

Atlanta, Georgia

Hyatt Regency Atlanta and Atlanta Marriott Marquis

January 4-7, 2017
Wednesday-Saturday

Meeting #1125

Joint Mathematics Meetings, including the 123rd Annual Meeting of the AMS, 100th 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: Brian Boe

Announcement issue of *Notices*: November 2016

Program first available on AMS website: To be announced

Deadlines

For organizers: Expired

For abstracts: September 20, 2016

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

Joint Invited Addresses

Ingrid Daubechies, Duke University, *Mathematics for art investigation* (MAA-AMS-SIAM Gerald and Judith Porter Public Lecture); Saturday, 3:00 pm.

Lisa Jeffrey, University of Toronto, *Cohomology of Symplectic Quotients*, (AWM-AMS Noether Lecture); Thursday, 10:05 am.

Donald Richards, Pennsylvania State University, *Distance Correlation Coefficients: A New Tool for Detecting Association and Measuring Correlation Between Data Sets* (AMS-MAA Invited Address); Friday, 11:10 am.

Alice Silverberg, University of California, Irvine, *Through the Cryptographer's Looking Glass, and What Alice Found There* (AMS-MAA Invited Address); Wednesday, 11:10 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 will announce the Böcher Memorial Prize, Levi L. Conant Prize, the Frank Nelson Cole Prize in Number Theory, the Joseph L. Doob Prize, the Leonard Eisenbud Prize for Mathematics and Physics, the Ruth Lyttle Satter 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 Robbins 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, and the Birman Prize in Geometry and Topology.

123rd Meeting of the AMS

AMS Invited Addresses

Tobias Colding, Massachusetts Institute of Technology, *Title to be announced*; Saturday, 9:00 am.

Carlos E. Kenig, University of Chicago, *Overview: The focusing energy critical wave equation* (AMS Colloquium Lectures: Lecture I), Wednesday, 1:00 pm.

Carlos E. Kenig, University of Chicago, *The focusing energy critical wave equation: the radial case in 3 space dimensions* (AMS Colloquium Lectures: Lecture II); Thursday, 1:00 pm.

Carlos E. Kenig, University of Chicago, *The focusing energy critical wave equation: the non-radial case* (AMS Colloquium Lectures: Lecture III); Friday, 1:00 pm.

John Preskill, California Institute of Technology, *Title to be announced* (AMS Josiah Willard Gibbs Lecture), Wednesday, 8:30 pm.

Barry Simon, California Institute of Technology, *Spectral Theory Sum Rules, Meromorphic Herglotz Functions and Large Deviations*; Wednesday, 10:05 am.

Gigliola Staffilani, Massachusetts Institute of Technology, *The many faces of dispersive and wave equations*; Thursday, 2:15 pm.

Richard Taylor, Institute for Advanced Study, *Galois groups and locally symmetric spaces*; Thursday, 3:20 pm.

Anna Wienhard, Heidelberg University, *A tale of rigidity and flexibility—discrete subgroups of higher rank Lie groups*; Friday, 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 co-sponsored with other organizations. These are noted within the parentheses at the end of each listing, where applicable.

Advanced Mathematical Programming and Applications, **Ram N. Mohapatra**, University of Central Florida, **Ram U. Verma**, University of North Texas, and **Gayatri Pany**, Indian Institute of Technology.

Advances in Mathematics of Ecology, Epidemiology and Immunology of Infectious Diseases, **Abba Gumel**, Arizona State University.

Advances in Numerical Analysis for Partial Differential Equations, **Thomas Lewis**, University of North Carolina at Greensboro, and **Amanda Diegel**, Louisiana State University.

Advances in Operator Algebras, **Michael Hartglass**, University of California, Riverside, **David Penneys**, University of California, Los Angeles, and **Elizabeth Gillaspay**, University of Colorado, Boulder.

Algebraic Statistics (a Mathematics Research Communities Session) **Daniel Irving Bernstein**, North Carolina State University, **Nathaniel Bushek**, University of Alaska, Anchorage, and **Mateja Raic**, University of Illinois at Chicago.

An Amicable Combination of Algebra and Number Theory (Dedicated to Dr. Helen G. Grundman), **Eva Goedhart**, Lebanon Valley College, **Pamela E. Harris**, Williams College, **Daniel P. Wisniewski**, DeSales University, and **Alejandra Alvarado**, Eastern Illinois University.

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

Analytic Number Theory and Arithmetic, **Robert Lemke Oliver**, Tufts University, **Paul Pollack**, University of Georgia, and **Frank Thorne**, University of South Carolina.

Analytical and Computational Studies in Mathematical Biology, **Yanyu Xiao**, University of Cincinnati, and **Xiangsheng Wang**, Southeast Missouri State University.

ApREUF: Applied Research Experience for Undergraduate Faculty, **Shenglan Yuan**, LaGuardia Community College, CUNY, **Jason Callahan**, St. Edwards University, **Eva Strawbridge**, James Madison University, and **Ami Radunskaya**, Pomona College.

Applications of Partially Ordered Sets in Algebraic, Topological, and Enumerative Combinatorics, **Rafael S. González D'León**, University of Kentucky, and **Joshua Hallam**, Wake Forest University.

Arithmetic Properties of Sequences from Number Theory and Combinatorics, **Eric Rowland**, Hofstra University, and **Armin Straub**, University of South Alabama.

Automorphic Forms and Arithmetic, **Frank Calegari**, University of Chicago, **Ana Caraiani**, Princeton University, and **Richard Taylor**, Institute for Advanced Study.

Bases in Function Spaces: Sampling, Interpolation, Expansions and Approximations, **Shahaf Nitzan** and **Christopher Heil**, Georgia Institute of Technology, and **Alexander V. Powell**, Vanderbilt University.

Character Varieties (a Mathematics Research Communities Session), **Nathan Druivenga**, University of Kentucky, **Brett Frankel**, Northwestern University, and **Ian Le**, Perimeter Institute for Theoretical Physics.

Coding Theory for Modern Applications, **Christine A. Kelley**, University of Nebraska-Lincoln, **Iwan M. Duursma**, University of Illinois Urbana-Champaign, and **Gretchen L. Matthews**, Clemson University.

Combinatorial and Cohomological Invariants of Flag Manifolds and Related Varieties, **Martha Precup**, Northwestern University, and **Rebecca Goldin**, George Mason University.

Commutative Algebra: Research for Undergraduate and Early Graduate Students, **Nicholas Baeth**, University of Central Missouri, and **Courtney Gibbons**, Hamilton College.

Complex Analysis and Special Functions, **Brock Williams**, Texas Tech University, **Kendall Richards**, Southwestern University, and **Alex Solynin**, Texas Tech University.

Continued Fractions, **James McLaughlin**, West Chester University, **Geremías Polanco**, Hampshire College, and **Nancy J. Wyshinski**, Trinity College.

Control and Long Time Behavior of Evolutionary PDEs, **Louis Tebou**, Florida International University, and **Luz de Teresa**, Instituto de Matemáticas, UNAM.

Discrete Geometry and Convexity (Dedicated to András Bezdek on the occasion of his 60th birthday), **Krystyna Kuperberg**, Auburn University, **Gergely Ambrus**, Renyi Institute of Mathematics, **Braxton Carrigan**, Southern Connecticut State University, and **Ferenc Fodor**, University of Szeged.

Discrete Structures in Number Theory, **Anna Haensch**, Duquesne University, and **Adriana Salerno**, Bates College.

Dynamical Systems, **Jim Wiseman**, Agnes Scott College, and **Aimee Johnson**, Swarthmore College.

Dynamics of Fluids and Nonlinear Waves, **Zhiwu Lin**, **Jiayin Jin**, and **Chongchun Zeng**, Georgia Institute of Technology.

Ergodic Theory and Dynamical Systems, **Mrinal Kanti Roychowdhury**, University of Texas Rio Grande Valley, and **Tamara Kucherenko**, City College of New York.

Fusion Categories and Quantum Symmetries, **Julia Plavnik**, Texas A&M University, **Paul Bruillard**, Pacific Northwest National Laboratory, and **Eric Rowell**, Texas A&M University.

Gaussian Graphical Models and Combinatorial Algebraic Geometry, **Rainer Sinn**, Georgia Institute of Technology, **Seth Sullivant**, North Carolina State University, and **Josephine Yu**, Georgia Institute of Technology.

Graphs and Matrices, **Sudipta Mallik**, Northern Arizona University, **Keivan Hassani Monfared**, University of Calgary, and **Bryan Shader**, University of Wyoming.

Group Actions and Geometric Structures, **Anna Wienhard**, Universität Heidelberg, and **Jeffrey Danciger**, University of Texas at Austin.

Group Representations and Cohomology, **Hung Nguyen**, The University of Akron, **Nham Ngo**, The University of Arizona, **Andrei Pavelescu**, University of South Alabama, and **Paul Sobaje**, University of Georgia.

Harmonic Analysis (In Honor of Gestur Olafsson's 65th Birthday), **Jens Christensen**, Colgate University, and **Sussanna Dann**, Technische Universität Wien-Vienna, Austria.

History of Mathematics, **Adrian Rice**, Randolph-Macon College, **Sloan Despeaux**, Western Carolina University, and **Daniel Otero**, Xavier University (AMS-MAA-ICHM).

