, one day conferences, mentoring opportunities, summer camps, etc. This poster session encompasses a wide variety of outreach efforts for a variety of age groups. For example, programs might be designed to reach out to underrepresented groups. The projects supported by MAA Tensor and Summa grants will find this an ideal venue in which to share the progress of their funded projects. Another possible type of outreach might involve mathematical enrichment programs. Other examples might include innovative programs to motivate undergraduates to study mathematics. We encourage everyone involved with offering mathematical outreach activities to consider submitting an abstract to the session organizer, Betsy Yanik, eyanik@emporia.edu. This session is sponsored by the Committee on the Participation of Women.

Town Hall Meeting: Revising MAA Guidelines on the Work of Faculty and Departments: Supporting Student Success, organized by **Tim Flowers**, Indiana University of Pennsylvania; Thursday, 10:35–11:55 am. The MAA Committee on Faculty and Departments (formerly called the Committee on the Status of the Profession) invites ideas and suggestions regarding ongoing updates and revisions to The Guidelines for Programs and Departments in Undergraduate Mathematical Sciences. These Guidelines are intended to be used by mathematical sciences programs in self-studies, planning, and assessment of their undergraduate programs, as well as by college and university administrators and external reviewers. In order to have the future online statements in the Guidelines be as complete and useful as possible, the committee is soliciting input from MAA members. In this session, panelists and committee members will take comments and questions from the audience regarding the statement on students. Specific topics will include guidelines related to the following: recruiting, retaining, and supporting a diverse student popu-

lation; evaluating the placement process for introductory courses; providing academic, career advice to students in mathematical sciences, including job placement; sponsoring co-curricular organizations and competitions; and leading undergraduate research projects. Moderator for this panel will be **Edward Aboufadel**, Grand Valley State University. Panelists are **Mary Beisiegel**, Oregon State University, **Suzanne Dorée**, Augsburg College, **Tyler Jarvis**, Brigham Young University and **Benedict Nmah**, Morehouse College. This session is sponsored by the MAA Committee on Faculty and Departments.

MAA Panel: Effectively Chairing a Mathematical Sciences Department, organized by **Kevin Charwood**, Washburn University, **Robert Buck**, Slippery Rock University and **Joanna Ellis-Monaghan**, Saint Michael's College; Thursday, 1:00–2:20 pm. We plan to host an 80-minute panel with 5 panelists from a variety of institutions, with two panelists having administrative experience outside the department. The target audience is those faculty who expect to Chair their units someday, but all are welcome to attend. Some talking points, used at the 2015 AMS Chair's workshop at the San Antonio JMM: 1. Why did you want to (or agree to) be Chair? 2. What are/were your goals as Chair: (A) Are there/were there new initiatives you/your colleagues wanted to see? (B) Problems needed fixing? (C) Existing programs to improve upon or grow? (D) Or, hoping to maintain status quo? 3. What is your main challenge/challenges in accomplishing these goals? Panelists are **Curtis Bennett**, Loyola Marymount University, **Karolyne Fogel**, California Lutheran University, **Sergio Loch**, Grand View University and **Joe Yanik**, Emporia State University.

MAA Panel: Out in Mathematics: Professional Issues Facing LGBTQ Mathematicians, organized by **David Crombecque**, University of Southern California and **Christopher Goff**, University of the Pacific; Thursday, 1:00–2:20 pm. This panel, organized by SPECTRA, the Association of LGBTQ Mathematicians, will address issues of concern for LGBTQ mathematicians, professionals or students. Panelists will share their personal experiences as OUT LGBTQ mathematicians, addressing key questions for LGBTQ career mathematicians such as: Should I come out during the job interview? ... on the CV? As a graduate student, should I be out to my advisor? If I am treated/evaluated differently at work because of my gender identity/sexual orientation, what is my recourse? How can I navigate changing my employment/academic records to reflect my gender identity? Our panelists will discuss these and many more questions relevant to the well-being and inclusion of current and future successful LGBTQ mathematicians. Moderator for this panel is Lily Khadjavi, Loyola Marymount University. Panelists are **Shelly Bouchat**, Indiana University of Pennsylvania, **DJ Bruce**, University of Wisconsin Madison, **Ron Buckmire**, National Science Foundation, **Frank Farris**, Santa Clara University and **Emily Riehl**, Johns Hopkins University.

MAA Poster Session: Projects Supported by the NSF Division of Undergraduate Education, organized by **Jon**

Scott, Montgomery College; Friday, 2:00–4:00 pm. This session will feature principal investigators (PIs) presenting progress and outcomes from various NSF funded projects in the Division of Undergraduate Education. The poster session format will permit ample opportunity for attendees to engage in small group discussions with the PIs and to network with each other. Information about presenters and their projects will appear in the program.

Estimathon! organized by **Andy Niedermaier**, Jane Street Capital; Thursday, 2:30–4:15 pm. They're called Fermi problems...

- How heavy is the Eiffel Tower?
- How many prime numbers have distinct digits?
- How many calories would you be eating if you had "one of everything" at the Cheesecake Factory?

If you're looking for a mindbending mixture of math and trivia, look no further! Jane Street Capital presents The Estimathon contest: teams will have 30 minutes to work on 13 problems, ranging from totally trivial to positively Putnamesque. Can your team beat the all-time best score? The top teams will receive prizes!

We will run 2 contests. Feel free to show up to either one!

(Please show up 15 minutes before the start time of the contest you want to join.)

Our target schedule is as follows:

2:30 pm Welcome, overview of rules and scoring.

2:45 pm Estimathon contest #1

3:30 pm Estimathon contest #2

AMS-MAA Joint Committee on TAs and Part-Time Instructors Panel: Teaching-Focused Faculty at Research Institutions, organized by **Angela Kubena**, University of Michigan, **Jean Marie Linhart**, Central Washington University, **Tom Roby**, University of Connecticut and **Michael Weingart**, Rutgers University; Thursday, 2:30–3:55 pm. It is increasingly common that a portion of the teaching at research universities is done by full-time teaching-focused faculty (TFF). These faculty are not asked to do research but instead are asked to take on an expanded role in helping the department carry out its teaching. This session will discuss issues around this development, from how such faculty may be supported to issues of evaluating faculty whose primary role is teaching and integrating them into a department culture that is focussed on research. Moderator for this panel will be **Tom Roby**, University of Connecticut. Panelists are **Amy Cohen**, Rutgers University, **John Eggers**, University of California San Diego, **Ellen Golstein**, Boston College, **Robin Gottlieb**, Harvard University, and **Amit Savkar**, University of Connecticut. This panel is sponsored by the AMS-MAA Joint Committee on TAs and Part-Time Instructors.

The Dolciani Award: Mathematicians in K-16 Education, organized by **David Stone**, Georgia Southern University, **Will Abram**, Hillsdale College, **Ken Gross**, University of Vermont, **Bill Hawkins**, University of the District of Columbia, **Glenn Stevens**, Boston University, **Ann Watkins**, California State University, Northridge and **Susan Wildstrom**, Walt Whitman High School, Bethesda MD; Thursday,

2:35–3:55 pm. The MAA Mary P. Dolciani Award, funded by the Dolciani Halloran Foundation, recognizes a pure or applied mathematician who is making a distinguished contribution to the mathematical education of K–16 students in the United States or Canada. Established in 2012, it is one of the MAA's major awards. Its recipients form an impressive list of mathematicians who are widely recognized as having contributed to mathematics education:

2017 Tatiana Shubin, San Jose State University

2015 Sybilla Beckmann, University of Georgia

2014 Alan Schoenfeld, University of California at Berkeley

2013 Hyman Bass, University of Michigan

2012 William G. McCallum, University of Arizona.

The panel features two recipients of the award and one other distinguished mathematician who has been involved in mathematics education. The panelists will address why they believe it is important that research mathematicians become involved in K–16 mathematics education, can provide examples of positive engagement and provide a road map for others who wish to follow their lead. They will highlight the key issues, the roadblocks and rewards in such endeavors.

In an address at a previous JMM, Hy Bass said, “There are three issues in which every mathematician should be engaged: research, applications and education.” This session is an opportunity to hear from mathematicians who have been leaders in all of these arenas.

The panel will conclude with an interactive Q&A session. Panelists are **Jim Lewis**, University of Nebraska, **Alan Schoenfeld**, University of California at Berkeley and **Tatiana Shubin**, San Jose State University. This panel is sponsored by the MAA Committee on the Mary P. Dolciani Award.

MAA Panel: What is a “Math Center” and What Can it do For Your Department?, organized by **Christina Lee**, Oxford College of Emory University, and **Jason Aubrey**, University of Arizona; Thursday, 2:35–3:55 pm. Many mathematics departments around the country are dedicating significant resources and personnel to the work of supporting the students in our courses, encouraging them to continue to take mathematics courses, and recruiting them into the major. This support goes beyond what is typically offered by campus tutoring centers, as it often includes mentoring and academic/career advising. At some schools, these activities have been organized into dedicated units (sometimes called “Math Centers”), led by mathematics faculty, often with dedicated staff support and budget. There are many benefits of having such units, such as increased interest in mathematics and the recruitment and retention of minority students. Panelists are comprised of leaders of such units and will discuss the implementation and outcomes of having such a dedicated support system for mathematics students. Panelists are **Jason Aubrey**, University of Arizona, **Christina Lee**, Oxford College of Emory University, **Rosalie Belanger-Rioux**, Harvard University, and **Kaitlyn Gingras**, Trinity College.

AMS-MAA-SIAM Panel on Multiple Paths to Mathematics Careers in Business, Industry and Government (BIG), organized by **Allen Butler**, Daniel H Wagner Associates, **Rachel Levy**, Harvey Mudd College, **Douglas Mupasiri**, University of Northern Iowa and **Suzanne Weekes**, Worcester Polytechnic Institute; Thursday, 2:35–3:55 pm. The proportion of new mathematics doctoral recipients who are taking jobs in business, industry and government (BIG) is growing. Still, many mathematics PhD programs do not include preparation for non-academic career options as part of their standard curriculum. At this panel, you will have the opportunity to hear about multiple career paths to employment in BIG. Panelists will share (a) what they wish they had known and done as graduate students/post-docs, (b) what you can do at your career stage if you are interested in making connections with business, industry or government, and (c) what suggestions they have for math doctoral programs to increase preparedness of their students for work in BIG. Co-sponsors for this panel are AMS, MAA, and SIAM.

MAA Panel: Teaching Mathematics Content to Prospective Elementary Teachers: Strategies and Opportunities, organized by **Lynn C. Hart**, Georgia State University; Friday, 8:00–9:20 am. This panel will discuss issues that mathematics faculty may encounter when teaching content courses to prospective elementary teachers, suggesting strategies for teaching future elementary teachers mathematics in ways that will have a lasting positive impact on how they will teach to future generations. Specifically, the panel will discuss the following questions.

1. What are the considerations for writing cognitively demanding mathematical tasks and enacting them in ways that maintain the demand?

2. How can exploring children’s mathematical thinking support learning content by prospective elementary teachers?

3. What are mathematical habits of mind and why is it more important than ever for us to attend to them in content courses for prospective elementary teachers?

4. How does affect impact prospective elementary teachers learning in mathematics content courses?

5. How have institutions across 3 countries (US, Canada, Norway) developed curriculum approaches to address these challenges? Panelists are **Christine Browning**, Western Michigan University, **Ziv Feldman**, Boston University, **Lynn C. Hart**, Georgia State University, **Jennifer Holm**, University of Alberta and **Susan Oesterle**, Douglas College.

MAA Panel: The New AP Calculus Curriculum —The First Round of Testing, organized by **James Sellers**, Pennsylvania State University; Friday, 9:35–10:55 am. In May of 2017, students across the country took the new AP Calculus AB and AP Calculus BC exams, the first that reflected the updated AP Calculus courses. This session will provide details on how the AP Calculus AB and AP Calculus BC courses have changed both in terms of course content and student expectations, and how students performed on these new examinations. The panel will include representatives from College Board, the col-

lege professor in charge of scoring these exams (aka, the Chief Reader), and some of the authors of the AP Calculus Curriculum Framework. There will be time in the session for the panelists to answer questions from the audience. Panelists are **Gail Burrill**, Michigan State University, **Stephen Davis**, Davidson College, **Ben Hedrick**, College Board and **James Sellers**, Pennsylvania State University.

MAA Panel: Pathways Through High School Mathematics: Building Focus and Coherence, organized by **Karen J. Graham**, University of New Hampshire; Friday, 1:00–2:20 pm. In Fall 2016, the NCTM Board of Directors appointed a task force whose members represent various constituencies from the larger mathematics education community including K–12 and post-secondary education. The task force was charged with addressing the purpose of high school mathematics and defining a set of curricular pathways that lead to college, career, and citizen readiness. This panel presentation will focus on the recommendations of the task force and the potential implications for post-secondary mathematics education. Members of the task force will discuss aspects of the document scheduled for release at the NCTM Annual Meeting & Exposition in Washington in April 2018 and engage the audience in a discussion of important themes and next steps. Panelists are **Gail Burrill**, Michigan State University, **Yvonne Lai**, University of Nebraska Lincoln, **Matt Larson**, National Council of Teachers of Mathematics, **Francis Su**, Harvey Mudd College and **Dan Teague**, North Carolina School of Science and Mathematics.