Hopf Algebras and their Actions, **Henry Tucker**, University of California, San Diego, **Susan Montgomery**, University of Southern California - Los Angeles, and **Siu-Hung Ng**, Louisiana State University.

Inverse Problems and Applications, **Vu Kim Tuan** and **Amin Boumenir**, University of West Georgia.

Inverse Problems and Multivariate Signal Analysis, **M. Zuhair Nashed**, University of Central Florida, **Willi Freeden**, University of Kaiserslautern, and **Otmar Scherzer**, University of Vienna.

Lie Group Representations, Discretization, and Gelfand Pairs (a Mathematics Research Communities Session), **Matthew Dawson**, CIMAT, **Holley Friedlander**, Dickenson College, **John Hutchens**, Winston-Salem State University, and **Wayne Johnson**, Truman State University.

Mapping Class Groups and their Subgroups, **James W. Anderson**, University of Southampton, UK, and **Aaron Wootton**, University of Portland.

Mathematics and Music, **Mariana Montiel**, Georgia State University, and **Robert Peck**, Louisiana State University.

Mathematics in Physiology and Medicine (a Mathematics Research Communities Session), **Kamila Larripa**, Humboldt State University, **Charles Puelz**, Rice University, **Laura Strube**, University of Utah, and **Longhua Zhao**, Case Western Reserve University.

Mathematics of Cryptography, **Nathan Kaplan** and **Alice Silverberg**, University of California, Irvine (AMS-MAA).

Mathematics of Signal Processing and Information, **Rayan Saab**, University of California, San Diego, and **Mark Iwen**, Michigan State University.

Measure and Measurable Dynamics (In Memory of Dorothy Maharam, 1917-2014), **Cesar Silva**, Williams College.

Minimal Integral Models of Algebraic Curves, **Tony Shaska**, Oakland University.

NSFD Discretizations: Recent Advances, Applications, and Unresolved Issues, **Talitha M. Washington**, Howard University, and **Ronald E. Mickens**, Clark Atlanta University.

New Developments in Noncommutative Algebra & Representation Theory, **Ellen Kirkman**, Wake Forest University, and **Chelsea Walton**, Temple University.

Nonlinear Systems and Applications, **Wenrui Hao**, Ohio State University.

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

Operator Theory, Function Theory, and Models, **William Ross**, Florida Gulf Coast University, and **Alberto Condori**, University of Richmond.

Orthogonal Polynomials, **Doron Lubinsky** and **Jeff Geronimo**, Georgia Institute of Technology.

PDE Analysis on Fluid Flows, **Xiang Xu**, Old Dominion University, and **Geng Chen** and **Ronghua Pan**, Georgia Institute of Technology.

PDEs for Fluid flow: Analysis and Computation, **Thinh Kieu**, University of North Georgia, **Emine Celik**, Texas Tech University, and **Hashim Saber**, University of North Georgia.

Partition Theory and Related Topics, **Amita Malik**, University of Illinois at Urbana-Champaign, **Dennis Eichhorn**, University of California, Irvine, and **Tim Huber**, University of Texas-Rio Grande Valley.

Problems in Partial Differential Equations, **Alex Himonas**, University of Notre Dame, and **Dionyssios Mantzavinos**, State University of New York at Buffalo.

Public School Districts and Higher Education Mathematics Partnerships, **Virgil U. Pierce** and **Aaron Wilson**, University of Texas Rio Grande Valley.

Pure and Applied Talks by Women Math Warriors Presented by EDGE (Enhancing Diversity in Graduate Education), **Candice Price**, University of San Diego, and **Amy Buchman**, Tulane University.

Quantum Groups, **Shuzhou Wang** and **Angshuman Bhattacharya**, University of Georgia.

Quaternions, **Johannes Familton**, Borough of Manhattan Community College, **Terrence Blackman**, Medgar Evers College, and **Chris McCarthy**, Borough of Manhattan Community College.

RE(UF)search on Graphs and Matrices, **Cheryl Grood**, Swarthmore College, **Daniela Ferrero**, Texas State University, and **Mary Flagg**, University of St. Thomas.

Random Matrices, Random Percolation and Random Sequence Alignments, **Ruoting Gong**, Illinois Institute of Technology, and **Michael Damron**, Georgia Institute of Technology.

Real Discrete Dynamical Systems with Applications, **M. R. S. Kulenovic**, University of Rhode Island, and **Abdul-Aziz Yakubu**, Howard University.

Recent Advances in Mathematical Biology, **Zhisheng Shuai**, University of Central Florida, **Guihong Fan**, Columbus State University, **Andrew Nevai**, University of Central Florida, and **Eric Numfor**, Augusta University.

Recent Progress on Nonlinear Dispersive and Wave Equations, **Dana Mendelson**, **Carlos Kenig**, and **Hao Jia**, University of Chicago, **Andrew Lawrie**, University of California, Berkeley, **Gigliola Staffilani**, Massachusetts Institute of Technology, and **Magdalena Czubak**, University of Colorado Boulder.

Representations and Related Geometry in Lie Theory, **Laura Rider**, Massachusetts Institute of Technology, and **Amber Russell**, Butler University.

Research in Mathematics by Undergraduates and Students in Post-Baccalaureate Programs, **Darren A. Narayan**, Rochester Institute of Technology, **Tamas Forgacs**, California State University, Fresno, and **Ugur Abdulla**, Florida Institute of Technology (AMS-MAA-SIAM).

Sheaves in Topological Data Analysis, **Mikael Vejdemo-Johansson**, CUNY College of Staten Island, **Elizabeth Munch**, University at Albany, SUNY, and **Martina Sciamiero**, École polytechnique fédérale de Lausanne.

Spectral Calculus & Quasilinear Partial Differential Equations, **Shijun Zheng**, Georgia Southern University, **Marius Beceanu**, State University of New York-Albany, and **Tuoc Van Phan**, University of Tennessee, Knoxville.

Spin Glasses and Disordered Media, **Antonio Auffinger**, Northwestern University, **Aukosh Jagannath**, New York University, and **Dmitry Panchenko**, University of Toronto.

Statistical Methods in Computational Topology and Applications, **Yu-Min Chung** and **Sarah Day**, College of William & Mary.

Stochastic Matrices and Their Applications, **Selcuk Koyuncu**, University of North Georgia, and **Lei Cao**, Georgian Court University.

Stochastic Processes and Modelling, **Erkan Nane**, Auburn University, and **Jebessa B. Mijena**, Georgia College and State University.

Symmetries, Integrability, and Beyond, **Maria Clara Nucci**, Università di Perugia, Italy, and **Sarah Post**, University of Hawaii at Manoa.

Symplectic Geometry, Moment Maps and Morse Theory, **Lisa Jeffrey**, University of Toronto, and **Tara Holm**, Cornell University (AMS-AWM).

Teaching Assistant Development Programs: Why and How?, **Solomon Friedberg**, Boston College, **Jessica Deshler**, West Virginia University, **Jeffrey Rummel**, University of California, San Diego, and **Lisa Townsley**, University Of Georgia.

The Mathematics of the Atlanta University Center, **Talitha M. Washington**, Howard University, **Monica Jackson**, American University, and **Colm Mulcahy**, Spelman College (AMS-NAM).

The Modeling First Approach to Teaching Differential Equations, **Chris McCarthy**, City University of New York, and **Brian Winkel**, US Military Academy, West Point.

Theory and Applications of Numerical Algebraic Geometry, **Daniel Brake**, University of Notre Dame, **Robert Krone**, Queen's University, and **Jose Israel Rodriguez**, University of Chicago.

Topics in Graph Theory, **Songling Shan**, Vanderbilt University, and **Xiaofeng Gu**, University of West Georgia.

Topology, Representation Theory, and Operator Algebras (A Tribute to Paul Baum), **Efton Park** and **Jose Carrión**, Texas Christian University.

Women in Analysis (In Honor of Cora Sadosky), **Alexander Reznikov**, Vanderbilt University, **Oleksandra Beznosova** and **Hyun-Kyoung Kwon**, University of Alabama, and **Katharine Ott**, Bates College.

Women in Topology, **Jocelyn Bell**, Hobart and William Smith Colleges, **Eleanor Ollhoff**, University of Tennessee,

Candice Price, University of San Diego, and **Arunima Ray**, Brandeis University.

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 jointmathematicsmeetings.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 20, 2016.** Late papers cannot be accommodated. Please e-mail 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

AMS Committee on the Profession Panel Discussion: Diversity and Inclusion in the Mathematical Sciences, organizers are **Pamela Gorkin**, Bucknell University; **Monica Jackson**, American University and **John McCleary**, Vassar College; Wednesday, 4:30–6:00 pm. Representation, recruitment and retention of a diverse set of students continue to be critical in higher education and in the workplace. To involve the best talent possible in the enterprise of mathematics, departments will need to bring the widest possible base of students to the field, nurturing students from marginalized communities and providing support for underrepresented students who choose to pursue a career in mathematics. From the panel we hope to hear how the speakers' experiences and expertise can help us shape new approaches to the challenge of increasing diversity in the mathematical community. Moderator for this panel will be **Helen G. Grundman**, AMS. Panelists will include **Carlos Castillo-Chavez**, Arizona State University; **Kristin Lauter**, Microsoft Corporation and **Talithia Williams**, Harvey Mudd College.

Conversation on Nonacademic Employment, Thursday, 10:30 am–noon. This session will concentrate on how to find nonacademic positions, types of jobs, the interview process, work environments, and advancement opportunities. The discussion will be led by a panel of mathematical scientists working in government and industry.