AMS-MAA Joint Committee on TAs and Part-Time Instructors Panel: Panel on The Experiences of Foreign Graduate Students as GTAs, organized by **John Boller**, University of Chicago, **Solomon Friedberg**, Boston College, and **Edward Richmond**, Oklahoma State University; Friday, 1:00–2:30 pm. Foreign graduate students make up a significant fraction of all math graduate students. When they serve as GTAs, these students must not only learn how to take on the role of teacher, but must do so in a system and culture that are unfamiliar to them. The goal of this session is to highlight the unique challenges that foreign graduate students encounter as GTAs so that the math community can better help them succeed. The panelists will draw from their own previous experiences as students living in the US for the first time as graduate students, and will offer their perspectives on what is most helpful in supporting similar students as they take on teaching responsibilities in the US. The moderator for this panel will be **Solomon Friedberg**, Boston College. Panelists will be composed of current graduate students and recent PhDs who lived in North America for the first time as graduate students. This panel is sponsored by the AMS-MAA Joint Committee on TAs and Part-Time Instructors

Town Hall Meeting: Creating Engaging, Meaningful Experiences for Teachers and Future Teachers, Friday, 1:00–2:00 pm. The MAA Committee on the Mathematical Education of Teachers (COMET) invites you to a networking event on creating experiences for pre-service and in-service math teachers. As we strive to actively engage teachers and pre-service teachers in meaningful and en-

gaging mathematical activities, the sharing of ideas and what works across campuses is crucial. Please bring your thoughts, ideas, and your lunch for this roundtable discussion. This session is sponsored by the MAA Committee on the Mathematical Education of Teachers (COMET).

MAA Panel: Career Trajectories Involving Administrative Roles: What You May Want to Consider, organized by **Ryan Zerr**, University of North Dakota, and **Edward Aboufadel**, Grand Valley State University; Friday, 2:35–3:55 pm. Because a move into administration can involve a major change in a mathematician's career trajectory, and require a variety of skills that may differ from those which have led to prior success, this panel discussion will solicit the advice and perspectives of mathematicians with administrative experience. What was their path to an administrative position? What are their responsibilities, and which new skills or abilities are required for success? Has their mathematical training helped them in their administrative roles? What impact has the move had on their teaching or research agendas? What can be expected upon a return to the non-administrative ranks? Topics such as these will be explored by the panelists. Panelists are **Edward Aboufadel**, Grand Valley State University, **Linda Braddy**, Tarrant County College, **Jenna Carpenter**, Campbell University, **Rick Gillman**, Valparaiso University and **Jennifer Quinn**, University of Washington Tacoma. This panel is sponsored by MAA Project NExT.

MAA Student Poster Session, organized by **Chasen Smith**, Georgia Southern University, and **Eric Ruggieri**, College of the Holy Cross; Friday, 4:30–6:00 pm. This session features research done by undergraduate students. First-year graduate students are eligible to present if their research was completed while they were still undergraduates. Research by high school students can be accepted if the research was conducted under the supervision of a faculty member at a post-secondary institution.

Appropriate content for a poster includes, but is not limited to, a new result, a new proof of a known result, a new mathematical model, an innovative solution to a Putnam problem, or a method of solution to an applied problem. Purely expository material is not appropriate for this session.

Participants should submit an abstract describing their research in 250 words or less by midnight, Friday, **October 6, 2017**. Notification of acceptance or rejection will be sent by **November 3, 2017**. See www.maa.org/programs/students/undergraduate-research/jmm-student-poster-session for further information on what should be included in the abstract and a link to the abstract submission form.

Posters will be judged during the session, and certificates will be mailed to presenters afterwards. Trifold, self-standing 48" by 36" tabletop poster boards will be provided. Additional materials and equipment are the responsibility of the presenters. Participants must set up posters between 2:30 and 3:30 pm and must be available at their posters from 3:30 to 6:00 pm. Judging will begin at

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3:30 pm, and general viewing will begin at 4:30 pm Judges' feedback will be available at the MAA Pavilion in the Exhibit Hall on Saturday. Questions regarding this session should be directed to Eric Ruggieri eruggier@holycross.edu and Chasen Smith csmith@georgiasouthern.edu. This session is sponsored by the MAA Committee on Undergraduate Student Activities and Chapters (CUSAC).

MAA Panel: the Evolving Career Outlook in Risk Management, organized by **Kevin Charwood**, Washburn University, **Michelle Guan**, Indiana University Northwest, **Steve Paris**, Florida State University, **Barry Smith**, Lebanon Valley College, **Sue Staples**, Texas Christian University and **Rick Gorvett**, Casualty Actuary Society (CASACT); Friday, 5:00–7:00 pm. In recent years, many businesses have been hiring actuaries for data mining, predictive analytics, and many risk management tasks beyond the traditional financial or insurance based actuarial careers. Our panelists from the actuarial industry will examine possible directions where the actuarial profession may be headed and provide examples of new career options for actuarial students. For instance, opportunities in managing risk from cyber theft, from climate change, and from automated processes such as self-driving cars, may be discussed. As those in the audience are largely from academia, panelists from actuarial programs will then discuss how actuarial science programs at post-secondary institutions should respond in educating students to take positions in the future career climate. Representatives from the Society of Actuaries and the Casualty Actuary Society will also be present to discuss changes to the curriculum and associated professional exams. Panelists are **Paul Bailey**, Willis Towers Watson, **Raya Feldman**, University of California Santa Barbara, **Zoe Rico**, Aon and **Barry Smith**, Lebanon Valley College. This panel is sponsored by the MAA Committee on Actuarial Science Education.

Mathematically Bent Theater, featuring **Colin Adams** and the **Möbiusbandaid Players**; Friday, 6:00–7:00 pm. What does it mean when someone says to you, “You are such an asymptote?” Is the plural of squadron *squadra*? After Alice Silverberg’s plenary talk at the Atlanta Joint Meetings, did you inadvertently walk off with my complimentary meeting bag containing my gummy bears and my entire worked out schedule for the meeting? These are just a few of the questions we will not answer in this theatrical presentation of several short mathematically inclined humorous pieces. The only prerequisite is a willingness to throw money rather than tomatoes.

Backgammon! organized by **Arthur Benjamin**, Harvey Mudd College; Friday, 8:00–10:00 pm. Learn to play backgammon from expert players. It’s a fun and exciting game where players with a good mathematics background have a decisive advantage. Boards and free lessons will be provided by members of the US Backgammon Federation. Stop by anytime!

MAA Panel: Student Perspectives and Feedback on REUs, organized by **Gareth E. Roberts**, College of the Holy Cross, **Thomas P. Wakefield**, Youngstown State University; and **Aklilu Zeleke**, Michigan State University; Saturday,

9:00–10:20 am. REU (Research Experience for Undergraduates) programs provide an important opportunity for undergraduates to gain valuable experience conducting mathematical research. This panel will explore REUs from the student’s viewpoint. Recent attendees of summer research programs in mathematics will share their experiences, offer feedback, and provide insight into these programs. Students will discuss the benefits of participating in a summer research program, the impact it had on their academics and career planning, the challenges that arose, particular aspects of their programs that worked well, and places for improvement. This panel discussion is pertinent to both students interested in participating in an REU as well as faculty who have worked in or led such programs. Panelists are **Alexander Durbin**, Virginia Polytechnic Institute; **Kathryn Leonard**, California State University Channel Islands and **Emily Winn**, Brown University. Sponsored by the MAA Subcommittee on Research by Undergraduates.

Interactive Lecture for Students and Teachers: Mathematics to the Rescue: How to Fold a Tie, organized by **Elgin Johnston**, Iowa State University; Saturday, 10:00–10:50 am. Presenter, **James Tanton**, MAA Mathematician at Large, welcomes students of all ages, and teachers, parents, mathematicians, and math enthusiasts of all ages. James Tanton explains “I have a personal problem. I travel a great deal and often have to pack a tie in my suitcase. I can’t lay the tie out flat in the case, nor can I fold the tie in half and lay out the folded tie, as the case is too short. Folding the tie into quarters leaves a crease mark later visible on my chest. Ideally, I should fold my tie into perfect thirds. How does one do that? Actually, years of careful data gathering shows that I tend to wear my ties with twenty-seven sixty-fourths of their length showing at front. Can I fold my tie at that position? Fortunately, brilliant mathematics can solve my personal tie folding problem. Let me show you how! (And can this mathematics solve other problems in my life too?)” Sponsored by the MAA Council on Outreach.

MAA Panel: Tips and Tricks to Securing Funding for Undergraduate Research, organized by **James P. Solazzo**, Coastal Carolina University and **Pamela E. Harris**, Williams College; Saturday, 10:35–11:55 am. Undergraduate research in mathematics has gained immense popularity and support from math faculty and administrators across institutions in the last decade. This growth stems from the many benefits of undergraduate research, such as successful transitions into graduate programs and job preparation for non-academic careers in industry and government. Faculty in this panel share their experiences, offer feedback, and provide insight into the grant writing process needed to secure funding for undergraduate research. Funding opportunities as well as strategies for submitting competitive grant proposals will be discussed. This panel is pertinent to all faculty interested in learning about finding and obtaining funding for undergraduate research. Panelists include faculty members who have received grants to support undergraduate research and

includes faculty who have run successful undergraduate research programs. Panelists are **Michael Dorff**, Brigham Young University, **Tamas Forgacs**, California State University Fresno, **Rebecca Garcia**, Sam Houston State University, **Leslie Hogben**, Iowa State University and **Cindy Wyels**, California State University Channel Islands. This panel is sponsored by the MAA Subcommittee on Research by Undergraduates.

MAA Panel: The Impact of Software on Learning in Upper Division Mathematics Courses, organized by **Brittany Bannish**, **Liz Lane-Harvard** and **Sean Lavery**, University of Central Oklahoma; Saturday, 1:00–2:20 pm. Computer labs are used to enhance a variety of college mathematics courses, but effectively implementing computer activities can be difficult. This panel session will focus on using mathematical software to facilitate teaching and learning in upper division mathematics courses. In particular, the session will focus on the incorporation of computer labs in Differential Equations, Linear Algebra, and Numerical Methods. Panelists will address available software options, how to successfully manage a wide range of student programming backgrounds, how to implement a lab for credit (or not for credit), whether students are allowed to work in groups, and lab write-up requirements. Panelists may also share difficulties encountered while implementing and assessing computer activities, and provide suggestions for avoiding these issues in the future. Audience members should come away from the panel with concrete ideas for successfully including computer activities in upper division math courses. Panelists are **Robert Buchanan**, Millersville University, **Sean Lavery**, University of Central Oklahoma, **Steven Leon**, University of Massachusetts Dartmouth, **Frank Lynch**, Eastern Washington University and **Ann Stewart**, Hood College.

Math Circle Demonstration, organized by **Alessandra Pantano**, University of California Irvine and **Amanda Sereney**, Riverbend Community Math Center; Saturday morning. A math circle is an enrichment experience that brings mathematics professionals in direct contact with pre-college students and/or their teachers. Circles foster passion and excitement for deep mathematics. This demonstration session offers the opportunity for conference attendees to observe and then discuss a math circle experience designed for local students. While students are engaged in a mathematical investigation, mathematicians will have a discussion focused on appreciating and better understanding the organic and creative process of learning that circles offer, and on the logistics and dynamics of running an effective circle. The sponsor for this demonstration is SIGMAA MCST.

Math Wrangle, organized by **Ed Keppelmann**, University of Nevada Reno and **Phil Yasskin**, Texas A&M University, Saturday afternoon. The Math Wrangle will pit teams of students against each other, the clock, and a slate of great math problems. The format of a Math Wrangle is designed to engage students in mathematical problem solving, promote effective teamwork, provide a venue for oral presentations, and develop critical listening skills. A

Math Wrangle incorporates elements of team sports and debate, with a dose of strategy tossed in for good measure. The intention of the Math Wrangle demonstration at the Joint Math Meetings is to show how teachers, schools, circles, and clubs can get students started in this exciting combination of mathematical problem solving with careful argumentation via public speaking, strategy and rebuttal. Sponsors for this event is SIGMAA for Math Circles for Students and Teachers (SIGMAA-MCST).

Special Interest Groups of the MAA (SIGMAAs)

SIGMAAs will be hosting a number of activities, sessions, and guest lectures. There are currently fourteen such focus groups in the MAA offering members opportunities to interact, not only at meetings, but throughout the year, via newsletters and email-based communications. For more information visit www.maa.org/community/sigmaas.

SIGMAA Officers Meeting, Thursday, 10:30 am–noon; chaired by **Andrew Miller**, Belmont University.

SIGMAA on Mathematics and the Arts (SIGMAA ARTS)

Arts and Mathematics: The Interface, Wednesday morning and afternoon (see MAA Contributed Paper Sessions).

SIGMAA on Business, Industry, and Government (BIG SIGMAA)

MAA-AMS-SIAM Joint Panel on Multiple Paths to Mathematics Careers in Business, Industry and Government (BIG), Thursday, 2:35–3:55 pm (see MAA Panels).

Mathematics Experiences and Projects in Business, Industry, and Government, Friday morning (see MAA Contributed Paper Sessions).

Guest Lecture, Friday, 5:30–6:20 pm.

Reception, Friday 6:30–7:00 pm.

Business Meeting, Friday 7:00–7:30 pm.

SIGMAA on Mathematical and Computational Biology (BIO SIGMAA)

Business Meeting and Reception, Thursday, 6:00–7:00 pm.

Guest Lecture, Thursday, 7:00–7:50 pm, **Trey Ideker**, University of California San Diego, Towards construction of a siri of the cell.

Trends in Undergraduate Mathematical Biology Education, Thursday morning (see MAA Contributed Papers Section).

Trends in Mathematical and Computational Biology, Wednesday morning (see MAA Invited Paper Sessions).

SIGMAA on Environmental Mathematics (SIGMAA EM)

Modeling and Understanding Environmental Risks, Thursday morning (see MAA Contributed Paper Sessions).

SIGMAA on the History of Mathematics (HOM SIGMAA)

Reception and Business Meeting, Wednesday, 6:00–7:00 pm.

Guest Lecture, Wednesday, 7:00–7:50 pm, **Joseph W. Dauben**, Herbert H. Lehman College, *The history of Chinese mathematics: 60th anniversary of the founding of the IHNS (CAS), Beijing*.

MAA Minicourse: Teaching Undergraduate Mathematics via Primary Source Projects, Part A: Thursday

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1:00–3:00 pm and Part B: Saturday 1:00–3:00 pm (see MAA Minicourses).

SIGMAA on Inquiry Based Learning (SIGMAA IBL)

Inquiry-Based Teaching and Learning, Friday morning and afternoon (see MAA Contributed Paper Sessions).

SIGMAA on Math Circles for Students and Teachers (SIGMAA MCST)

Math Circle Topics with Visual or Kinesthetic Components, Thursday afternoon (see MAA Contributed Paper Sessions).

Math Circle Demonstration, Saturday.

Math Wrangle, Saturday.

MAA Minicourse: How to Run Successful Math Circles for Students and Teachers, Part A: Wednesday 2:15–4:15 pm and Part B: Friday 1:00–3:00 pm (see MAA Minicourses).

SIGMAA on the Philosophy of Mathematics (POM SIGMAA)

Reception, Thursday, 5:30–6:00 pm.

Business Meeting, Thursday, 6:00–6:15 pm.

Guest Lecture, Thursday, 6:15–7:05 pm, **Rafael Núñez**, University of California San Diego, *Towards a philosophy of mathematics informed by the sciences of the mind*.

Philosophy of Mathematics as Actually Practiced, Friday morning (see MAA Contributed Paper Sessions).

SIGMAA on Quantitative Literacy (SIGMAA QL)

Quantitative Literacy Across the Curriculum, Saturday morning (see MAA Contributed Paper Sessions).

MAA Panel: Ethics, Morality and Politics in the Quantitative Literacy Classroom, Wednesday, 2:15–3:35 pm (see MAA Panels).

SIGMAA on Research in Undergraduate Mathematics Education (SIGMAA on RUME)

Research in Undergraduate Mathematics Education, Thursday morning and afternoon (see MAA Contributed Paper Sessions).

Research in Undergraduate Mathematics Education: Highlights from the Annual SIGMAA on RUME Conference, Saturday morning (see MAA Invited Paper Sessions).

SIGMAA on Statistics Education (SIGMAA Stat Ed)

A Mathematician Teaches Statistics: The Road Less Traveled, Wednesday, 3:50–5:10 pm (see MAA Panels).

MAA Minicourse: Teaching Introductory Statistics Using the Guidelines from the American Statistical Association, Part A: Wednesday 9:00–11:00 am and Part B: Friday 9:00–11:00 am (see MAA Minicourses).

MAA Minicourse: Teaching Statistics using R and RStudio, Part A: Thursday 9:00–11:00 am and Part B: Saturday 9:00–11:00 am (see MAA Minicourses).

Incorporating Big Data Ideas in the Mathematics and Statistics Classroom, Thursday afternoon (see MAA Contributed Paper Sessions).

Technology and Resources for Teaching Statistics, Friday afternoon (see MAA Contributed Paper Sessions).

Reception, Friday, 5:30–6:00 pm.

Business Meeting, Friday, 6:00–6:45 pm.

Guest Lecture, Friday, 6:50–7:40 pm, **Robert Gould**, University of California Los Angeles, *We are all data scientists (or we should be)*.

SIGMAA on Mathematics Instruction Using the Web (WEB SIGMAA)

Reception, Friday, 5:30–6:00 pm.

Guest Lecture, Friday, 6:00–6:50 pm, **Jim Fowler** and **Bart Snapp**, Ohio State University, *Using Ximera to build online interactive math activities*.

The Advancement of Open Educational Resources, Friday morning (see MAA Contributed Papers Section).

Lightning Talks and E-Posters: Me and My Gadgets, Teaching with Technology, Saturday morning (see MAA Contributed Paper Sessions).

MAA Sessions for Students

Radical Dash! organized by **Stacey Muir**, University of Scranton, and **Janine Janoski**, Kings College; **Radical Dash Kickoff Meeting**: Wednesday, 2:15–3:00 pm and **Radical Dash Prize Session**: Friday, 10:30–11:00 am. The Radical Dash is a multi-day scavenger hunt for teams of undergraduates filled with math challenges and creative activities. Clues will be released periodically via Instagram (follow us now @MAARadicalDash) tasking teams with doing things such as solving math problems, finding mathematical objects in everyday life, and hunting down locations throughout the conference. Team posts will be judged based on completion of tasks as well as creativity. Join us for the Radical Dash Kickoff on Wednesday, January 10, 2:15–3:00 pm where team sign ups take place and more details will be provided. Individuals are welcome and encouraged to participate; they will be formed into teams on site at our Kickoff. Winners and prizes will be announced at the Radical Dash Prize Session on Friday, January 12, 10:30–11:00 am. Questions? Email us at MAARadicalDash@gmail.com. Can't make the Kickoff? Email us by Tuesday, January 9. The Radical Dash! is sponsored by MAA Committee on Undergraduate Student Activities and Sections (CUSAC).

MAA Panel: What Every Student Should Know about the JMM, organized by **Violeta Vasilevska**, Utah Valley University; Wednesday, 9:35–10:55 am. Navigating a large conference can be overwhelming, even for those who have previously attended such an event. Panelists will provide guidance for students attending the Joint Mathematics Meetings, including answers to some common questions: How do I get the most out of the program? What sessions are especially for students? What other events should I be on the lookout for? Will I understand any of the invited addresses or should I not bother attending them? If I am presenting a poster, where do I go to set it up? How can I get some cool, free math stuff? Students and their faculty mentors are encouraged to attend. Panelists are **Joyati Debnath**, Winona State University, **Michael Dorff**, Brigham Young University and **Frank Morgan**, Williams College. This panel is sponsored by the MAA Committee for Undergraduate Student Activities and Chapters (CUSAC).

Estimathon! organized by **Andy Niedermaier**, Jane Street Capital; Thursday, 2:30–4:15 pm. They're called Fermi problems...

- How heavy is the Eiffel Tower?

- How many prime numbers have distinct digits?
- How many calories would you be eating if you had “one of everything” at the Cheesecake Factory?

If you're looking for a mindbending mixture of math and trivia, look no further! Jane Street Capital presents The Estimathon contest: teams will have 30 minutes to work on 13 problems, ranging from totally trivial to positively Putnamesque. Can your team beat the all-time best score? The top teams will receive prizes!

We will run 2 contests. Feel free to show up to either one!

(Please show up 15 minutes before the start time of the contest you want to join.)

Our target schedule is as follows:

2:30 pm Welcome, overview of rules and scoring.

2:45 pm Estimathon contest #1

3:30 pm Estimathon contest #2

Grad School Fair, Friday, 8:30–10:30 am. Here is the opportunity for undergrads to meet representatives from mathematical sciences graduate programs from universities all over the country. January is a great time for juniors to learn more, and college seniors may still be able to refine their search. This is your chance for one-stop shopping in the graduate school market. At last year's meeting over 300 students met with representatives from 60 graduate programs. If your school has a graduate program and you are interested in participating, for US\$125 a table will be provided for your posters and printed materials (**registration for this event must be made by a person already registered for the JMM**), and you are welcome to personally speak to interested students. Complimentary coffee will be served. Co-sponsored by the AMS and MAA.

MAA Lecture for Students, Friday, 1:00–1:50 pm, will be given by **James Tanton**, MAA Mathematician at Large, *HOW MANY DEGREES ARE IN A MARTIAN CIRCLE? And other human—and nonhuman—questions one should ask about everyday mathematics.*

MAA Student Poster Session, organized by **Chasen Smith**, Georgia Southern University and **Eric Ruggieri**, College of the Holy Cross; Friday, 4:30–6:00 pm. This session features research done by undergraduate students. First-year graduate students are eligible to present if their research was completed while they were still undergraduates. Research by high school students can be accepted if the research was conducted under the supervision of a faculty member at a post-secondary institution.

Appropriate content for a poster includes, but is not limited to, a new result, a new proof of a known result, a new mathematical model, an innovative solution to a Putnam problem, or a method of solution to an applied problem. Purely expository material is not appropriate for this session.

Participants should submit an abstract describing their research in 250 words or less by midnight, Friday, **October 6, 2017**. Notification of acceptance or rejection will be sent by **November 3, 2017**. See www.maa.org/programs/students/undergraduate-research/jmm-

[student-poster-session](#) for further information on what should be included in the abstract and a link to the abstract submission form.

Posters will be judged during the session, and certificates will be mailed to presenters afterwards. Trifold, self-standing 48” by 36” tabletop poster boards will be provided. Additional materials and equipment are the responsibility of the presenters. Participants must set up posters between 2:30 and 3:30 pm and must be available at their posters from 3:30 to 6:00 pm. Judging will begin at 3:30 pm, and general viewing will begin at 4:30 pm. Judges' feedback will be available at the MAA Pavilion in the Exhibit Hall on Saturday. Questions regarding this session should be directed to Eric Ruggieri eruggier@holycross.edu and Chasen Smith csmith@georgiasouthern.edu. This session is sponsored by the MAA Committee on Undergraduate Student Activities and Chapters (CUSAC).

Interactive Lecture for Students and Teachers: Mathematics to the Rescue: How to Fold a Tie, organized by **Elgin Johnston**, Iowa State University; Saturday, 10:00–10:50 am. Presenter, **James Tanton**, MAA Mathematician at Large, welcomes students of all ages, and teachers, parents, mathematicians, and math enthusiasts of all ages. James Tanton explains: I have a personal problem. I travel a great deal and often have to pack a tie in my suitcase. I can't lay the tie out flat in the case, nor can I fold the tie in half and lay out the folded tie, as the case is too short. Folding the tie into quarters leaves a crease mark later visible on my chest. Ideally, I should fold my tie into perfect thirds. How does one do that? Actually, years of careful data gathering shows that I tend to wear my ties with twenty-seven sixty-fourths of their length showing at front. Can I fold my tie at that position? Fortunately, brilliant mathematics can solve my personal tie folding problem. Let me show you how! (And can this mathematics solve other problems in my life too?) Sponsored by the MAA Council on Outreach.

Project NExT

Project NExT Workshop, Wednesday–Saturday, 8:00–6:00 pm.

Project NExT Lecture on Teaching, Thursday, 11:10–12 noon, will be given by **Jo Boaler**, Stanford University, *Changing mathematical relationships and mindsets: how all students can succeed in mathematics learning.*

See details about the reception on Friday in Social Events.

Other MAA Events

MAA Congress, Tuesday, 9:00 am–5:00 pm.

MAA Section Officers Meeting, Wednesday, 4:00–5:00 pm, chaired by **Betty Mayfield**, Hood College. Section officers will meet with members of the Committee on Sections and MAA staff to share information and discuss current initiatives.

SIGMAA Officers Meeting, Thursday, 10:30–12:00 noon, chaired by **Andrew Miller**, Belmont University.

MAA Business Meeting, Saturday, 11:10–11:40 am, chaired by MAA President **Deanna Hausperger**, Carleton College, and organized by MAA Secretary **Barbara Faires**, Westminster College.

MAA Workshops

Creating Interdisciplinary Activities for Mathematical Sciences Classrooms, presenters are **Eugene Fiorini** and **Linda McGuire**, Muhlenberg College; Wednesday, 9:35–10:55 am. Mathematics and science education research indicates that to actively engage students, instructors should encourage cooperative learning, present and discuss real-life applications, suggest open-ended questions, and provide higher-order thinking tasks [Verma & Dickerson, *Technology and Engineering Teacher*, 2011]. In a world with challenges that are complex, dynamic, riddled with uncertainty, and potentially massive in scale, the mathematical and computer sciences have a central role to play by providing tools for analyzing and interpreting massive data sets, models and simulations of complex systems, and designs for future systems that are more efficient and secure. Workshop participants will begin development of one-day modules at the undergraduate level that can then be implemented in their courses. The modules will either focus on topics participants brought with them or topics provided by workshop organizers from such areas related to sustainability, cyber-security, and forensics. The workshop, intended for the novice writer, will include small group writing sessions allowing participant teams to develop common modules.

Get to Know the National Science Foundation, organized by **Ron Buckmire**, **Sandra Richardson** and **Lee Zia**, Division of Undergraduate Education, National Science Foundation; Thursday, 9:00–10:20 am. Presenters will describe the general NSF grant proposal process and consider particular details relevant to programs in the Division of Undergraduate Education. This workshop is geared towards those who have not submitted a proposal to NSF and are unfamiliar with the organization. If you believe you have an idea, project or program worthy of federal support that will positively impact undergraduate education in mathematics you should attend this session. This workshop will provide information on the specific components of a NSF proposal, demonstrate the NSF peer review process, provide access to previously funded proposals and explicate the NSF merit review criteria by which proposals are evaluated. This is intended to be an interactive hands-on session where participants can have their individual questions answered and leave with more information about NSF than they had when they entered.

Hungarian Approach to Teaching Proof-Writing: Pósa's Discovery-Based Pedagogy, organized by **Péter Juhász**, MTA Rényi Institute and Budapest Semesters in Mathematics Education, **Réka Szász**, Budapest Semesters in Mathematics Education and **Ryota Matsuura**, St. Olaf College and Budapest Semesters in Mathematics Education; Thursday, 10:35–11:55 am. Lajos Pósa, a co-author of Erdős, is a Hungarian mathematician and educator.