MAA-AMS Joint Panel Session on Design (or improve) Preparation of Your Graduate Students to Teach: Using MAA's CoMinDS Resource Suite, organized by **Jessica Deshler**, West Virginia University; Thursday, 10:35–11:55 am. CoMinDS is a MAA project, funded by the NSF, to support teaching-related professional development (PD) for beginning college mathematics instructors (CMIs),

e.g., graduate student teaching assistants. CoMInDS aims to provide resources and support networks for those: (1) who deliver the PD in their departments (2) who create PD materials for CMIs and (3) who conduct research on CMI PD. One component of the project is an online collection of instructional materials and research-related resources for use in CMI PD. In this session, we will illustrate how to use the resource suite to design PD programs for CMIs. We will provide an overview of the contents of the suite and then we will illustrate how to identify specific resources. In particular, we will provide a guided tour of how items from the resources suite can be used to create a pre-semester orientation session for new CMIs. We will also illustrate how to locate and use research-based resources from the suite, such as research articles, to use as readings and research reports that can be used to support the need for such programs. At the close of the session we will present opportunities for participants to get involved in the project and to contribute their own materials to the resources suite.

This panel is being organized and offered in conjunction with a complementary AMS Special Session on Saturday morning and afternoon, *Teaching Assistant Development Programs: Why and How?* (see AMS sessions).

Panelists are **Jack Bookman**, Duke University; **Natasha Speer**, University of Maine; **Jessica Deshler**, West Virginia University; and **Sarah Schott**, Duke University. This panel is sponsored by the MAA Committee on Professional Development and AMS-MAA Joint Committee on TAs and Part-Time Instructors.

AMS and SIAM Committees on Education Joint Panel Discussion: Broadening Research Experiences for Doctoral Students in the Mathematical Sciences, organized by **Loek Helminck**, NC State University; **Rachel Levy**, Harvey Mudd College; **Douglas Mupasiri**, University of Northern Iowa and **Suzanne L. Weekes**, Worcester Polytechnic Institute; Thursday, 1:00–2:30 pm. AMS survey data demonstrate that a substantial portion of doctoral recipients are taking positions outside of academia. In this panel, we will hear about efforts to improve the training of mathematical sciences doctoral students by involving them in research activities outside of their main dissertation research in order to better them for a broader range of careers.

Programs have been designed to encourage connections between mathematical sciences and other academic departments, and between academia and business, industry, government and non-profits. The goal is to produce students who are able to recognize opportunities for the development of mathematics and statistics in problems originating in a variety of settings, and who can apply advance mathematics and statistics to help solve such problems. Panelists are **Peter Constantin**, Princeton University; **Susan Minkoff**, University of Texas at Dallas; **Stephen Pankavich**, Colorado School of Mines; and **Carlos Tolmasky**, Institute for Mathematics and its Applications, University of Minnesota.

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 about 300 students met with representatives from 60 graduate programs. If your school has a graduate program and you are interested in participating, for US\$80 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.

Who Wants to Be a Mathematician / National Contest, organized by **Michael A. Breen**, AMS, and **William T. Butterworth**, DePaul University; Saturday, 1:00 pm–2:45 pm. Show your support for ten of the nation's best high school students 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 and match wits with the contestants.

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: Grassroots Advocacy for Mathematics and Science Policy, organized by **Jeffrey Hakim**, American University; **Douglas Mupasiri**, University of Northern Iowa and **Scott Wolpert**, University of Maryland; Friday, 2:30–4:00 pm.

Congressional Fellowship Session, 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. Application deadline for the 2017–18 AMS Congressional Fellowship is **February 15, 2017**.

Other AMS Events

Council, Tuesday, 2:30 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, 2016**.

AMS Short Course on Random Growth Models

This two-day course will take place on Monday and Tuesday before the meeting actually begins. It is co-organized by **Michael Damron**, Georgia Institute of Technology; **Firas Rassoul-Agha**, University of Utah; and **Timo Seppäläinen**, University of Wisconsin-Madison. Michael Damron will give an *Introduction to Random Growth Models* in two lectures, followed by **Jack Hanson**, The City College of New York, *Infinite Geodesics, Asymptotic Directions, and Buseman Functions*; **Philippe Sosoe**, Harvard University, *Concentration in First-Passage Percolation*; **Firas Rassoul-Agha**, University of Utah, *Busemann Functions, Geodesics, and the Competition Interface for Directed Percolation*; **Timo Seppäläinen**, University of Wisconsin-Madison, *Stationary Versions and Fluctuation Exponents for Exactly Solvable Models*; and **Ivan Corwin**, Columbia University, *KPZ Fluctuations in Exactly Solvable Models*.

There are separate registration fees to participate in this course. Advance registration (**before December 20, 2016**): Member, US\$112; Non-member, US\$170; Student, unemployed, or emeritus, US\$60. On-site registration: Member, US\$146; Nonmember, US\$200; Student, unemployed, or emeritus, US\$81. Please see the complete Short Course article on page 1087 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, Monday (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 participants 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 designed to stimulate discussion on a wide range of issues facing departments today, including personnel issues (staff and faculty), long-range planning, hiring, promotion and tenure, budget management, assessments, outreach, stewardship, junior faculty development, communication, and departmental leadership. There is a separate registration and fee to participate. Interested participants should also consider attending the NSF-EHR Grant Proposal Writing Workshop to be held on Monday, January 2. For further information, please contact the AMS Washington Office at 401-455-4116 or amsdc@ams.org.

100th Meeting of the MAA

MAA Invited Addresses

Jason Cantarella, University of Georgia, *Random polygons, grassmannians, and a problem of Lewis Carroll*; Wednesday, 3:20 pm.

Ingrid Daubechies, Duke University, *Mathematics for art investigation*; Saturday, 3:00 pm (MAA-AMS-SIAM Gerald and Judith Porter Public Lecture).

Susan Holmes, Stanford University, *Finding meaningful patterns: the decoding of the human microbiome*; Saturday, 10:05 am.

Lillian Pierce, Duke University, *From Gauss to today: class numbers and p -torsion in class groups of number fields*; Thursday, 9:00 am.

Matthew Richey, St. Olaf College, *Take what you have gathered from coincidence: understanding and using randomness*; Friday, 1:00 pm (Lecture for Students).

Francis Su, Harvey Mudd College, *Mathematics for human flourishing*, Friday, 9:00 am (Retiring Presidential Address).

Laura Taalman, James Madison University, *Math by design: 3D printing for the Working Mathematician*; Wednesday, 2:15 pm.

Presentations by MAA Teaching Award Recipients

Friday, 2:30–3:50 pm, organized by MAA Secretary **Barbara Faires**, Westminster College, and MAA President **Francis Su**, Harvey Mudd 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.

MAA Invited Paper Sessions

Current Trends in Mathematical and Computational Biology, organized by **Raina Robeva**, Sweet Briar College; **Erin Bodine**, Rhodes College; and **Brian Walton**, James Madison University; Saturday, 8:00–11:50 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, phylogenetics, RNA folding, evolution,

infectious disease dynamics, neuroscience, growth and control of populations, ecological networks, drug resistance modeling, and medical breakthroughs related to cancer therapies have increasingly ensued from utilizing mathematical and computational approaches. Our session on current trends will sample from this diversity of important questions from biology and medicine and their mathematical treatments, with a goal of maximizing the range of topics and research methods presented at the session. Mathematical approaches will include deterministic and stochastic continuous dynamical models, as well as finite dynamical systems and combinatorial and algebraic methods. This session is sponsored by BIO SIGMAA.

L-functions and Other Animals, organized by **Caroline Turnage-Butterbaugh**, Duke University, and **Maria Nastasescu**, Duke University; Part A: Friday, 8:00–10:50 am and Part B: Friday, 1:00 – 2:50 pm. The Riemann zeta function famously encodes the properties of the prime numbers, and generalizations of the zeta function, called *L*-functions, are ubiquitous in number theory. Yet like the Riemann zeta function, many properties of *L*-functions remain unproved. This session will highlight a variety of approaches to studying *L*-functions and to applying properties of *L*-functions to other problems in number theory. This session complements the MAA Invited Address by Lillian B. Pierce.

Role of Modeling in Understanding Environmental Risks, organized by **Ben Fusaro**, Florida State University; Wednesday afternoon. Systems and structures can collapse unexpectedly. The challenge is to quantitatively and qualitatively analyze such events and perhaps be in a better position to prevent or mitigate damage—dam collapse (Mariana, Brazil; Mosul, Iraq), mining & resource extraction (fracking, subsidence, ecosystem impact, occupational & public health), spread of disease (Ebola, TB, Zika, TB), nuclear power (Fukushima), etc. This session is sponsored by SIGMAA EM and the SIAM Activity Group on the Mathematics of Planet Earth (SIAG/MPE).

New Directions in Quantitative Literacy for General Education, in honor of Lynn Steen organized by **Catherine Crockett**, Point Loma Nazarene University; **Gary Franchy**, Southwestern Michigan College; and **Andy Miller**, Belmont University; Saturday, 8:30–10:50 am. In a number of influential books, articles, and collaborations at the turn of the twenty-first century, Lynn A. Steen (1941–2015) laid the foundation for contemporary quantitative literacy education. In *Mathematics and Democracy* (2001), he wrote, “Quantitatively literate citizens...need a predisposition to look at the world through mathematical eyesQuantitative literacy empowers people by giving them the tools to think for themselves, to ask intelligent questions of experts, and to confront authority confidently.”