Pósa developed a method of teaching mathematics centered on the idea that students should learn to think like mathematicians. Pósa's pedagogy uses the task thread, or a series of tasks that build on each other and gradually guide students toward understanding. By engaging with these task threads, students discover mathematical concepts through their own work. While Pósa's method was initially intended for gifted students, it has also been successfully implemented in more general school settings. The workshop will begin with a brief introduction on Pósa and his work. Then participants will experience Pósa's method by working on several task threads (intended to introduce secondary students to proof-writing), followed by discussions of the tasks. We will share our experiences of using Pósa's method in Hungarian high school classrooms. Lastly, we will describe Budapest Semesters in Mathematics Education, a study abroad program (in Budapest) in which American students learn about the Hungarian approach to mathematics education, including Pósa's method. The workshop is intended for students and faculty members interested in the learning and teaching of secondary mathematics.

Using Problem Solving and Discussions in Mathematics Courses for Prospective Elementary Teachers, organized by **Ziv Feldman**, Boston University, **Ryota Matsuura**, St Olaf College, **Suzanne Chapin**, Boston University, **Lynsey Gibbons**, Boston University and **Laura Kyser Callis**, Boston University; Thursday, 1:00–2:20 pm. National reports and policy recommendations highlight the importance of deepening pre-service elementary teachers' (PSTs') mathematical understanding and focusing on mathematical knowledge for teaching. This workshop is intended for those who teach mathematics content courses for future elementary teachers. Participants will learn about instructional materials created by the Elementary Mathematics Project (EMP) and funded by NSF. In this curriculum, PSTs engage in recurring cycles of collaborative problem solving, group discussions, and presentations that support the development of mathematical practices such as generalization and justification. Units on whole number concepts/operations and geometry will be explored. Examples of how the curriculum connects mathematical concepts, helps PSTs understand why procedures work, uses mathematical structure and illustrates children's thinking to support learning will be provided. Attendees will examine and solve problems from the curriculum and link content to the Common Core State Standards. They will discuss how to implement the EMP materials using class discussions and presentations. Videos of how instructors enacted the tasks with PSTs will be shared. Opportunities for faculty members to field test materials will be discussed.

Writing Pedagogical and Expository Papers, organized by **Janet Beery**, University of Redlands, **Matt Boelkins**, Grand Valley State University, **Susan Jane Colley**, Oberlin College, **Joanna Ellis-Monaghan**, St Michael's College, **Brian Hopkins**, St. Peter's University, **Michael Jones**, Mathematical Reviews, **Gizem Karaali**, Pomona College,

Marjorie Senechal, Smith College and **Brigitte Servatius**, Worcester Polytechnic Institute; Thursday, 2:35–3:55 pm. This hands-on workshop will be an opportunity for prospective authors to learn directly from journal editors what they look for in papers on mathematical pedagogy and/or expository mathematics for a broad audience. It will be conducted by members of the editorial boards of several journals whose focus includes mathematical pedagogy and general audience exposition: the *College Mathematics Journal*, *Convergence*, the *Journal of Humanistic Mathematics*, *Math Intelligencer*, *Mathematics Magazine*, *The American Mathematical Monthly*, *The Pi Mu Epsilon Journal*, and *PRIMUS* (Problems Resources and Issues in Mathematics Undergraduate Studies). Workshop participants are encouraged to bring to the workshop ideas, titles, abstracts, or rough outlines of prospective papers concerned with some aspect of mathematics pedagogy or with expository mathematics for a broad audience. After brief overview presentations, there will be breakout groups where editors will briefly share some primary features of representative papers published in their various journals, and where authors may discuss the specifics of their work in progress. Attendees without specific papers in mind who want to learn more about publishing pedagogical or expository papers are also welcome. Workshop will be for you.

Championing Master's Programs in Mathematics: A Forum for Advocacy, Networking, and Innovation, organized by **Michael O'Sullivan**, San Diego State University, **Nigel Pitt**, University of Maine and **Virgil Pierce**, University of Texas Rio Grande Valley; Thursday, 2:15–4:15 pm. This workshop will give leaders of master's programs an opportunity to share challenges and successes and begin to plan for greater innovation and more robust advocacy for these programs. There is considerable attention given to undergraduate education and to doctoral programs in mathematics, but it seems to the organizers that the challenges facing departments that offer master's degrees are not adequately addressed. Yet, master's programs can be a great source of innovation. We will have a series of round-table discussions with reports back in two phases. Phase 1 is oriented to assessment of the current status of programs in the country and will address the major challenges that master's programs face as well as successful innovations and ways to address these challenges. It will close by identifying pathways for strengthening master's programs, and set an agenda for the second phase, which will focus on advocacy. How can national mathematics societies and funding agencies provide more support for master's programs? How can we increase and strengthen ties between mathematics departments and business, industry and government? What sort of networking and cooperation among the master's degree institutions should we foster?

Activities of Other Organizations

This section includes scientific sessions. Several organizations or special groups are having receptions or other social events. Please see the "Social Events" section of this announcement for those details.

Association for Symbolic Logic (ASL)

This two-day program on Friday and Saturday will include sessions of contributed papers as well as Invited Addresses by **Cameron Hill**, Wesleyan University, **Antonina Kolokolova**, Memorial University of Newfoundland, **Aristotelis Panagiotopoulos**, California Institute of Technology, **Emily Riehl**, Johns Hopkins University, **Simon Thomas**, Rutgers University, **Sebastien Vasey**, Harvard University and **Keita Yokoyama**, JAIST, Japan.

See also the session cosponsored by ASL on *Set Theory, Logic and Ramsey Theory* on Wednesday morning, Thursday morning and afternoon in the "AMS Special Sessions" listings. Organizers for this session are **Andrés Caicedo**, Mathematical Reviews, and **José Mijares**, University of Colorado, Denver.

Association for Women in Mathematics (AWM)

Thirty-Ninth Annual Noether Lecture, Thursday, 10:05 am, will be given by **Jill Pipher**, Brown University, *Title to be announced*.

Association for Women in Mathematics Panel: Using Mathematics in Activism, organized by **Michelle Manes**, University of Hawaii at Manoa; Wednesday, 2:15–3:40 pm. There is a romantic notion that mathematics is somehow so pure that it is separate from the "real world" and untouched by it. However, mathematicians live in the world and are affected by it, and that in turn affects their work. Many mathematicians tackle problems and issues in their communities, in the country, and in the world. Activism can mean many things: engaging with the general public through social media or through traditional media via op ed pieces and letters to the editor; outreach with marginalized populations; advocacy work in professional organizations; and even mathematical research in the context of social and political justice. Our panelists will share their experiences as activist mathematicians and they will help lead a conversation about what we can each do to effect change around issues we care about. This session is open to all JMM attendees. Panelists include **Federico Ardila**, San Francisco State University, **Piper Harron**, University of Hawaii at Manoa, **Lily Khadjavi**, Loyola Marymount University, **Beth Malmskog**, Villanova University, **Karen Saxe**, American Mathematical Society and other panelists to be announced. sites.google.com/site/awmpanel2018/

Business Meeting, Wednesday, 3:45–4:15 pm. Chair, **Ami Radunskaya**, AWM President.

Association for Women in Mathematics Committee on Education Panel: Supporting, Evaluating and Rewarding Work in Mathematics Education in Mathematical Sciences Departments, organized by **Jacqueline Dewar**, **Pao-sheng Hsu** and **Harriet Polatsek**, AWM Education Committee; Thursday, 10:30 am–12:00 pm. Many in the mathematical community in the US, in various capacities, are involved in mathematic education at all levels—from supporting K–12 teachers, improving learning of undergraduates to professional

development of graduate students. The panel will discuss the challenges of supporting, evaluating, and rewarding work in mathematics education in departments of mathematical sciences. Panels co-sponsored by AWM Education Committee at the last two JMM focused on highlighting the breadth of work in mathematics education in departments of mathematical sciences. This panel will expand on those discussions by focusing on how such work is valued by the mathematics community. Some panelists, as well as the moderator, will be able to speak from their own administrative experiences, and some from the faculty points of view. Moderator for this panel will be **Minerva Cordero**, University of Texas at Arlington. Panelists include **Jenna Carpenter**, Campbell University, **Rebecca Garcia**, Sam Houston State University, **W. James Lewis**, University of Nebraska—Lincoln and **Thomas Roby**, University of Connecticut.

Workshop Poster Presentations and Reception, Friday, 6:00–7:15 pm. AWM will conduct its workshop poster presentations by women graduate students. AWM seeks volunteers to serve as mentors for workshop participants. If you are interested, please contact the AWM office at awm@awm-math.org. This session is open to all JMM attendees. Organizers for these presentations are **Alina Bucur**, University of California, San Diego, **Matilde Lalin**, University of Montreal and **Radmila Sazdanovic**, North Carolina State University. The Poster Judging Coordinator is **Sylvia Wiegand**, University of Nebraska at Lincoln.

AWM Workshop: Special Session on Noncommutative Algebra and Representation Theory, Saturday, 8:00 am–5:00 pm, AWM will conduct its workshop with presentations by senior and junior women researchers. Updated information about the workshop is available at www.awm-math.org. All JMM attendees are invited to attend the program. Organizers for this workshop are **Anne Shepler**, University of North Texas and **Sarah Witherspoon**, Texas A&M University.

Reception, Wednesday, 9:30–11:00 pm. See the listing in the “Social Events,” section of the announcement.

See also the session cosponsored by the AWM on *Women in Symplectic and Contact Geometry and Topology* on Friday in the “AMS Special Sessions” listings. Organizers for this session are **Bahar Acu**, Northwestern University, **Ziva Myer**, Duke University, and **Yu Pan**, Massachusetts Institute of Technology.

See also the Joint Panel on Wednesday co-sponsored by AWM in the “MAA Panels” listings: **MAA-JCW-AWM-NAM Panel: Implicit Bias and Its Effects in Mathematics**.

National Association of Mathematicians (NAM)

Granville–Brown–Haynes Session of Presentations by Recent Doctoral Recipients in the Mathematical Sciences, Friday, 1:00–4:00 pm. Organized by **Talitha Washington**, Howard University/NAM.

Cox–Talbot Address, to be given Friday after the banquet by **Erica Walker**, Teachers College, Columbia University, *Hidden in Plain Sight: Mathematics Teaching and Learning Through a Storytelling Lens*. See details about the banquet on Friday in the “Social Events” section.

Panel Discussion: Advising Our Students on the Transition to the 1st (or 0th) Year of Graduate School, Saturday, 9:00–9:50 am. The moderator for this panel will be **Duane Cooper**, Morehouse. Panelists are **Julia Anderson–Lee**, Iowa State University, **Trachette Jackson**, University of Michigan, **Doug Mupasiri**, University of Northern Iowa and **Michael Young**, Iowa State University.

Business Meeting, Saturday, 10:00–10:50 am.

Claytor–Woodward Lecture, Saturday, 1:00 pm, **Ronald Mickens**, Clark Atlanta University, *Nonstandard Finite Different Schemes: Impact, Importance, and Dynamical Consistency*. See also the Joint Panel on Wednesday co-sponsored by NAM in the “MAA Panels” listings: **MAA-AWM-NAM-JCW Panel: Implicit Bias and Its Effects in Mathematics**.

National Science Foundation (NSF)

The NSF will be represented at a booth in the exhibit area. NSF staff members will be available to provide counsel and information on NSF programs of interest to mathematicians. The booth is open the same days as the exhibitis. Times that staff will be available will be posted at the booth.

NSF-EHR Grant Proposal Writing Workshop: **Developing a Competitive Proposal for NSF-EHR**, Monday, 3:00–6:00 pm; advance registration required (see AMS Workshops). **MAA Panel: NSF Funding Opportunities to Improve Learning and Teaching in the Mathematical Sciences**, Wednesday, 2:15–4:00 pm (See MAA Panels).

Get to Know the National Science Foundation, Thursday, 9:00–10:20 am (see MAA Workshops).

National Science Foundation: Update from the Division of Mathematical Sciences, Friday, 4:00–5:30pm, organized by **Henry Warchall**, Division of Mathematical Sciences, National Science Foundation.

Pi Mu Epsilon (PME)

Council Meeting, Thursday, 8:00–11:00 am.

Rocky Mountain Consortium

Board Meeting, Friday, 2:15–4:00 pm

Society for Industrial and Applied Mathematics (SIAM)

This program consists of an Invited Address, **Tensor Decompositions: A Mathematical Tool for Data Analysis**, at 11:10 am on Thursday given by **Tamara G. Kolda**, Sandia National Laboratories, and a series of Minisymposia to include **Data Science in the Mathematics Curriculum**, **Suzanne Weekes**, Worcester Polytechnic Institute; **Numerical Linear Algebra**, **Daniel B. Szyld**, Temple University and Eugene Vecharynski, **Lawrence Berkeley National Laboratory**; **Advances in Imaging Science**, **Misha Kilmer**, Tufts University, **Eric de Sturler**, Virginia Polytechnic Institute, **Eric Miller**, Tufts University, and **Avind Saibaba**, North Carolina State University; **Tensors! Mathematical Challenges and Opportunities**, **David Gleich**, Purdue University, **Tamara G. Kolda**, Sandia National Laboratories,

and **Luke Oeding**, Auburn University; *Advances in Finite Element Approximation*, **Constantin Bacuta**, University of Delaware, and **Ana Maria Soane**, United States Naval Academy; *Mimetic Multiphase Subsurface and Oceanic Transport*, **Jose Castillo**, San Diego State University and **Chris Paolini**, San Diego State University; *Recent advances in modeling, analysis, and control in epidemiology, spatial ecology and evolution*, **Aijun Zhang**, **Vrushali Bokil** and **Patrick Deleenheer**, Oregon State University, and **Carrie Manore**, Los Alamos National Labs; and *Problems in Quasilinear Dispersive PDE*, **David Ambrose**, Drexel University, **Jeremy Marzuola**, The University of North Carolina at Chapel Hill.

MAA-SIAM-AMS Hrabowski-Gates-Tapia-McBay Session, organized by **Ricardo Cortez**, Tulane University; Wednesday, 9:00-10:20 am. The Hrabowski-Gates-Tapia-McBay Session is named after four influential scientists of color: (1) Freeman Hrabowski, President of the University of Maryland at Baltimore County; (2) James S. Gates, University of Maryland, College Park; (3) Richard Tapia, Rice University; and (4) Shirley McBay, President of Quality Education for Minorities (QEM). Through multiple mechanisms, these Sessions expect to facilitate and accelerate the participation of scientists in the building of sustainable communities of mathematicians and mathematical scientists. In particular, the intention is to systematically recruit, welcome, encourage, mentor, and support individuals from underrepresented groups in the USA. This year the session will consist of a lecture at 9:00 am given by **Talithia Williams**, Harvey Mudd College, *Mathematics for the Masses*, and a short panel discussion after the talk at 9:50 am. The 2018 panel will focus on *Access to Quality Mathematics by All*. Panelists and attendees will discuss issues related to removing roadblocks in mathematics education (e.g. Tracking, placement, 'weed out' courses, etc) as well as hiring or award selection practices that tend to favor the majority groups that have influence. Panelists will also address the question: What are the roles and responsibilities do mathematicians and mathematics educators have in creating a just and accessible system? Panelists will include **Ron Buckmire**, NSF, **James Alvarez**, University of Texas at Arlington, and **Talithia Williams**, Harvey Mudd College. This event is sponsored by the MAA Committee on Minority Participation in Mathematics, SIAM and the AMS.

AMS-MAA-SIAM Panel on Multiple Paths to Mathematics Careers in Business, Industry and Government (BIG), organized by **Allen Butler**, Daniel H Wagner Associates, **Rachel Levy**, Harvey Mudd College, **Douglas Mupasiri**, University of Northern Iowa and **Suzanne Weekes**, Worcester Polytechnic Institute; Thursday, 2:35-3:55 pm. The proportion of new mathematics doctoral recipients who are taking jobs in business, industry and government (BIG) is growing. Still, many mathematics PhD programs do not include preparation for non-academic career options as part of their standard curriculum. At this panel, you will have the opportunity to hear about multiple career paths to employment in BIG. Panelists will share (a) what they

wish they had known and done as graduate students/post-docs, (b) what you can do at your career stage if you are interested in making connections with business, industry or government, and (c) what suggestions they have for math doctoral programs to increase preparedness of their students for work in BIG. Co-sponsors for this panel are AMS, MAA, and SIAM.

See also the AMS-MAA-SIAM Special Session on *Research in Mathematics by Undergraduates and Students in Post-Baccalaureate Programs* on Wednesday morning, Thursday afternoon, Saturday morning and afternoon in the "AMS Special Session" listings. The organizers for this session are **Tamas Forgacs**, CSU Fresno, **Darren A. Narayan**, Rochester Institute of Technology, and **Mark David Ward**, Purdue University.

Other events

MAA-JCW-AWM-NAM Panel: Implicit Bias and Its Effects in Mathematics, organized by **Semra Kilic-Bahi**, Colby-Sawyer College, **Maura Mast**, Fordham College at Rose Hill, **Naomi Cameron**, Lewis & Clark College, **Andrew Cahoon**, Colby-Sawyer College, and **Charles Doering**, University of Michigan; Wednesday, 4:15-5:35 pm. Implicit bias occurs when someone explicitly rejects stereotypes and prejudices, but unconsciously holds negative (mostly) associations. People are not hiding their prejudices, but rather, they just do not know they have these unconscious feelings or thoughts that affect their decision-making and behavior. Social scientists are identifying implicit biases as one of the most pervasive barriers to equal opportunities for minorities and women in today's society. This panel discussion addresses how implicit bias might manifest and affect our classrooms, departments, and campuses in terms of academic and scholarly opportunities and evaluations. Panelists are **Ron Buckmire**, National Science Foundation, **Jenna P. Carpenter**, Campbell University, **Lynn Garrioch**, Colby-Sawyer College, **Joanna Kania-Bartoszynska**, National Science Foundation, and **Francis Edward Su**, Harvey Mudd College. This panel is sponsored by the MAA Committee on the Participation of Women in Mathematics; Committee on the Minority Participation in Mathematics; Association for Women in Mathematics; National Association of Mathematicians; and the Joint Committee on the Participation of Women in Mathematics.

Mathematical Art Exhibition, organized by **Robert Fathauer**, Tessellations Company, **Nathan Selikoff**, Digital Awakening Studios, and **Elizabeth Whiteley**, studio artist, Washington, DC, and supported by the Special Interest Group of the MAA for Mathematics and the Arts, and the Bridges Organization. A popular feature at the Joint Mathematics Meetings, this exhibition provides a break in your day. On display are works in various media by artists who are inspired by mathematics and by mathematicians who use visual art to express their findings. Topology, fractals, polyhedra, and tiling are some of the ideas at play here. Do not miss this unique opportunity for a different perspective on mathematics. The exhibition will be located

inside the Joint Mathematics Exhibits and open during the same exhibit hours.

Summer Program for Women in Mathematics (SPWM) Reunion, organized by **Murli M. Gupta**, George Washington University; Thursday, 1:00–3:00 pm. This is a reunion of the summer program participants from all 19 years (1995–2013) who are in various states of their mathematical careers: some are students and, others are in various jobs, both in academia as well as government and industry. The participants will describe their experiences relating to all aspects of their careers. There will also be a discussion on the increasing participation of women in mathematics over the past two decades and the national impact of SPWM and similar programs. See www.gwu.edu/~spwm.

Mathemati-Con

Events will take place on Saturday, January 13 between 9:00 am and 4:00 pm in a variety of locations at the JMM.

Some special presentations slated to be included in this program are the Who Wants to Be a Mathematician Championship, demonstrations of both Math Circles and Math Wrangles provided by the MAA SIGMAA on Math Circles for Students and Teachers, an Interactive Lecture for Teachers and Students presented by James Tanton, the 2018 Mathematical Art Exhibition, and much more, concluding with the MAA-AMS-SIAM Gerald and Judith Porter Public Lecture “Political Geometry: Voting Districts, ‘Compactness,’ and Ideas About Fairness,” by Moon Duchin, Tufts University. All events on the Mathemati-Con program are open to the public.

Mathematical Art Exhibition, organized by **Robert Fathauer**, Tessellations Company; **Nathan Selikoff**, Digital Awakening Studios, and **Elizabeth Whiteley**, studio artist, Washington, DC, and supported by the Special Interest Group of the MAA for Mathematics and the Arts, and the Bridges Organization. A popular feature at the Joint Mathematics Meetings, this exhibition provides a break in your day. On display are works in various media by artists who are inspired by mathematics and by mathematicians who use visual art to express their findings. Topology, fractals, polyhedra, and tiling are some of the ideas at play here. Do not miss this unique opportunity for a different perspective on mathematics. The exhibition will be located inside the Joint Mathematics Exhibits and open during the same exhibit hours.

Interactive Lecture for Students and Teachers: Mathematics to the Rescue: How to Fold a Tie, organized by **Elgin Johnston**, Iowa State University; Saturday, 10:00–10:50 am. Presenter, **James Tanton**, MAA Mathematician at Large, welcomes students of all ages, and teachers, parents, mathematicians, and math enthusiasts of all ages. James Tanton explains: I have a personal problem. I travel a great deal and often have to pack a tie in my suitcase. I can’t lay the tie out flat in the case, nor can I fold the tie in half and lay out the folded tie, as the case is too short. Folding the tie into quarters leaves a crease mark later visible on my chest. Ideally, I should fold my tie into perfect thirds. How does one do that? Actually, years of careful data gathering shows that I tend

to wear my ties with twenty-seven sixty-fourths of their length showing at front. Can I fold my tie at that position? Fortunately, brilliant mathematics can solve my personal tie folding problem. Let me show you how! (And can this mathematics solve other problems in my life too?) Sponsored by the MAA Council on Outreach.

Who Wants to Be a Mathematician Championship, organized by **Michael A. Breen**, American Mathematical Society, and **William T. Butterworth**, DePaul University; Saturday, 1:00 pm–2:45 pm. Show your support for top high school students from the US, Canada, and the UK in the first international Who Wants to Be a Mathematician as they compete for a US\$5,000 first prize for themselves and US\$5,000 for their school’s math department. Semifinals are at 1:00 pm and finals are at 2:00 pm. Come match wits with the contestants and support their mathematical achievement.

Math Circle Demonstration, organized by **Alessandra Pantano**, University of California Irvine, and **Amanda Serenevy**, Riverbend Community Math Center; Saturday-morning. A math circle is an enrichment experience that brings mathematics professionals in direct contact with pre-college students and/or their teachers. Circles foster passion and excitement for deep mathematics. This demonstration session offers the opportunity for conference attendees to observe and then discuss a math circle experience designed for local students. While students are engaged in a mathematical investigation, mathematicians will have a discussion focused on appreciating and better understanding the organic and creative process of learning that circles offer, and on the logistics and dynamics of running an effective circle. The sponsor for this demonstration is SIGMAA MCST.

Math Wrangle, organized by **Ed Keppelmann**, University of Nevada Reno, and **Phil Yasskin**, Texas A&M University, Saturday afternoon. The Math Wrangle will pit teams of students against each other, the clock, and a slate of great math problems. The format of a Math Wrangle is designed to engage students in mathematical problem solving, promote effective teamwork, provide a venue for oral presentations, and develop critical listening skills. A Math Wrangle incorporates elements of team sports and debate, with a dose of strategy tossed in for good measure. The intention of the Math Wrangle demonstration at the Joint Math Meetings is to show how teachers, schools, circles, and clubs can get students started in this exciting combination of mathematical problem solving with careful argumentation via public speaking, strategy and rebuttal. Sponsors for this event is SIGMAA for Math Circles for Students and Teachers (SIGMAA-MCST).

Moon Duchin, Tufts University, *Political Geometry: Voting districts, “compactness,” and ideas about fairness*, (MAA-AMS-SIAM Gerald and Judith Porter Public Lecture); Saturday, 3:00 pm.

Welcoming Environment Policy

The AMS and MAA strive to ensure that participants in the Joint Mathematics Meetings (JMM) enjoy a welcoming environment. In all JMM activities, the two organizations

seek to foster an atmosphere that encourages the free expression and exchange of ideas. The AMS and MAA support equality of opportunity and treatment for all participants, regardless of gender, gender identity or expression, race, color, national or ethnic origin, religion or religious belief, age, marital status, sexual orientation, disabilities, or veteran status.

Harassment is a form of misconduct that undermines the integrity of JMM activities as well as the AMS and MAA missions. The AMS and MAA will make every effort to maintain an environment that is free of harassment, even though they do not control the behavior of third parties. A commitment to a welcoming environment is expected of all attendees at JMM activities, including mathematicians, students, guests, staff, contractors and exhibitors, and participants in scientific sessions and social events. To this end, the AMS and MAA will include a statement concerning their expectations toward maintaining a welcoming environment in registration materials, and have put in place a mechanism for reporting violations. Violations may be reported confidentially and anonymously to 855-282-5703 or at www.mathsociety.ethicspoint.com. The reporting mechanism ensures the respect of privacy while alerting the AMS and MAA to the situation.

Exhibits

The Joint Mathematics Meetings Exhibits include the country's leading scientific publishers, professional organizations, companies that offer mathematics-enrichment products and services, computer hardware and software companies, and the Mathematical Art Exhibit. It will be open to all registered participants on Wednesday (starting with the Grand Opening) 12:15 pm–5:30 pm, on Thursday and Friday 9:30 am–5:30 pm and on Saturday 9:00 a–noon. See more details at jointmathematicsmeetings.org.

AMS Book Sales and Membership: The American Mathematical Society booth, located in the Exhibit Hall, is where attendees will find the latest AMS titles, fun giveaways, mathematics awareness materials, and information about programs available to the mathematical community. Make sure to visit the booth to track your Mathematical Genealogy or attend a demonstration of MathSciNet, both offered daily throughout the meeting.

If you join the AMS or renew your membership during the meeting, you will receive a complimentary gift and will be able to start using your member discount on AMS titles right away. Make sure to ask about our new membership benefit, free shipping on all purchases, not just at meetings but also on orders placed online, phoned in, faxed, or sent via postal mail. This year, as an exclusive member benefit, the AMS Membership Department has arranged for a photographer to take professional portraits that will be available electronically within minutes. Visit amermathsoc.simplybook.me to schedule an appointment.

Attendees are invited to the booth to see the unveiling of the AMS's new logo. While you're there, take advantage of the special exhibit discounts that will be offered on most AMS titles, 40% off list price for members and 25%

off for all other attendees. All orders that are purchased on-site are eligible for free shipping.

MAA Book Sales and Membership: Join fellow mathematicians in the exhibit hall at the Mathematical Association of America Pavillion, Booth 120. Take a break in our lounge, find your dream job with the MAA Career Resource Center, talk to staff about programs and resources for your research and classroom, renew your membership, and learn how **MAA advances the understanding of mathematics and its impact on our world.**

Mathematical Art Exhibit: This exhibit is organized by **Robert Fathauer**, Tessellations Company, **Nathan Selikoff**, Digital Awakening Studios, and **Elizabeth Whiteley**, studio artist, Washington, DC, and supported by the Special Interest Group of the MAA for Mathematics and the Arts, and the Bridges Organization. A popular feature at the Joint Mathematics Meetings, this exhibition provides a break in your day. On display are works in various media by artists who are inspired by mathematics and by mathematicians who use visual art to express their findings. Topology, fractals, polyhedra, and tiling are some of the ideas at play here. Do not miss this unique opportunity for a different perspective on mathematics. The exhibition will be located inside the Joint Mathematics Exhibits and open during the same exhibit hours.