Over the last two decades, a number of mathematicians have answered Steen’s and his colleagues’ calls to advance quantitative literacy education for college students, most commonly through universities’ general education programs. A number of mathematicians and educators

have written new textbooks, designed new courses, founded or revived journals, connected quantitative literacy to new social contexts, and used quantitative literacy to reframe developmental mathematics. In this session, we will hear from some of these innovators and consider the future of quantitative literacy in general education programs. This session is sponsored by SIGMAA QL.

Office Hours with a Geometric Group Theorist, organized by **Dan Margalit**, Georgia Tech, and **Matthew Clay**, University of Arkansas; Part A: Wednesday, 9:00 – 10:50 am and Part B: Wednesday, 2:15–4:35 pm. Each talk will be a broadly accessible introduction to some topic within the exciting world of geometric group theory. The speakers are all contributing authors of the forthcoming introductory textbook *Office Hours with a Geometric Group Theorist*.

Random Polygons and Knots, organized by **Jason Cantarella**, University of Georgia; Thursday morning. Random knotting occupies an interesting corner of the intersection of mathematics, physics, and biology, as it provides a foundational model for knotted polymers like DNA. Recently, it has been proposed as a potentially powerful method for constructing examples in knot theory as well. The field has seen a lot of progress in recent years as new techniques are imported from other areas of mathematics and old problems solved. One of the appealing features of the area is that many of the techniques and arguments are fairly understandable for a general mathematical audience. In this session, a cross-section of speakers will deliver accessible talks from a variety of perspectives on the subject. This MAA Invited Paper Session accompanies **Jason Cantarella’s** 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**, **John Haddock**, **Teri (TJ) Murphy**, **Sandra Richardson**, and **Lee Zia**, National Science Foundation; Directorate for Education and Human Resources; Division of Undergraduate Education; Friday, January 6, 8:00–10:50 am. In this Invited Paper Session, research and findings will be presented from projects funded by the National Science Foundation Division of Undergraduate Education’s Improving Undergraduate STEM Education (IUSE) Program. The purpose of this session is to provide a venue for the mathematical sciences community to share recent research from innovations related to undergraduate mathematical sciences.

The 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.

Technical Tools for Mathematical 3D Printing, organized by **Elizabeth Denne**, Washington & Lee University, and **Laura Taalman**, James Madison University; Thursday, 1:00–4:15 pm. Speakers will go through the nitty-gritty technical details involved in designing mathematical models for 3D printing, including the strengths and quirks of using software such as Rhino, Grasshopper, Cinema4D, and OpenSCAD. Session participants will learn multiple ways to produce models that reflect and illustrate their own mathematical 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. Complex Analysis and Geometry/Topology as Introductions to Proofs Courses, presented by **Neelesh Tiruvilumala**, University of Southern California; **David Crombecque**, University of Southern California; Part A, Wednesday, 4:45–6:45 pm, and Part B, Friday, 3:30–5:30 pm. An "Introduction to Proofs" course is valuable for young math majors who are transitioning to more rigorous areas in the curriculum. Several departments lack the resources to implement such a course. Furthermore, students often do not have the time or the necessary units to incorporate such a course into their four-year plan. Complex Analysis and Geometry/Topology courses are natural substitutes because the material involved is inspiring, accessible, and not always intuitive. As such, students discover for themselves that they cannot always rely on their intuition and this organically leads to several tractable and elucidating proofs. Furthermore, Complex analysis and Geometry/Topology incorporate concepts and proof techniques from a wide range of mathematical subjects. This minicourse will provide instructors with the specific tools necessary to extend their Complex analysis and Geometry/Topology courses to function dually as introduction to proofs courses.

Minicourse #2. Directing Undergraduate Research, presented by **Aparna Higgins**, University of Dayton; Part A, Wednesday, 2:15–4:15 pm, and Part B, Friday, 1:00–3:00 pm. This minicourse is designed as a guide for faculty who are interested in directing undergraduate research at their own institutions during the academic year, and who are new to directing undergraduate research. The minicourse 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. Ideas for short projects will be provided. Certain questions, that can be used to generalize research in any

area 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 #3. Flipping your Linear Algebra 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 Bonfert-Taylor**, Dartmouth College; 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. We will specifically focus building a flipped linear algebra course using a particular set of OER materials, however the instructional strategies learned in this workshop would apply equally well to other mathematical subject areas. 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 a particular set of linear algebra OER materials and provide meaningful feedback for the continuous improvement of these community resources.

Minicourse #4. Incorporating Randomization Methods into Introductory Statistics, presented by **Patti Frazer Lock**, St. Lawrence University; **Robin H. Lock**, St. Lawrence University; **Allan Rossman**, Cal Poly–San Luis Obispo; **Beth Chance**, Cal Poly–San Luis Obispo; **Soma Roy**, Cal Poly–San Luis Obispo; Part A, Wednesday, 9:00B–11:00 am, and Part B, Friday, 9:00–11:00 am. The goal of this minicourse is to help participants see how to use simulation-based methods to introduce students to concepts of statistical inference in an introductory statistics course. The Common Core State Standards in Mathematics recommend these methods, so instructors teaching pre-service teachers are particularly welcomed. Through easy to use free online tools and class activities, participants will see how to engage students and make these methods readily accessible. We illustrate how to use these methods to build conceptual understanding and how to integrate them into an existing introductory statistics course without requiring a major overhaul. This course is sponsored by the SIGMAA on Statistics Education.

Minicourse #5. Introductory Proposal Writing for Grant Applications to the National Science Foundation EHR Division of Undergraduate Education, presented by **Ron Buckmire**, **John Haddock**, **Teri Jo Murphy**, **Sandra Richardson**, and **Lee Zia**, Division of Undergraduate Education, National Science Foundation; Part A, Wednesday, 2:15–4:15 pm, and Part B, Thursday, 9:00–11:00 am. Presenters will describe the general NSF grant proposal process and consider particular details relevant to programs in the Division of Undergraduate Education. This short course 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 two-part short course 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 reviewed. Participants should leave this short course with a draft of a project summary.

Minicourse #6. *Linear Algebra in Computer Graphics and Data Mining*, presented by **Tim Chartier**, Davidson College; Part A, Wednesday, 4:45–6:45 pm, and Part B, Friday, 3:30–5:30 pm. This minicourse is designed to help participants who wish to integrate linear algebra applications into classes. Application topics will range from those that require little mathematical background (such as submatrices, matrix arithmetics) which would be suitable in a first year seminar or general education course), to more sophisticated topics (eigenanalysis, singular value) that can supplement a linear algebra course or elective course for mathematics majors or minors. Examples will come from computer graphics and data mining. Participants will find many of the issues covered are discussed in the MAA published book *When Life is Linear: From Computer Graphics to Bracketology* by Tim Chartier and on the free edX MOOC *Applications of Linear Algebra Parts 1 and 2* created through a partnership through Davidson College and edX. This course is sponsored by the MAA Subcommittee on Mathematics Across the Disciplines (MAD)

Minicourse #7. *Mathematical Modeling Contest Papers: Insights for Instructors and Students*, presented by **Gregory Rhoads**, Appalachian State University; **William Bauldry**, Appalachian State University; Part A, Thursday, 1:00–3:00 pm, and Part B, Saturday, 1:00–3:00 pm. Mathematical modeling has been identified as an important connection between classroom mathematical content and the types of problems that could be encountered in future employment. Modeling contests gives students an experience solving “real-world” type problems and participation in these contests has been steadily increasing in the past decade. This minicourse will give the participants insight into what constitutes a good paper for these contests. Participants will read a stratified set of papers from an actual contest and analyze them for strengths and weaknesses, which will then be compared to comments from actual contest graders. The course will include discussions about the modeling process and how this process is reflected in the submissions, ideas for creating and assessing modeling problems used as classroom assignments, and how to prepare a team for a contest. This minicourse is intended for both students and faculty. A limited number of scholarships are available for undergraduate students interested in attending this minicourse. Please contact Gregory Rhoads at rhoadsgs@appstate.edu for more information.

Minicourse #8. *(Re)Designing Your Own Mathematics Course using Backwards Course Design*, presented by **Joel Kilty**, Centre College and **Alex M. McAllister**,

Centre College; Part A, Wednesday, 9:00–11:00 am, and Part B, Friday, 9:00–11:00 am. As mathematics faculty, we are often tasked with designing, or redesigning, courses to meet the specific needs of the students at our institutions. However, our educational background is typically in mathematics and we have little formal training in or experience with educational theory. This minicourse introduces “backwards” course design theory and provides participants with a workshop type atmosphere to begin the process of designing or redesigning a course of their choice through a process of articulating (1) the goals for their course, (2) acceptable evidence of goal attainment, and (3) learning experiences as specific approaches to achieving these goals.