Hotel Accommodations

The importance of reserving a hotel room at one of the official Joint Mathematics Meetings (JMM) hotels cannot be stressed enough. The AMS and the MAA make every effort to keep participants expenses at the meeting, registration fees, and hotel rooms for the meeting as low as possible. They work hard to negotiate the best hotel rates and to make the best use of your registration dollars to keep the meetings affordable. The AMS and MAA encourage all participants to register for the meeting. When anyone pays the registration fee and reserves a room with an official JMM hotel, he or she is helping to support not only the JMM in 2018, but also future meetings.

General: Participants are encouraged to register for the JMM in order to reserve hotel rooms at the contracted JMM rates. If a participant needs to reserve a hotel room before they are registered for the JMM, he or she must contact the Mathematics Meetings Services Bureau (MMSB) at mmsb@ams.org or 1-800-321-4267 ext. 4137 or ext. 4144 for further instructions.

Special rates have been negotiated exclusively for this meeting at the following hotels:

Marriott Marquis San Diego Marina, Embassy Suites Hotel San Diego Bay, Manchester Grand Hyatt San Diego, Omni Hotel San Diego, Hilton Gaslamp San Diego, Hard Rock Hotel San Diego, Best Western Plus Bayside Inn, Solamar Hotel San Diego, Palomar Hotel San Diego, Horton Grand Hotel, and Porto Vista Hotel. (See details on these hotels below.)

To receive the JMM rates, reservations for these hotels must be made through the MMSB. The hotels will not be able to accept reservations directly until after **December 15, 2017**, and at that time, rooms and rates will be based on availability. Any rooms reserved directly with the hotels after **December 15, 2017** are subject to rates higher than the JMM rates.

A link to the 2018 JMM housing site will be included in the email confirmations of all registrations. If a participant needs to have the link emailed to him or her, please send the request to mmsb@ams.org. If anyone is having problems reserving a hotel room, please send email to mmsb@ams.org.

Any participant who needs to reserve a hotel room and does not have a credit card, he or she should contact the MMSB at mmsb@ams.org for further instructions. If a check is being used to reserve a hotel room, the reservation and check must be received by the MMSB no later than **December 5, 2017**.

ADA Accessibility: We strive to take the appropriate steps required to ensure that no individual with a disability is excluded, denied services, segregated, or otherwise treated differently. If special assistance, auxiliary aids, or other reasonable accommodations to fully participate in this meeting is required, it should be indicated in the appropriate section on the Registration and Housing Form or emailed to the MMSB at mmsb@ams.org. Requests for ADA-accessible rooms should also be clearly indicated when making hotel reservations. All requests for special

accommodations under the Americans with Disabilities Act of 1990 (ADA) must be made allowing enough time for evaluation and appropriate action by the AMS and MAA. Any information obtained about any disability will remain confidential.

Cancellation Policies: All of the official 2018 JMM hotels have a 72-hour cancellation policy.

Check-in/Check-out: Check-in at 3:00 pm and check-out at 11:00 am: Porto Vista Hotel

- Check-in at 3:00 pm and check-out at noon: Omni Hotel San Diego, Hilton Gaslamp San Diego, Best Western Plus Bayside Inn, and Horton Grand Hotel
- Check-in at 4:00 pm and check-out at 11:00 am: Marriott Marquis San Diego Marina, Embassy Suites Hotel San Diego Bay, Hard Rock Hotel San Diego, Solamar Hotel San Diego, and Palomar Hotel San Diego
- Check-in at 4:00 pm and check-out at noon: Manchester Grand Hyatt San Diego

Confirmations: An email confirmation number will be provided for each hotel reservation made online. This confirmation number will give participants direct access to edit their reservations up to **December 15, 2017**. Those who did not receive a confirmation number or who have any questions about the reservation process should contact the MMSB at mmsb@ams.org or 1-800-321-4267, ext. 4137 or 4144.

Complimentary Room Drawing: Participants who register and reserve a hotel room by **October 31, 2017**, will be included in a lottery for complimentary hotel room nights during the meeting. Rooms with multiple occupants will be included. The winners will be notified by phone and/or email prior to **December 19, 2017**.

Deadlines:

- Chance to win complimentary hotel nights: **October 31**
- In time to have badge/program mailed in December: **November 22**
- Hotel Reservation Changes, and Cancellations through the MMSB: **December 6**

Environmental Policies: All of the hotels listed have environmental-friendly programs in place.

Internet Access/Wireless:

- Complimentary wireless internet in all public areas, the lobby, and all sleeping rooms: Embassy Suites Hotel San Diego Bay, Manchester Grand Hyatt San Diego, Omni Hotel San Diego, Hard Rock Hotel San Diego, Best Western Plus Bayside Inn, Solamar Hotel San Diego, Palomar Hotel San Diego, Horton Grand Hotel, and Porto Vista Hotel
- Complimentary wireless is all public places and the lobby. A daily charge of US\$12.95 for wired or wireless internet in the sleeping rooms: Hilton Gaslamp San Diego
- Complimentary wireless in all public places and the lobby. All JMM participants who are Marriott Rewards Members and who provide their Marriott Rewards Number on their reservations will receive complimentary "essential" wireless access in their guest

MEETINGS & CONFERENCES

rooms during the JMM at the Marriott Marquis San Diego Marina. Any JMM participants who do not have a Marriott Rewards number will be charged US\$1.00 per day for “essential” wireless access in their guest rooms during the JMM. To sign up for a free membership to Marriott Rewards, visit www.marriott.com/rewards/createAccount/createAccountPage1.mi?segmentId=elite.nonrewards. Note that “essential” wireless access will be high speed internet access that is good for checking emails and smaller tasks. It will not be good for streaming.

Location: The Marriott Marquis San Diego Marina will be the headquarter hotel for this meeting. The JMM Registration Desk, exhibits, poster sessions, scientific sessions, and AMS Employment Center will be located in the San Diego Convention Center. Committee meetings, social events and affiliate events will be held in both the Marriott Marquis San Diego and the San Diego Convention Center. These properties are located approximately 500 feet from each other.

Marriott Marquis San Diego Marina (headquarter), 333 West Harbor Drive, San Diego, CA 92101. Room Rates are US\$207 for a city view single/double; US\$222 for a bay view single/double and US\$147 for a city view student rate single/double room. This property is a smoke-free hotel. Restaurants located on-site include Marina Kitchen Restaurant & Bar; Tequila Bar & Grille; Roy’s; Exchange and Starbucks. Amenities at this property include an outdoor pool, fitness center open limited hours and a 24-hour business center available to registered guests. Full amenities are available in guest rooms including laptop-sized safes and some rooms with windows that open. Children under 17 are free in a room with an adult and cribs are available upon request at no additional charge. Rollaways are available for use only in king-bedded rooms. No pets are allowed at this property. Valet parking is available for a charge of US\$35 per day with in/out privileges. Parking rates are subject to change. This hotel does not offer an airport shuttle. Confirmations will be sent by email only.

Embassy Suites Hotel San Diego Bay, 601 Pacific Highway, San Diego, CA 92101. Room Rates for this property are US\$180 for a single/double and US\$160 for a student rate single/double room. This property is a smoke-free hotel. Restaurants located on-site include the Lobby Restaurant & Bar and Dunkin Donuts. Amenities at this property include a fitness center, indoor pool and a 24-hour business center available to registered guests. Full amenities are available in guest rooms including laptop-sized safes and some rooms with windows that open. Children under 18 are free in a room with an adult and cribs are available upon request at no additional charge. Rollaways are not available. No pets are allowed at this property. Valet parking is available for a charge of US\$46 per day with in/out privileges. Parking rates are subject to change. This hotel does not offer an airport shuttle. Confirmations will be sent by email only.

Manchester Grand Hyatt San Diego, One Market Place, San Diego, CA 92101. Room Rates at this property are

US\$179 for a single, US\$189 for a double and US\$147 for a student rate single/double room. This property is a smoke-free hotel. Restaurants located on-site include the Seaview Breakfast Buffet Restaurant, Market One, Sally Fish House & Bar, the Grand Lobby Bar, Redfield’s Sports Bar, and the Top of the Hyatt. Amenities at this property include a fitness center, outdoor pool and 24-hour business center available to registered guests. Full amenities are available in guest rooms including laptop-sized safes and some rooms with windows that open. Children under 18 are free in a room with an adult and cribs are available upon request at no additional charge. Rollaways are available only in king-bedded rooms. Pets are allowed at this property; pets are restricted to 50 pounds or under for one pet, or 75 pounds or under for 2 pets. There will be a US\$100 fee assessed for pet cleaning per stay (up to 6 nights). Valet parking is available for a charge of US\$49 per day with in/out privileges. Parking rates are subject to change. This hotel does not offer an airport shuttle. Confirmations will be sent by email only.

Omni Hotel San Diego, 675 L Street, San Diego, CA 92101. Room Rates are US\$179 for a single, US\$189 for a double and US\$147 for a student rate single/double room. This property is a smoke-free hotel. Restaurants located on-site include McCormick & Schmick’s and Zumbido. Amenities at this property include a fitness center, outdoor pool and 24-hour business center available to registered guests. Full amenities are available in guest rooms including laptop-sized safes and some rooms with windows that open. Children under 17 are free in a room with an adult and cribs are available upon request at no additional charge. Rollaways are available only in king-bedded rooms. This property allows cats only, not exceeding 25 pounds, with a US\$50 non-refundable cleaning deposit fee due upon check-in. Valet parking is available for a charge of US\$47 per day with in/out privileges. Parking rates are subject to change. This hotel does not offer an airport shuttle. Confirmations will be sent by email only.

Hilton Gaslamp San Diego, 401 K Street, San Diego, CA 92101. Room Rates are US\$176 for a single/double and US\$158 for a student rate single/double room. This property is a smoke-free hotel. On-site restaurant at this property is New Leaf Restaurant. Amenities available at this property include a fitness center, outdoor pool and 24-hour business center available to registered guests. Full amenities are available in guest rooms including laptop-sized safes and some rooms with windows that open. Children under 18 are free in a room with an adult and cribs are available upon request at no additional charge. Rollaways are available only in king-bedded rooms. Pets are allowed at this property with a US\$75 non-refundable deposit plus a US\$75 per day fee. Valet parking is available for a charge of US\$49 per day with in/out privileges. Parking rates are subject to change. This hotel does not offer an airport shuttle. Confirmations will be sent by email only.

Hard Rock Hotel San Diego, 207 Fifth Avenue, San Diego, CA 92101. Room Rates are US\$170 for a single/double and US\$159 for a student rate single/double room.

This property is a smoke-free hotel. Restaurants located onsite include Float Rooftop Pool & Lounge, 207 Bar, Mary Jane's Diner, and Nobu. Amenities at this property include a fitness center, outdoor pool and 24-hour business center available to registered guests. Full amenities are available in guest rooms including laptop-sized safes and some rooms with windows that open. Children under 18 are free in a room with an adult and cribs are available upon request at no additional charge. Rollaways are available only in king-bedded rooms. No pets are allowed at this property. Valet parking is available for a charge of US\$49 per day with in/out privileges. Parking rates are subject to change. This hotel does not offer an airport shuttle. Confirmations will be sent by email only.

Best Western Plus Bayside Inn, 555 West Ash Street, San Diego, CA 92101. Room Rates are US\$165 for a single/double and US\$155 for a student rate single/double room. This property is a smoke-free hotel. On-site restaurant is the Bayside Bar & Grill. Amenities at this property include a fitness center, outdoor pool and a 24-hour business center available to registered guests. Full amenities are available in guest rooms including laptop-sized safes and a balcony in each room. Children under 18 are free in room with an adult and cribs are available upon request at no additional charge. Rollaways are available only in king-bedded rooms. No pets are allowed at this property. Self-parking only is available for a charge of US\$18 per day with in/out privileges. Parking rates are subject to change. This hotel offers a courtesy airport shuttle. Confirmations will be sent by email only.

Solamar Hotel San Diego, 435 Sixth Avenue, San Diego, CA 92101. Room Rates are US\$165 for a single/double and US\$149 for a student rate single/double. This property is a smoke-free hotel. Restaurants located on-site include Jsix and Upper East. Amenities at this property include a fitness center and outdoor pool. All front desk agents are available to assist with business center needs. Full amenities are available in guest rooms including laptop-sized safes and windows that open in all rooms. Children under 18 are free in a room with an adult and cribs are available upon request at no additional charge. Rollaways are available only in king-bedded rooms. Pets are allowed at this property. Valet parking is available for a charge of US\$47 per day with in/out privileges. Parking rates are subject to change. This hotel does not offer an airport shuttle. Confirmations will be sent by email only.

Palomar Hotel San Diego, 1047 Fifth Avenue, San Diego, CA 92101. Room Rates are US\$160 for a single/double and US\$149 for a student rate single/double room. This property is a smoke-free hotel. The on-site restaurant at this hotel is Curedero. Amenities at this property include a fitness center, outdoor pool and a 24-hour business center available to registered guests. Full amenities are available in guest rooms including laptop-sized safes in guest rooms and some rooms with windows that open. Children under 18 are free in a room with an adult and cribs are available upon request at no additional charge. Rollaways are not available. Pets are allowed at this prop-

erty. Valet parking is available for a charge of US\$45 per day with in/out privileges. Parking rates are subject to change. This hotel does not offer an airport shuttle. Confirmations will be sent by email only.

Horton Grand Hotel, 311 Island Avenue, San Diego, CA, 92101. Room Rates are US\$159 for a single/double and US\$139 for a student rate single/double room. This property is a smoke-free hotel. The on-site restaurant at this hotel is Ida Bailey's. Amenities at this property include a fitness center and a 24-hour business center available to registered guests. Full amenities are available in guest rooms. Safes are available behind the front desk. Windows in guest rooms do not open. Children under 18 are free in a room with an adult and cribs are available upon request at no additional charge. Rollaways are not available. Pets are not allowed at this property. Valet parking is available at a charge of US\$42 per day with in/out privileges. Parking rates are subject to change. This hotel does not offer an airport shuttle. Confirmations will be sent by email only.