Minicourse #9. *Statistical Education of Teachers*; presented by **Anna E. Bargagliotti**, Loyola Marymount University; **Christine Franklin**, University of Georgia; **Denise Spangler**, University of Georgia; Part A, Thursday, 9:00–11:00 am and Part B, Saturday, 9:00–11:00 am. The Common Core State Standards for Mathematics place a large emphasis on statistics, especially in the middle- and high-school grades. Although statistics has been included as an important branch of K–12 mathematics education, there is a great need for preparing and supporting teachers trying to integrate statistics learning into the classroom. The American Statistical Association commissioned the *Statistical Education of Teachers (SET)* report to clarify the statistics teachers must know to effectively address current K–12 needs. At many institutions preservice and inservice teachers, particularly pre-K–8 teachers, learn their statistics content in mathematics courses. Thus, it is imperative that mathematicians and mathematics educators be well-versed in issues of statistics education so that they can orchestrate conversations with statisticians and those who teach mathematics content courses about the statistical preparation of teachers. This minicourse will present the recommendations of the SET report. Participants will work through grade-band specific examples, examine teacher work, and discuss difficulties and potential “roadblocks” that could emerge. This course is sponsored by the SIG-MAA on Statistics Education.

Minicourse #10. *Teaching an Applied Topology Course*, presented by **Colin Adams**, Williams College and **Robert Franzosa**, University of Maine; Part A, Thursday, 9:00–11:00 am, and Part B, Saturday, 9:00–11:00 am. Applications of topology have proliferated in recent years. It is now possible to teach a course in topology, still covering much of the same material that would appear in a traditional topology course, but motivated entirely by applications. Typically, offering an “applied” topology course immediately doubles the enrollments. Applications include areas such as geographic information systems, robotics, chaos, fixed point theory in economics, knots in DNA and synthetic chemistry, and the topology of the spatial universe. Through the applications, students become engaged with the material. In this minicourse, we will introduce the various applications, and provide participants with the background necessary to design and teach their own applied topology course.

Minicourse #11. *Teaching an Introduction to the Mathematics of Computer Graphics*, presented by **Nathan C. Carter**, Bentley University; Part A, Thursday, 9:00–11:00 am, and Part B, Saturday, 9:00–11:00 am. This minicourse introduces a project-based, general-population elective on the mathematics of computer graphics. Participants will see some new mathematics and receive a course outline and syllabus, and more importantly, a hands-on introduction to the free software used in the course projects. The minicourse also covers how to extend the course for more advanced audiences, such as mathematics majors or computer science majors. The free software POV-Ray has been around for decades, but is still updated and released today. It creates realistic 3D images and animations from mathematical descriptions of the objects in a scene. This requires students to master the mathematical content in pursuit of their creative goals, but also gives them immediate and enjoyable practical applications of that content. Students no longer ask, “What is this good for?” They immediately see the purpose of the mathematics in their own creative projects, and in the computer graphics industry. Participants receive a list of suggested student projects with grading rubrics, interactive online tools, references for further reading, and more. Prerequisites for this general-population course are algebra and polynomial differentiation; linear algebra and/or computer programming are not required.

Minicourse #12. *Teaching Introductory Statistics, GAISE 2016*, 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 2016 Guidelines for Assessment and Instruction in Statistics Education (GAISE) 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. Parts of each activity will be done by the participants, other parts will be summarized by the presenter and the main statistical ideas of the activity will be explained to the 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. An annotated list of additional resources will be discussed. This course is sponsored by the SIGMAA on Statistics Education and the MAA-ASA Joint Committee on Undergraduate Statistics.

Minicourse #13. *Teaching Modeling-First Differential Equations-Technology and Complete End Game Efforts*, presented by **Brian Winkel**, SIMIODE; **Rosemary Farley**, Manhattan College; **Jon Paynter**, US Military Academy;

Therese Shelton, Southwestern College; and **Patrice Tiffany**, Manhattan College; Part A, Thursday, 1:00–3:00 pm, and Part B, Saturday, 1:00–3:00 pm. We offer experiences for building and teaching mathematical models with differential equations: epidemic model of school infirmity, Torricelli’s Law, fishery management effort, post-operative retinal fluid dissipation, fair stadium design, sublimation of carbon dioxide, chemical kinetics, ant tunnel building, spread of oil slick, pursuit efforts, pharmacokinetics of LSD and paracetamol, shuttlecock fall, and lake algae. We discuss the role technology plays in the end game modeling efforts of parameter estimation, non-linear regression analysis, and model comparison. Through hands-on small group learning, faculty will experience the use of modeling and technology to teach differential equations. We use SIMIODE–Systemic Initiative for Modeling Investigations and Opportunities with Differential Equations, an online (www.simiode.org) community of teachers.

Minicourse #14. *Teaching Quantitative Reasoning with Common Sense and Common Knowledge*, presented by **Ethan D. Bolker**, UMass Boston; **Maura B. Mast**, Fordham University; Part A, Wednesday, 2:15–4:15 pm, and Part B, Friday 1:00–3:00 pm. Ten years from now, what do you want or expect your Quantitative Reasoning students to remember? Our answers to this question profoundly shaped our approach to teaching Quantitative Reasoning. We realized that in ten years, what matters will be how students approach a problem using the tools they carry with them – common sense and common knowledge – not the particular mathematics we chose for the curriculum. That changed how and what we teach. In this interactive minicourse we will provide hands-on experience with class activities using our approach, discuss issues in teaching and learning quantitative reasoning, and practice creating examples and exercises from current news. New and experienced instructors will learn how to craft classes and problems that will help their students come to grips with numbers in the news while learning the necessary mathematics. This course is sponsored by SIGMAA QL.

Minicourse #15. *Unraveling Four Interesting Ciphers*, presented by **Chris Christensen**, Northern Kentucky University; and **Jeffrey Ehme**, Spelman College; Part A, Thursday, 1:00–3:00 pm, and Part B, Saturday, 1:00–3:00 pm. This minicourse will explore four cryptologically, historically, and mathematically interesting ciphers: the running key cipher, rotor machine ciphers, the Playfair cipher, and the ADFGX and ADFGVX ciphers. Running key ciphers were used by spies; the Playfair and ADFGX and ADFGVX ciphers were used during World War I; and machine ciphers, like the German Enigma, dominated cryptography from the 1920s until the 1970s. For each cipher, the method of enciphering will be explained and a method of attack will be discussed.

Minicourse #16. *Using and Making Integrated Online Textbooks with MathBook XML*, presented by **Karl-Dieter Crisman**, Gordon College; Part A, Wednesday, 4:45–6:45 pm, and Part B, Friday, 3:30–5:30 pm. In this minicourse participants will learn how to effectively use online textbooks authored with the AIM-sponsored MathBook XML ([MBX, mathbook.pugetsound.edu/](http://mathbook.pugetsound.edu/)), as well as to begin creating their own course supplements with this

tool. First, we will explore the power of having online (and print) texts in subjects from Abstract Algebra to Calculus with embedded online WeBWorK problems and Sage computational cells. In the second session, 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, webpages, and computational notebooks. In both cases, the presenter's own free Number Theory text will be used as a case study of how to create a project like this. No previous experience with Sage or WeBWorK 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. This course is sponsored by the MAA Committee on Technology in Mathematics Education (CTIME).

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 jointmathematicsmeetings.org/meeting/national/jmm2017/2180_maacall.

The deadline for submission of abstracts is Tuesday, September 20, 2016.

MAA Contributed Paper Sessions with Themes

The Advancement of Open Educational Resources, organized by **Benjamin Atchison**, Framingham State University; and **Jeremy Russell**, The College of New Jersey; Saturday morning.

Assessment in Distance Learning Environments, organized by **Miriam Harris-Botzum**, Lehigh Carbon Community College; **William O. Martin**, North Dakota State University; **Sarah Cook**, Washburn University; and **Semra Kilic-Bahi**, Colby-Sawyer College; Wednesday afternoon. Sponsored by the MAA Assessment Committee.

The Creation and Implementation of Effective Homework Assignments, organized by **Sarah Greenwald**, Appalachian State University; and **Judy Holdener**, Kenyon College; Saturday morning. Sponsored by Problems, Resources, and Issues in Undergraduate Mathematics Studies (PRIMUS).

Cryptology for Undergraduates, organized by **Robert Lewand**, Goucher College; **Joshua Holden**, Rose-Hulman Institute of Technology; and **Chris Christensen**, Northern Kentucky University; Wednesday morning.

Discrete Mathematics in the Undergraduate Curriculum - Ideas and Innovations for Teaching, Organized by **John S. Caughman**, Portland State University; **Elise**

Lockwood, Oregon State University; and **Art Duval**, University of Texas El Paso; Saturday afternoon.

Do Mathematicians Really Need Philosophy?, organized by **Bonnie Gold**, Monmouth University; and **Carl Behrens**, Alexandria VA; Saturday afternoon. Sponsored by POM SIGMAA.

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

Humor and Mathematics, Organized by **Debra K. Borkovitz**, Wheelock College; **Gizem Karaali**, Pomona College; **Semra Kilic-Bahi**, Colby-Sawyer College; and **Cesar Martínez-Garza**, Penn State Berks; Friday morning.

Incorporating Big Data Ideas in the Mathematics and Statistics Classroom, organized by **Sue Schou**, Idaho State University; **Stacey Hancock**, University of California, Irvine; and **Patti Frazer Lock**, St. Lawrence University; Thursday afternoon. Sponsored by the SIGMAA on Statistics Education.

Innovative and Effective Ways to Teach Linear Algebra, organized by **Megan Wawro**, Virginia Tech; **Gil Strang**, MIT; and **David Strong**, Pepperdine University; Friday morning.

Innovative Strategies to Inspire & Prepare Potential STEM Majors Who Are Not Yet Ready for Calculus, organized by **Rebecca Hartzler**, Seattle Central College; **Suzanne I. Doree**, Augsburg College; **Frank Savina**, University of Texas at Austin; and **Michael Oehrtman**, Oklahoma State University; Thursday afternoon. Sponsored by the MAA Committee on Curriculum Renewal Across the First Two Years (CRAFTY).

Innovative Teaching through Recreational Mathematics, organized by **Matthew Jura**, Manhattan College; **Tyler Markkanen**, Springfield College; and **Oscar Levin**, University of Northern Colorado; Wednesday morning.

Inquiry-Based Teaching and Learning, Organized by **Brian P. Katz**, Augustana College; **Judith Covington**, Louisiana State University in Shreveport; **Theron Hitchman**, University of Northern Iowa; **Angie Hodge**, University of Nebraska Omaha; **Alison Marr**, Southwestern University; and **Victor Piercey**, Ferris State University; Friday afternoon. Sponsored by the SIGMAA IBL.

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

Intertwining Mathematics with Social Justice in the Classroom, organized by **Joanna Wares**, University of

Richmond; **Carl Yerger**, Davidson College; **Zeynep Teymuroglu**, Rollins College; and **Catherine Buell**, Fitchburg State University; Saturday morning. Sponsored by Problems, Resources, and Issues in Undergraduate Mathematics Studies (PRIMUS).

Mathematical Technology in the Calculus Classroom, organized by **Joel Kilty** and **Alex M. McAllister**, Centre College; Thursday morning.

Mathematics and the Arts, organized by **Douglas Norton**, Villanova University; Wednesday morning. Sponsored by the SIGMAA on Mathematics and the Arts.

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

Mathematics Experiences and Projects in Business, Industry, and Government, organized by **Allen Butler**, Daniel H. Wagner Associates, Inc., Friday morning. Sponsored by the BIG SIGMAA.

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

Methods of Engaging Math Learners with Physical Impairments, organized by **Rebekah Gilbert** and **Steven Schluchter**, George Mason University; Thursday afternoon.

Modern Data Sets for the Intro Statistics Classroom and Beyond, organized by **Sue Schou**, Idaho State University; **Stacey Hancock**, University of California, Irvine; and **Patti Frazer Lock**, St. Lawrence University; Friday afternoon. Sponsored by the SIGMAA on Statistics Education.

PIC Math and Preparing Students for Nonacademic Careers, organized by **Suzanne Weekes**, Worcester Polytechnic Institute; **Michael Dorff**, Brigham Young University; and **Elly Farnell**, Kenyon College; Saturday morning. Sponsored by the MAA BIG committee, BIG SIGMAA, and SIAM.

Preparing Pre-service and In-service Teachers to Support the Common Core State Standards Assessments, organized by **Bonnie Gold**, Monmouth University; **Karen Morgan**, New Jersey City University; and **Gulden Karakok**, University of Northern Colorado; Friday afternoon.

Preserving and Writing the History of Mathematics Departments, organized by **Toke Knudsen**, SUNY Oneonta; and **Lawrence D'Antonio**, Ramapo College; Friday morning. Sponsored by the HOM SIGMAA.

Proofs and Mathematical Reasoning in the First Two Years of College, organized by **Dean Gooch**, Santa Rosa Junior College; **Chris Oehrlein**, Oklahoma City Community College; and **Joanne Peoples**, El Paso Community College;

Thursday morning. Sponsored by the MAA Committee on Two-Year Colleges.

Research in Undergraduate Mathematics Education (RUME), organized by **Karen Keene**, North Carolina State University; and **Megan Wawro**, Virginia Tech; Thursday morning and afternoon. Sponsored by the SIGMAA RUME.

Revitalizing Complex Analysis, organized by **Russell W. Howell**, Westmont College; and **Paul Zorn**, St. Olaf College; Friday morning.

The Scholarship of Teaching and Learning in Collegiate Mathematics, organized by **Jacqueline Dewar**, Loyola Marymount University; **Thomas Banchoff**, Brown University; **Curtis Bennett**, Loyola Marymount University; **Pam Crawford**, Jacksonville University; and **Edwin Herman**, University of Wisconsin-Stevens Point; Wednesday morning and afternoon.

Successful Implementation of Innovative Models for Developmental and General Education Mathematics, organized by **Christopher Oehrlein**, Oklahoma City Community College; **Phil Mahler**, Middlesex Community College; **Tom Hagedorn**, The College of New Jersey; and **Christina H. Lee**, Oxford College of Emory University; Thursday afternoon. Sponsored by the MAA Committee on Two-Year Colleges.

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

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

Trends in Undergraduate Mathematical Biology Education, organized by **Timothy D. Comar**, Benedictine University; and **Daniel Hrozencik**, Chicago State University; Friday afternoon. Sponsored by the SIGMAA on Mathematical and Computational Biology.

Unexpected Topics for a Math Circle, organized by **Robert M. Klein**, Ohio University; and **Phillip Yasskin**, Texas A&M University; Friday morning. Sponsored by the SIGMAA MCST.

Women in Mathematics, organized by **Semra Kilic-Bahi**, Colby-Sawyer College; **Meghan De Witt**, St. Thomas Aquinas College; and **Kim Roth**, Juniata College; Saturday afternoon.

General Contributed Paper Sessions, organized by **Emelie Kenney**, Siena College; **Kimberly Presser**, Shippensburg University; and **Melvin Royer**, Indiana Wesleyan University; 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: Algebra; Analysis; Applied Mathematics; Assessment; Geometry; Graph Theory; History or Philosophy of Mathematics; Interdisciplinary Topics in Mathematics; Linear Algebra; Logic and Foundations; Mathematics and Technology; Mentoring; Modeling and Applications; Number Theory; Outreach; Probability and Statistics; Teaching and Learning Advanced Mathematics; Teaching and Learning Calculus; Teaching and Learning Developmental Mathematics; Teaching and Learning Introductory Mathematics; Topology; or Other.

An Electronic Poster Session

Me and My Gadgets—Teaching with Technology, organized by **Karl R. B. Schmitt**, Valparaiso University; **John Travis**, Mississippi College; **Thomas Hagedorn**, The College of New Jersey; and **Michael Scott**, California State University at Monterey Bay; Saturday, 10:00–11:55 am. Constantly changing technology presents an exciting and shifting opportunity to engage students and improve learning. This electronic poster session will consist of live, interactive demonstrations of applets, widgets or other technology for teaching mathematics. Rather than preparing a traditional printed poster, presenters will showcase how students engage mathematics through their application using some electronic device such as a tablet, smartphone, or laptop. Preference will be given to presenters demonstrating their own or new applications or to novel approaches in using existing ones.

In addition to the active displays, all participants will give a 3–5 minute “Lightning Talk” to demonstrate their application, highlighting where it fits into a mathematics curriculum. These will be scheduled in the middle of the session, and included in the program.

Abstracts should include a short description of the application/software (or a web-link to it) and explain the pedagogical use of the application.

Sponsored by the MAA Committee for Technology in Mathematics Education (CTIME) and Web SIGMAA.

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 20, 2016.**

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. The

session rooms are equipped with computer projectors and screens. Please note that the dates and times scheduled for these sessions remain tentative. Questions concerning the submission of abstracts should be addressed to abs-coord@ams.org.

MAA Panels, Posters, Workshops, and Other Sessions

Refocusing Your Career: Making Time and Space, organized by **Brian P. Katz**, Augustana College, and **Rachelle Bouchat**, Indiana University of Pennsylvania; Wednesday, 8:00–9:20 am. The ongoing work of an educator, scholar, colleague, leader, and advisor can and does fill all of the time we, as mathematicians, have to give. And yet, many of us have projects we are passionate about that we struggle to fit into this time, including issues of social justice, community outreach, exploration of novel areas of mathematics, and incorporation of students into our research. Some are struggling to make time rather than to make more time, while others are struggling to define the work of a mathematician so that it includes their passion projects. Panelists will discuss their varied experiences pursuing these kinds of projects and share advice that can help others navigate this career passage. There will be time for questions and discussion about applying these ideas to our own careers. This panel is sponsored by the MAA Project NExT Pine’09 cohort. Many members of this cohort are moving into phases of their careers in which both time pressures and self-determination have grown, making this issue particularly salient. While the needs of this group generated this panel, we intend the discussion to be accessible and useful for all conference attendees. Panelists are: **Colin Adams**, Williams College; **Gizem Karaali**, Pomona College; **Katherine Socha**, Park School of Baltimore; **Michael Starbird**, University of Texas at Austin; **Laura Taalman**, James Madison University; and **Diana White**, University of Colorado Denver. This panel is sponsored by MAA Project NExT.

NSF Funding Opportunities for the Learning and Teaching of the Mathematical Sciences, organizers and panelists are **Ron Buckmire**, **John Haddock**, **Teri Jo Murphy**, **Sandra Richardson**, and **Lee Zia**, Division of Undergraduate Education, NSF; **Karen King**, Division of Research on Learning, NSF; **Tasha Inniss**, Division of Human Resource Development, NSF; **Tara Smith**, Division of Graduate Education, NSF and **Jennifer Slimowitz Pearl**, Division of Mathematical Sciences, NSF. 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 in two sessions. Anticipated budget highlights and other new initiatives for the next fiscal year, as appropriate, will also be presented. These programs will be discussed in two sessions.