Porto Vista Hotel, 1835 Columbia Street, San Diego, CA, 92101. Room Rates are US\$125 for a single/double room. This property is a smoke-free hotel. The on-site restaurant at this hotel is the Glass Door. Amenities at this property include a fitness center, outdoor pool and a 24-hour business center available to registered guests. Full amenities are available in guest rooms including laptop-sized safes and windows that open in all rooms. Children under 18 are free in a room with an adult and cribs are available upon request at no additional charge. Rollaways are not available. Pets, up to 40 lbs in weight, are allowed with a US\$25 per day fee. Pets are not allowed to stay in a room unattended. Valet parking is available for a charge of US\$25 per day with in/out privileges. Parking rates are subject to change. This hotel offers an airport shuttle from 7:00 am to 8:00 pm. Confirmations will be sent by email only.

Parking: Please see the *Parking* section under "Travel" for any additional parking options. Parking information for each hotel is listed below.

Rates: All rates are subject to applicable local and state taxes in effect at the time of check-in; currently 10.5% state tax, the San Diego Tourism Marketing District assessment 2% tax, and the CA Tourism fee of US\$0.77 per night.

Miscellaneous

Audio-Visual Equipment: AMS Special Sessions and Contributed Papers, and MAA Invited and Contributed Paper Sessions, are provided with a screen and a LCD projector for projecting presentation slides. Blackboards, white boards, and transparency projectors are not available. Session rooms do not include an Internet connection or sound connection for videos or sound clips. For presentations using MAC computers, speakers are advised to bring the proper adaptors and equipment needed. LCD projectors are equipped with adapters to accept both VGA & HDMI cables

Invited address talks (50-minutes long) are provided with a lectern, PC Laptop with Microsoft Office Suite including PowerPoint, wireless microphone, laser pointer, wireless slide advancer "clicker," document camera (for

print materials and transparencies), and LCD projector for projecting presentation slides on large stage flanking screens. For presentations using MAC materials, speakers are advised to bring the proper adaptors and equipment needed. The Invited Address room does not include an Internet connection. Speakers that are planning to show videos should save them to their computers or USB drives prior to the meeting.

Overhead projectors are no longer provided as part of the standard audio-visual setup in any room. Any request for additional equipment should be sent to meet@ams.org and received by November 1.

Child Care: The AMS and the MAA will provide a limited number of reimbursement grants of US\$250 per family to help with the cost of child care for registered participants at JMM 2018. The funds may be used for child care that frees a parent to participate more fully in JMM. Registration for the JMM as well as membership in the AMS or MAA is required to apply for this program.

Information about applying for child care grants will be available prior to the opening of advance registration in September; watch the JMM website for details. Applications will be accepted on a first-come, first-served basis until **November 7, 2017**. Final decisions on recipients will be made on or before **November 28, 2017**. All grant funds will be provided in the form of a check which will be issued at the JMM.

Email Services: Limited email access for all Joint Meetings participants will be available in an email center located in Exhibit Hall B1, on the ground level of the San Diego Convention Center. The hours of operation will be published in the program. Participants should be aware that **complimentary wireless internet access** will also be available in specific, designated areas of the Convention Center. These locations will be identified in the program.

Information Distribution: Tables are set up in the exhibit area for dissemination of general information of possible interest to the members and for the dissemination of information of a mathematical nature not promoting a product or program for sale. Information must be approved by the AMS Director of Meetings and Conferences prior to being placed on these tables.

If a person or group wishes to display information of a mathematical nature promoting a product or program for sale, they may do so in the exhibit area at the Joint Books, Journals, and Promotional Materials exhibit for a fee of US\$50 (posters are slightly higher) per item. Please contact the exhibits coordinator, MMSB, PO Box 6887, Providence, RI 02940, or by email at cpd@ams.org for further details.

The administration of these tables is in the hands of the AMS-MAA Joint Meetings Committee, as are all arrangements for Joint Mathematics Meetings.

Local Information: For information about the city, see visitsandiego.com

Broadcasting, Photographing, and Videotaping Policy: Each invited address (50+minutes long) that takes place in the Invited Address room will be recorded, with the permission of the speaker, and posted online on a webpage hosted by the Joint Mathematics Meetings. These recordings will

be taken by a professional videographer hired by the Joint Mathematics Meetings.

The recording or broadcasting of any AMS or joint-sponsored event, talk, and session by any other party is strictly forbidden without the explicit written permission of the AMS Executive Director or AMS Director of Meetings and Conferences. To obtain permission, send your request by email to meet@ams.org to the attention of the AMS Director of Meetings and Conferences. Having submitted a request form does not constitute temporary authority, and approval will not be given orally. Please allow sufficient time for the approval process to be completed. Allow at least two weeks from time of receipt of request by the AMS.

The recording or broadcasting of any MAA sponsored event by any other party is strictly forbidden without the explicit written permission of the Mathematical Association of America. To obtain permission to record and/or broadcast an MAA event or activity, complete the information requested in the Request to Record or Broadcast form on maa.org and send your request to the MAA Executive Director. You must have received a signed form granting approval for recording and/or broadcasting an MAA event before the event takes place. Having submitted a request form does not constitute temporary authority, and approval will not be given orally. Please allow sufficient time for the approval process to be completed. Allow at least two weeks from time of receipt of request by the MAA office.

Photographs and videos of meeting interactions will be taken by professional photographers hired by the Joint Mathematics Meetings or by AMS and MAA staff. These photographs and videos may occasionally be used for publicity purposes. By participating in the Joint Mathematics Meetings, participants acknowledge that their photograph or a video that includes them may be published in material produced by the Joint Mathematics Meetings, AMS or MAA. AMS and MAA are not responsible for unauthorized photographs, videos, or other images not taken by professional photographers hired by the Joint Mathematics Meetings or AMS and MAA staff.

Under no circumstances will anyone be permitted to take pictures of an exhibitor's product without permission of the exhibitor.

Telephone Messages: It will be possible to leave a message for any registered participant at the meetings registration desk from January 10 through 13 during the hours that the desk is open. These messages will be posted on the Mathematics Meetings Message Board in the networking center; however, staff at the desk will try to locate a participant in the event of a bona fide emergency. The telephone number will be published in the program and daily newsletter.

Registration

The importance of registering for the meeting cannot be overemphasized. Advanced registration fees are considerably lower than on-site registration fees. The AMS and the MAA encourage all participants to register for the meeting. When a participant pays a registration fee, he or she

is helping to support a wide range of activities associated with planning, organizing, and executing the meetings.

All participants who wish to attend sessions are expected to register and should be prepared to show their badges, if so requested. Badges are required to enter the Joint Mathematics Meetings (JMM) Exhibits, the Employment Center, to obtain discounts at the AMS and MAA Book Sales, and to cash a check with the Joint Meetings cashier.

All JMM registrations are processed by the Mathematics Meetings Service Bureau (MMSB). Participants who register by **November 22, 2017**, may receive their badges, programs, and tickets (where applicable) in advance by US mail, approximately three weeks before the meetings. Those who do not want their materials mailed should check the appropriate box on the Registration and Housing Form. Materials cannot be mailed to Canada, Mexico, or other countries outside of the US. Participants from these countries must pick up their materials at the Joint Meetings Registration Desk, which will be located inside exhibit hall B of the San Diego Convention Center. Please note that a replacement fee of US\$5 will be charged for badges that were mailed but not brought to the meeting.

Online Registration: To register and reserve a hotel room online, visit www.jointmathematicsmeetings.org/register. VISA, MasterCard, Discover, and American Express are the only methods of payment accepted for online registrations, and charges to credit cards will be made in US funds. Registration acknowledgments will be sent by email to the email addresses provided.

Paper Form Registration: For the convenience of those who do not have access to the internet or who prefer to not use the internet to register and reserve a hotel room, a paper copy of the registration form is located at the back of this issue. It is also located at www.jointmathematicsmeetings.org/meetings/national/jmm2018/JMM18_regform.pdf. If you are using this method to register for the meeting and do not have a credit card, please contact the MMSB at mmsb@ams.org for further instructions. If you are using a check to reserve your hotel room, your reservation and check must be received by the MMSB no later than **December 1, 2017** to ensure that your check is validated and reaches the hotel in time to hold your room.

Forms must be mailed or faxed to the MMSB at MMSB, PO Box 6887, Providence, RI 02940 or 401-455-4004. For security reasons, credit card numbers by postal mail, email or fax cannot be accepted. If a participant is registering by paper form and would like to pay for his or her registration via credit card, he or she should indicate this on the form. MMSB staff will then contact that person.

Programs: NEW! In an effort to make the JMM more environmentally friendly as well as save on printing expenses to the meeting, the JMM program books will **now only be distributed to participants who ask for them.**

Updates and corrections received too late for the printed program will be reflected in the online program on the JMM website and in the JMM mobile app. Therefore, participants will be encouraged to explore the features

and functionality available to them through these digital options, which give them easier access to the most up-to-date program as well as other meeting information.

To receive a program book, please check the “yes” button in the appropriate section on the Registration and Housing Form. If you do not want to receive a program booklet, please check the “no” button. Note that extra copies of the program book will be available onsite at the meeting for those that inadvertently checked the wrong button, while supplies last.

Badges: All registered participants (including guests) for the meeting will receive a badge. Each badge of a registered mathematician will include an embedded vCard (electronic business card) in the form of a QR Code; placed on the back of the badge. This code will include name, postal address, phone number, email address, and subject classification code (if given). It will enable exhibitors to retrieve the same information they would retrieve from a business card, but with one quick scan. Any participant may choose to not have an exhibitor scan his or her badge.

Participant Lists and Mailing Lists: If a participant would like to opt-out of any mailing lists or participant lists that are generated for the meeting, he or she should check the appropriate box on the Registration and Housing Form. All participants who do not opt-out will be included in all mailing lists and participant lists that are generated and distributed for the meeting.

Cancellation Policy: Participants who cancel their registrations for the meetings, minicourses, short course, or banquet tickets by **January 4, 2018**, will be eligible to receive a 50% refund of fees paid. No refunds will be issued after this date.

Joint Mathematics Meetings Registration Fees

	Advanced (by Dec. 20)	At Meeting
Member of AMS, ASL, CMS, MAA, SIAM	US\$329	US\$433
Non-member	522	666
Graduate Student Member of AMS, ASL, CMS, MAA, SIAM	74	86
Graduate Student Non-member	118	130
Undergraduate Student Member of AMS, ASL, CMS, MAA, PME, KME, SIAM	74	86
Undergraduate Student Non-member	118	130
Temporarily Employed	268	307
Emeritus Member of AMS, MAA; Unemployed; High School Teacher; Developing Countries; Librarian	74	86
High School Student	7	14
One-Day Member of AMS, ASL, CMS, MAA, SIAM	N/A	235
One-Day Non-member	N/A	367
Non-mathematician Guest	21	21
Commercial Exhibitor	0	0
MAA Minicourses	100	100
Grad School Fair Table	125	125

MEETINGS & CONFERENCES

AMS Short Course:

Member of AMS	114	148
Non-member	175	205
Student/Unemployed/Emeritus	62	83

Registration Category Definitions

Full-Time Students: Any person who is currently working toward a degree or diploma is eligible for this category. Students are asked to determine whether their status can be described as a graduate (working toward a degree beyond the bachelor's), an undergraduate (working toward a bachelor's degree), or high school (working toward a high school diploma) and to mark the Registration and Housing Form accordingly. See membership distinctions below.

Graduate Student Member: Any graduate student who is a member of the AMS, ASL, CMS, MAA, or SIAM is eligible for this category. Students should check with their department administrator to check their membership status.

Undergraduate Student Member: Any undergraduate student who is a member of the AMS, ASL, CMS, MAA, SIAM, PME, or KME is eligible for this category. Students should check with their department administrator to check their membership status.

Emeritus: Any person who has been a member of the AMS for twenty years or more and who retired because of age or long-term disability from his or her latest position is eligible for this category. Anyone person who has been a member of the MAA for 25 years and who is 70+ years of age is eligible for this category.

Librarian: Any librarian who is not a professional mathematician is eligible for this category.

Unemployed: Any person who is currently unemployed, actively seeking employment, and is not a student is eligible for this category. This category is not intended to include any person who has voluntarily resigned or retired from his or her latest position.

Developing Country Participant: Any person employed in developing countries where salary levels are radically not commensurate with those in the US is eligible for this category.

Temporarily Employed: Any person currently employed but who will become unemployed by June 1, 2018, and who is actively seeking employment is eligible for this category.

Non-mathematician Guest: Any family member or friend, who is not a mathematician, and who is accompanied by a participant in the meetings is eligible for this category. Guests will receive a badge and may accompany a mathematician to any session or talk and may also enter the exhibit area.

Commercial Exhibitor: Any person exhibiting in the Joint Mathematics Meetings Exhibits is eligible for this category. This does not include anyone participating in any poster sessions. Any exhibitor who is a mathematician and is participating in the scientific program and/or wants to attend sessions, talks, etc. is expected to register separately for the meeting.

Art Exhibitor: Any person exhibiting in the Mathematical Art Exhibition is eligible for this category. This does

not include anyone participating in any poster sessions. Any exhibitor who is a mathematician and is participating in the scientific program and/or wants to attend sessions, talks, etc. is expected to register separately for the meeting.

Registration Deadlines

There are three registration deadlines, each with its own benefits:

EARLY meeting registration (complimentary room lottery deadline)—**October 31**

ORDINARY meeting registration (registration materials mailed)—**November 22**

FINAL meeting registration (advanced registration, short course, minicourses, banquets)—**December 20**

Early Registration: Participants who register by the early deadline of October 31 will be included in a random drawing to select winners of complimentary hotel room nights during the meeting. Rooms with multiple occupants will be included in the drawing. The location of these rooms will be based on the number of complimentary room nights earned in the various hotels. Therefore, a free room will not necessarily be in winner's first-choice hotel. All winners will be notified by phone and email prior to **December 19**, so register early!

Ordinary Registration: Participants who register by **November 22** can choose to receive their materials before the meeting by mail.

Final Registration: Participants who register after **November 22** and by **December 20** must pick up their badges, programs, and any tickets for social events at the meeting.

Social Events

All events listed are open to all registered participants. It is strongly recommended that for any event requiring a ticket, tickets should be purchased through advance registration. Only a very limited number of tickets, if any, will be available for sale on site. If you must cancel your participation in a ticketed event, you may request a 50% refund by returning your tickets to the Mathematics Meetings Service Bureau (MMSB) by **January 4, 2018**. After that date, no refunds can be made. Special meals are available at banquets upon advance request, but this must be indicated on the Advanced Registration/Housing Form.

AMS Dinner, The AMS Connects and Supports! Join your colleagues on this special occasion of celebration in the mathematical community. Enjoy delicious meals from gourmet food stations, take pictures at the photo booth, and enter to win fun prizes at the raffle table! Each guest will also receive a special gift from the AMS.

This evening of celebration will be held on Saturday, January 13 with a reception at 6:30 pm and doors opening at 7:30 pm. Purchase your tickets when registering for the Joint Mathematics Meetings. Tickets are US\$75 and a limited number of tickets will be available at the special student rate of US\$30.

Annual Spectra Reception, Thursday, 6:00–8:00 pm. Annual Spectra reception for lesbian, gay, bisexual, and

transgender mathematicians. We are affiliated with NO-GLSTP, the National Organization of Gay and Lesbian Scientists and Technical Professionals, Inc.

Association of Christians in the Mathematical Sciences (ACMS) Reception and Lecture, Thursday, 5:30–7:30 pm. The reception will take place between 5:30 and 6:30 pm, followed by a short program and 20 minute talk at 6:30 pm. Students are encouraged to attend, and opportunity will be provided afterwards for delegates to go to dinner at local restaurants. The talk will be given by **Francis Su**.

Association for Women in Mathematics Reception and Awards Presentation, the AWM Reception which is open to all JMM participants will be held on Wednesday at 9:30 pm after the AMS Gibbs Lecture. The AWM President at 10:00 pm will recognize all of the honorees of the AWM Alice T. Schafer Prize for Excellence in Mathematics by an Undergraduate Woman, the recipients of the AWM Dissertation Prize and the AWM Service Awards.

Backgammon! organized by **Arthur Benjamin**, Harvey Mudd College; Friday, 8:00–10:00 pm. Learn to play backgammon from expert players. It's a fun and exciting game where players with a good mathematics background have a decisive advantage. Boards and free lessons will be provided by members of the US Backgammon Federation. Stop by anytime!

Budapest Semesters in Mathematics Annual Alumni Reunion, Thursday, 5:30–6:30 pm.

Budapest Semesters in Mathematics Education Informational Session, Friday, 12:00–1:00 pm. BSME is a semester-long program in Budapest, Hungary, designed for American and Canadian undergraduates (and recent graduates) interested in teaching middle school or high school mathematics. Participants will study the *Hungarian approach* to learning and teaching, in which a strong and explicit emphasis is placed on problem solving, mathematical creativity, and communication. Come learn more about this exciting new program.

University of California, San Diego Reception, Thursday, 6:00–7:30 pm. Reception for Mathematics alumni.

University of Chicago Mathematics Alumni Reception, Thursday, 6:00–7:00 pm.

Reception for Graduate Students and First-Time Participants, Wednesday, 5:30–6:30 pm. The AMS and MAA cosponsor this social hour. Graduate students and first-timers are especially encouraged to come and meet some old-timers to pick up a few tips on how to survive the environment of a large meeting. Light refreshments will be served.

University of Illinois at Urbana—Champaign, Friday, 5:30–7:30 pm. Department of Mathematics, Math Reception. Everyone ever connected with the Department is encouraged to get together for conversation and to hear about mathematics at the University of Illinois.

Joint Prize Reception, Thursday 5:30–6:30 pm.

University of Kansas Reception, Thursday, 6:00–7:00 pm. University of Kansas alumni and friends reception.

Knitting Circle, Thursday, 8:15–9:45 pm. Bring a project (knitting/crochet/tatting/beading/etc.) and chat with other mathematical crafters!

MAA/Project NExT Reception, Friday, 8:00–10:00 pm. All Project NExT Fellows, consultants, and other friends of MAA Project NExT are invited. Organizers: **Julia Barnes**, West Carolina University, **Alissa Crans**, Loyola Marymount University, **Matt DeLong**, Taylor University and **David Kung**, St Mary's College of Maryland.

MAA Two-Year College Reception, Wednesday, 5:45–7:00 pm, is open to all meeting participants, particularly two-year faculty members. This is a great opportunity to meet old friends and make some new ones.

Mathematical Reviews Reception, Friday, 6:00–7:00 pm. All friends of the Mathematical Reviews (MathSciNet) are invited to join reviewers and MR editors and staff (past and present) for a reception in honor of all of the efforts that go into the creation and publication of the Mathematical Reviews database. Refreshments will be served.

Mathematical Institutes Open House, Wednesday, 5:30–8:00 pm. Members of the AMS and MAA who are attending the Joint Mathematics Meetings are warmly invited to come to the Mathematical Institutes Open House reception, co-sponsored by several of the mathematical sciences institutes in North America. This reception precedes the Gibbs Lecture. We hope to see you there! icerm.brown.edu/events/mioh/2018

MathILy, MathILy-Er Yearly Gather, Wednesday, 7:00–8:30 pm. Come one, come all, and play a recently created mathematical game or solve a new puzzle! And learn about the MathILy, MathILy-Er summer programs for high-school students, then hang out with MathILy, MathILy-Er alumni and instructors.

MSRI Reception for Current and Future Donors, Thursday, 6:30–8:00 pm. MSRI invites current and prospective donors to an informal reception with appetizers and drinks. Directors **David Eisenbud** and **Helene Barcelo** will speak about present and upcoming events and programs, as well as the impact of private support on the Institute.

MSRI thanks and acknowledges mathematicians who support MSRI's programs and workshops through membership in the Archimedes Society or the Gauss Society. Archimedes Society members support MSRI with annual gifts. Gauss Society members support MSRI with a planned gift through arrangements in their wills and estates.

For more information about the event and how to join the Archimedes or Gauss Societies, please contact, James Sotiros, Director of Development, j.sotiros@msri.org; 510.643-6056. www.msri.org

National Association of Mathematicians Banquet, Friday, 6:00–8:40 pm. A cash bar reception will be held at 6:00 pm, and dinner will be served at 6:30 pm. Tickets are US\$75 each, including tax and gratuity. The Cox-Talbot Invited Address will be given after the dinner.

NSA Women in Mathematics Society Networking Session, Thursday, 6:00–8:00 pm.

Penn State Mathematics Department Reception, Thursday, 5:30–7:30 pm. Reception for alumni, students and faculty. Join us for this event.

PROMYS and Ross Reception for Alumni and Friends, Thursday, 7:30–9:30 pm. There will be hors d'oeuvres, a

cash bar, and interesting conversation with friends old and new!

Texas A&M University Mathematics Department Reception for Alumni, Students, and Faculty, Friday, 5:30–7:30 pm. All alumni, current students, faculty, and current and former post-docs are invited to join us for this reception.

Reception for Undergraduates, Wednesday, 4:30–5:30 pm.

YP17 HCSSiM Reunion Breakfast, Friday, 7:34 am.

Travel/Transportation

The 2018 Joint Mathematics Meetings will be held in San Diego, CA, at the San Diego Convention Center and the **Marriott Marquis San Diego Marina**. The San Diego Convention Center is located at 111 West Harbor Drive, San Diego, CA 92101, and the **Marriott Marquis San Diego Marina** is located at 333 West Harbor Drive, San Diego, CA 92101. San Diego is on Pacific Standard Time.

Air Transportation

The principal airport in San Diego is San Diego Airport (SAN), www.san.org. SAN is served by all major airlines and is located slightly over three miles from the downtown area and the Convention Center. For reference, an interactive terminal map can be found here: sanmap.san.org.

Ground Transportation

Car Rental: All major rental car companies have offices at San Diego Airport. There is a separate rental car facility. Car rental pick-ups and drop-offs from the San Diego Airport are done at the Rental Car Center at 3355 Admiral Boland Way, San Diego, CA 92101. Free dedicated shuttle buses run continually to bring customers between the airport terminals and the rental car center.

Hertz is the official car rental company for the meeting. To access the JMM special meeting rates at www.hertz.com, please click the box that says “Enter a discount or Promo code” on the reservation screen, and type in the JMM convention number (CV): **04N30008**. At the time of the reservation, meeting rates will be automatically compared to other Hertz rates and the best rate will be applied.

Reservations can also be made by calling Hertz directly at 800-654-2240 (US and Canada) or 1-405-749-4434. Meeting rates include unlimited mileage and are subject to availability. Advance reservations are recommended and blackout dates may apply. Government surcharges, taxes, tax reimbursement, airport-related fees, vehicle licensing fees and optional items are extra. Standard rental conditions and qualifications apply. Minimum rental age is 20 (age differential charge for 20–24 applies).

Shuttles: Shuttle service in a shared van is available from the airport to downtown hotels for approximately US\$10–13 per person one way, and US\$20–24 per person round trip. From Terminal 1, cross the skybridge, and take either the escalators or the elevators to street level. From Terminal 2, use the pedestrian crosswalk located outside the baggage claim area to access the Transportation Plaza.

A customer service representative will place you with the first available shuttle, unless you specify a particular shuttle company. There is a list of shuttle companies available at www.san.org/Parking-Transportation/Shuttles. Two of the companies listed are Advanced Shuttle (www.advancedshuttle.com/), 800-719-3499 and Cloud 9/Supershuttle (www.supershuttle.com/), 800-9-SHUTTLE (800-974-8885). Supershuttle also offers private van service at a higher price.

The Best Western Bayside Inn has a courtesy shuttle available from 7:00 am to 11:00 pm daily. The **Porto Vista Hotel** offers a complimentary airport shuttle from 7:30 am to 7:30 pm. For these hotels, please call upon your arrival at the San Diego Airport and pick up your baggage. They will then send a shuttle. For the return trip, please make a reservation in advance with the front desk of your hotel.

The concierge services at many of the hotels will assist you with a return shuttle if you do not book a round trip.

Taxi: From the baggage claim area, follow the signs leading to the Transportation Plaza, and a customer service representative will place you with the first available taxi. Taxi fare to the downtown area is approximately US\$18 one way.

Public Transportation: The Metropolitan Transit System Bus Route No. 992 (Airport via Harbor Drive/Cruise Ship Terminal) stops at airport Terminals 1 and 2 and travels to downtown San Diego. Ask a customer service representative outside baggage claim for directions to the bus stop. The 992 runs every 15 minutes between 5:00 am and 11:30 pm on weekdays and every 30 minutes on weekends. Maps, schedules and a helpful online trip planner (www.sdmts.com/schedules-real-time/trip-planner) for San Diego’s bus and trolley routes are available at the website of the San Diego Metropolitan Transit System, www.sdmts.com/.

To go to the Convention Center, take the 992 to Broadway and Kettner Boulevard, and cross the street to Santa Fe Station. Take the Green Line trolley with the sign “12th and Imperial” and get off at the Convention Center stop. For alternate routes and destinations, please check the trip planner or call 1-619-233-3004. To take the 992 bus, the price is currently US\$2.25 one way, cash and exact fare is required. For the trolley, exact fare is US\$2.50, but credit cards are accepted as well as cash. The SMTS also has an app called “Compass Cloud” which will help you purchase fares. Please see www.sdmts.com/fares-passes/compass-cloud for details.

Train: The San Diego Station, Santa Fe Depot (also called Union Station), is located at 1050 Kettner Boulevard. For additional information on Amtrak service to San Diego, call 1-800-USA-RAIL, or visit Amtrak (www.amtrak.com) or Amtrak California (www.amtrakcalifornia.com/).

Parking: On-site private vehicle parking is available at the San Diego Convention Center’s 1,950-vehicle underground garage which is located below the building. The entrance to the parking garage is on Harbor Drive between First Avenue and Fifth Avenue. Parking rates may range from US\$15 to US\$35 on days when there is a special event

activity at PETCO Park or other downtown events. Payment is due upon entry and there are no in and out privileges. For questions about the parking garage, call Ace Parking at 619-237-0399. No overnight or RV parking is permitted. The garage has 31 ADA compliant parking spots with elevator access to the convention center.

There is also a 2,000-space parking structure located directly across the street from the Convention Center, on the corner of Harbor and 8th Avenue. Off-site parking is also available at other nearby parking lots and garages in downtown San Diego. Many are within walking distance. Helpful local parking information may also be found on the Gaslamp District's website at www.gaslamp.org/parking/.

Information about parking at the hotels is listed under "Hotel Information."

Driving Directions from the airport to the Convention

Center: The San Diego Convention Center is located at 111 W. Harbor Drive, San Diego, CA 92101, and is approximately 3 miles away from the airport. Upon leaving the airport, drive out of parking lot, and follow signs to Interstate 5/Downtown. The ramp will put you on Harbor Drive going south. Follow signage to the parking entrance for the San Diego Convention Center. For driving directions from other points, see visitsandiego.com/location/directions.