Part I: Undergraduate/Graduate Education, Department of Mathematics Infrastructure, and Human Resource Development (DUE/DGE/DMS/HRD) Wednesday, 8:00–9:15 am, and

Part II: The K–16 Continuum: Learning Science & Research and Pre- and In-Service Teachers (DUE/DRL) Wednesday, 9:30–10:30 am.

What Belongs in a Twenty-First Century Geometry Course?, organized by **Stephen Kennedy**, MAA Press; Wednesday, 9:35–10:55 am. The members of the panel are all well-known authors of successful textbooks for the college geometry course. Panelists will attempt to address all the relevant questions a faculty member teaching that course might face. *What is the proper role of axiomatics? What topics are absolutely essential to include? What is important for future high-school teachers in your class to master? How does the Common Core affect the answer to that question? At what level should technology be used and what are some good options?* Particular attention will be paid to the recommendations contained in the most recent MAA CUPM Guide. Panelists are: **Matthew Harvey**, University of Virginia College at Wise; **Tom Sibley**, St. John's University; and **Gerard Venema**, Calvin College.

What Every Student Should Know about the JMM, organized by **Violeta Vasilevska**, Utah Valley University; Wednesday, 2:15–3:35 pm. 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 Matt DeLong, Taylor University, 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 **Matt DeLong**, Taylor University. This panel is sponsored by the MAA Committee for Undergraduate Student Activities and Chapters (CUSAC).

Preparing for the Data Deluge: Mathematics Programs and the Future of Undergraduate Statistics Education organized by **Sue Schou**, Idaho State University; **Stacey Hancock**, University of California, Irvine; and **Patti Frazer Lock**, St. Lawrence University; Wednesday, 2:15–3:35 pm. The McKinsey report states that “by 2018, the United States alone could face a shortage of 140,000 to 190,000 people with deep analytical skills as well as 1.5 million managers and analysts with the know-how to use the analysis of big data to make effective decisions.” With terms like “Big Data” and “Analytics” being used in the media and among academics, the question arises as to how to best prepare undergraduates for careers in statistics. Employers value statistics skills and the demand is high, perhaps higher than it has ever been due to the “data deluge.” In response, there is a trend in the growth of and creation of statistics undergraduate programs. Programs, especially those housed within mathematics departments, need to determine the best options to train and teach future statisticians. Our panel will host several members of the mathematics and statistics community who have created innovative curriculum and programs to meet the demand for statistics training. These panelists will share their experiences in creating programs in statistics, the advantages and disadvantages of creating

separate Mathematics and Statistics majors, and how to incorporate new ASA guidelines for Statistics Programs into new or existing programs. Panelists are: **Robin Lock**, St. Lawrence University; **Nicholas Horton**, Amherst College; and **K. Scott Alberts**, Truman State University. This panel is sponsored by the SIGMAA on Statistics Education.

Professional Development at the Section Level: Section NExT, Opportunities for Graduate Students, & More, organized by **Julie Barnes**, Western Carolina University; **Benjamin V. C. Collins**, University of Wisconsin-Platteville; **Jessica Deshler**, West Virginia University; **Eric Eager**, University of Wisconsin La Crosse; and **David Torain**, Hampton University; Wednesday, 3:50–5:10 pm. MAA sections can provide a great set of faculty-development resources for individuals throughout the entire spectrum of the mathematical community. For example, yearly or bi-yearly section meetings are a great place for faculty to interact and learn from each other without the expense of attending national meetings. Section NExT retreats and panels offer early-career faculty with the opportunity to be mentored, without the time and financial commitment that come with national MAA Project NExT. However, that isn't the only thing that sections can do to provide professional development opportunities. In this panel, mathematicians from three different sections will share ideas from their Section NExT programs; an additional panelist will discuss professional development being offered for graduate students in one section. We will include time at the end not only for questions, but also for people to share ideas about any form of professional development available in their sections. Panelists are: **Brian Birgen**, Wartburg College; **Eric Eager**, University of Wisconsin La Crosse; **Jon Ernstberger**, LaGrange College; and **Sarah Frick**, Furman University. This panel is sponsored by the MAA Committee on Professional Development; MAA Committee on Sections; MAA Committee on Early Career Mathematicians; and MAA Project NExT.

Research Support Networks organized by **Louis Deaett**, Quinnipiac University; Wednesday, 3:50–5:10 pm. Faculty in the early and middle part of their careers may find it challenging to maintain an active program of scholarship that extends beyond their thesis work. A support network of fellow mathematicians with similar expectations of scholarship and background in a common area of mathematics can be vital to success. Diverse programs exist offering faculty opportunities to foster such research support networks. Panelists representing three such programs will share features that make each program unique, while panelists who have participated in one or more of these programs will speak to the benefits of their experiences. Panelists are: **Margaret Cozzens**, Rutgers University; **Ulrica Wilson**, Morehouse College/ICERM; **Joyati Debnath**, Winona State University; and **T. Christine Stevens**, American Mathematical Society. This panel is sponsored by the MAA Committee on Professional Development.

Bylaws for a New Century: Q&A Forum on Proposed Changes in MAA Governance, Thursday, 8:00 – 8:50 am. Come hear about and ask questions about the revised MAA bylaws which will be voted on at the Saturday MAA Business Meeting. Moderators for this forum are **Jim**

Daniel, MAA Treasurer, and **Matt Boelkins**, MAA First Vice President.

Pushing for Change: the MAA and Advocacy, organized by **Karen Saxe**, Macalester College, and **David Manderscheid**, Ohio State University; Thursday, 9:00–10:20 am. This panel will update the community on the policy and advocacy activities of the Mathematical Association of America. After a broad overview of the history of policy and advocacy work of the MAA, we will discuss more recent work of the MAA Science Policy Committee, and future directions for this committee, the MAA, and indeed all professional associations moving forward working with both federal and state governments. Panelists for this session are: **Daniel Goroff**, Alfred P. Sloan Foundation; **David Manderscheid**, Ohio State University; and **Michael Pearson**, MAA.

MAA Session for Chairs: Data, Information, Knowledge using Annual Survey of Math Science & CBMS Survey, organized by **Catherine M. Murphy**, Purdue University Calumet, and **Daniel Maki**, Indiana University; Thursday, 9:00–10:35 am. This will be an interactive session for Chairs to learn how the AMS-ASA-MAA-SIAM Annual Survey of the Mathematical Sciences (ASMS) and the Conference Board of the Mathematical Sciences (CBMS) Survey are conducted and how to effectively use these and other surveys to address issues such as course enrollments, teaching loads, trends in hiring faculty, patterns in compensation, and diversity in the work force and student population. Participants will have the opportunity to work in groups and consult with presenters on questions of their own choosing or from a suggested list. Having a notebook computer with browser and spreadsheet application would be most useful during the consulting process. Panelists are: **Thomas Barr**, American Mathematical Society, and **Ellen Kirkman**, Wake Forest University. This panel is sponsored by the AMS-ASA-MAA-SIAM Joint Data Committee.

Mathematical Outreach Programs, organized by **Elizabeth Yanik**, Emporia State University; Thursday, 10:00 am–12:00 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. For example, recipients of Dolciani Mathematics Enrichment Grants might wish to highlight their 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.

Models for Mathematicians Working with K-12 Mathematics Teachers, organized by **Ben Ford**, Sonoma State University, and **Debbie Gochenaur**, Shippensburg University; Thursday, 10:35–11:55 am. In addition to work preparing teachers before they enter the classroom, many mathematical science departments are integral to professional development efforts for practicing teachers in their regions. Panelists will discuss successful models in which they participate, including statewide networks, masters programs for in-service teachers, math teacher circles, and national programs. Panelists are: **James A. M. Epperson**, The University of Texas at Arlington; **David Fischman**, California State University, San Bernardino; and **Robert M. Klein**, Ohio University. This panel is sponsored by the MAA Committee on the Mathematical Education of Teachers (COMET).

MAA-AMS Joint Panel Session on Design (or improve) Preparation of Your Graduate Students to Teach: Using MAA's CoMInDS Resource Suite, organized by **Jessica Deshler**, West Virginia University; Thursday, 10:35–11:55 am. CoMInDS is a MAA project, funded by the NSF, to support teaching-related professional development (PD) for beginning college mathematics instructors (CMIs), e.g., graduate student teaching assistants. CoMInDS aims to provide resources and support networks for those: (1) who deliver the PD in their departments (2) who create PD materials for CMIs and (3) who conduct research on CMI PD. One component of the project is an online collection of instructional materials and research-related resources for use in CMI PD. In this session, we will illustrate how to use the resource suite to design PD programs for CMIs. We will provide an overview of the contents of the suite and then we will illustrate how to identify specific resources. In particular, we will provide a guided tour of how items from the resources suite can be used to create a pre-semester orientation session for new CMIs. We will also illustrate how to locate and use research-based resources from the suite, such as research articles, to use as readings and research reports that can be used to support the need for such programs. At the close of the session we will present opportunities for participants to get involved in the project and to contribute their own materials to the resources suite.

This panel is being organized and offered in conjunction with a complementary AMS Special session on Saturday morning and afternoon, *Teaching Assistant Development Programs: Why and How?* (see AMS sessions).

Panelists are **Jack Bookman**, Duke University; **Natasha Speer**, University of Maine; **Jessica Deshler**, West Virginia University; and **Sarah Schott**, Duke University. This panel is sponsored by the MAA Committee on Professional Development and AMS-MAA Joint Committee on TAs and Part-Time Instructors.

Perspectives on Inquiry Based Learning: Novice, Experienced, and Master, organized by **Theron J. Hitchman**, University of Northern Iowa; **Judith Covington**, Louisiana State University Shreveport; **Angie Hodge**, University of Nebraska Omaha; **Brian Katz**, Augustana College; **Alison Marr**, Southwestern University; and **Victor Piercey**, Ferris State University; Thursday, 1:00–2:20 pm. Panelists will share their experiences in getting started

with Inquiry Based Learning (IBL) and perspectives on maintaining these techniques over time. They will share a quick thought on the opportunities and challenges of IBL courses, but a large fraction of the time will be reserved for a questions from the audience. Our panelists include someone new to IBL teaching, someone with enough experience to feel comfortable designing a new course, and an acknowledged master teacher who has mentored others in IBL teaching. Panelists are **Carol Schumacher**, Kenyon College; **Theron Hitchman**, University of Northern Iowa; and **Susan Crook**, Loras College. This panel is sponsored by IBL SIGMAA.

Women and Scholarly Publishing, organized by **Semra Kilic-Bahi**, Colby-Sawyer College; **Kim Roth**, Juniata College; and **Jenna Carpenter**, Campbell University; Thursday, 1:00–2:20 pm. Data on the publications emphasize the gender gap among the authorship of published scholarly work. A further analysis of the data reveals that the number of submissions by women to professional journals is considerably less than men's. There is a wide array of publishing venues and format to present scholarly work to diverse audiences. Panelists will share tips on how to integrate writing to our busy schedules, how to best frame articles for a variety of journals, and how to become successful authors. The exploration of possible reasons on the gender discrepancy in scholarly publishing will be an important theme of the panel. Panelists are **Jackie Jensen-Vallin**, Lamar University; **Susan Colley**, Oberlin College; **Gizem Karaali**, Pomona College; **Marjorie Senechal**, Smith College; **Cathy Kessel**, Illustrative Mathematics; and **Dorothy Wallace**, Dartmouth College.

Projects Supported by the NSF Division of Undergraduate Education, organized by **Jon Scott**, Montgomery College; Thursday, 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.

MAA Panel on the Dolciani Award: Mathematicians in K-16 Education, organized by **David Stone**, Georgia Southern University; **Will Abram**, Hillsdale College; **Judith Grabiner**, Pitzer College; **Bill Hawkins**, University of the District of Columbia; **Betty Mayfield**, Hood College; **Susan Wildstrom**, Walt Whitman HS, Bethesda MD; and **Glenn Stevens**, Boston University; 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. Although it is new and relatively unknown, 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:

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 will feature recipients of the award and other mathematicians who have 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: **Hyman Bass**, University of Michigan; **Sybilla Beckman**, University of Georgia; and **Bill McCallum**, University of Arizona.

MAA-AMS-SIAM Panel on Multiple Paths to Mathematics Careers in Business, Industry and Government (BIG), organized by **Rachel Levy**, Harvey Mudd College; **Allen Butler**, Daniel H Wagner Associates; and **Douglas Mupasiri**, University of Northern Iowa Thursday, 2:35–3:55 pm. Career opportunities in Business, Industry and Government (BIG) are growing as tenure track academic job opportunities are shrinking. Yet many Mathematics PhD programs do not include preparation for BIG career options as part of the standard curriculum. At this panel you will have the opportunity to hear about multiple career paths to BIG. Panelists will share (a) what they wish they had known and done as graduate students/postdocs and (b) what you can do at your career stage if you are interested in making connections with business, industry or government. Panelists are: Natalie Durgan, Spiceworks; Mary Morley, State of New Jersey; Frank Cullen, Emeritus Principal with Blackstone & Cullen, Inc.; Dan Sanders, Columbia University; and Prasad Tetali, Georgia Tech. Sponsors for this panel are AMS, BIG SIGMAA, MAA, and SIAM.

Poetry + Math, organized by **Gizem Karaali**, Pomona College; **Lawrence M. Lesser**, University of Texas at El Paso; and **Douglas Norton**, Villanova University; Thursday, 5:30–7:00 pm. In the last few years, JMM attendees have enjoyed eclectic poetry readings. This year's poetry reading continues the tradition. All who are interested in mathematical poetry and/or mathematical art are invited. Come to share your poetry or simply enjoy the evening's offerings! Though we do not discourage last-minute decisions to participate, we invite and encourage poets to submit poetry (no more than three poems, no longer than five minutes) and a bio in advance—and, as a result, be listed on our printed program. Inquiries and submissions (by December 1, 2016) may be made to Gizem Karaali (gizem.karaali@pomona.edu) Sponsors for this event are the Journal of Humanistic Mathematics and SIGMAA ARTS.

Developing the MAA Instructional Practices Guide, organized by **Martha Abell**, Georgia Southern University, and **Linda Braddy**, Tarrant County Community College; Friday, 9:35–10:55 am. In the process of revising the Curriculum Guide, the MAA Committee on the Undergraduate Program in Mathematics (CUPM) encountered questions related to "how we teach" as well as "what we teach." As a result,

the MAA Committee on the Teaching of Undergraduate Mathematics (CTUM) was charged with developing an Instructional Practices (IP) Guide to help faculty become more aware of research-based pedagogical approaches, course design, and assessment of student learning. Panelists are lead writers or project PIs who will discuss various aspects of the Guide, including structure, content, and review process. This panel discussion provides an opportunity for members of the mathematics community to learn more about the Guide and to provide feedback as it is being developed. Panelists are: **Ben Braun**, University of Kentucky; **Julie Phelps**, Valencia College; **Lew Ludwig**, Denison University; and **Hortensia Soto**, University of Northern Colorado. Sponsored by the MAA Committee on the Teaching of Undergraduate Mathematics (CTUM).

Insights from MAA studies of College Algebra, Precalculus, and Calculus, organized by **David Bressoud**, Macalester College, and **Marilyn Carlson**, Arizona State University; Friday, 9:35–10:55 am. The MAA has been running two large NSF-sponsored studies of introductory undergraduate mathematics: Using Research to Shape Instruction and Placement in Algebra and Precalculus (URSIP) and Progress through Calculus (PtC). The latter builds on the findings of Characteristics of Successful Programs in College Calculus to provide tools for departments to improve the precalculus through calculus sequence. It also is studying the obstacles and affordances to the implementation of beneficial changes. This panel will consist of researchers from these two projects summarizing their most significant findings and seeking feedback from the audience for future directions. Panelists are: **Jess Ellis**, Colorado State University; **Bernie Madison**, University of Arkansas; **Chris Rasmussen**, San Diego State University; and **Michael Tallman**, Oklahoma State University.

Presentations by MAA Teaching Award Recipients, organized by **Barbara Faires**, Westminster College, and **Francis Su**, Harvey Mudd College.; Friday, 2:30–3:50 pm. Winners of the Deborah and Franklin Tepper Haimo Awards for Distinguished College or University Teaching will give presentations on the secrets of their success.

Highlighting Contributions to Mathematics Education from Members of Departments of Mathematical Sciences, organized by **Beth Burroughs**, Montana State University; **Jacqueline Dewar**, Loyola Marymount; and **Pao-sheng Hsu**; 2:35–3:55 pm. There are a variety of ways in which members of departments of mathematical sciences contribute to work in mathematics education. This panel is designed to illustrate the breadth and range of these activities and to provide a forum for discussion of particular issues that might arise from such work. It will highlight examples and include the perspectives of mathematicians and mathematics education researchers who contribute in areas such as: teacher education (pre- and in-service); instructional materials development in K–16 mathematics; equity issues in mathematics; and mathematics education research. Panelists will discuss their work in mathematics education and may reflect on how their work is received in their departments. Panelists will update the community on the project. The moderator for this panel is **Robert Klein**, Ohio University. Panelists are: **Viveka Borum**, Spelman College; **LouAnn Lovin**, James

Madison University; **Megan Wawro**, Virginia Polytechnic and State University; and **Nina White**, University of Michigan. This panel is co-sponsored by the MAA Committee on the Mathematical Education of Teachers (COMET) and AWM Committee on Education.

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 7, 2016. Notification of acceptance or rejection will be sent by November 1, 2016. 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 award certificates will be mailed to presenters with the highest scores. 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 results will be available at the MAA Pavilion in the Exhibit Hall the following day until the exhibits close.

Questions regarding this session should be directed to Chasen Smith csmith@georgiasouthern.edu and Eric Ruggieri eruggier@holycross.edu. This session is sponsored by the MAA Committee on Undergraduate Student Activities and Chapters.

Actuarial Science at the JMM: 25 Years and Counting, organized by **Patrick Brewer**, Lebanon Valley College; **Robert Buck**, Slippery Rock University; **Betty Case**, Florida State University; **Kevin Charlwood**, Washburn University; **Michelle Guan**, Indiana University Northwest; **Steve Paris**, Florida State University; and **Sue Staples**, Texas Christian University; Friday, 5:00–7:00 pm. In 1992, James Daniel, University of Texas, began organizing actuarial science sessions to keep faculty members informed of ever-evolving actuarial curriculum changes and career information. Commemorating the 25th anniversary celebration of that first session, Jim will be the opening speaker. He will offer some historical perspective of the past 25 years and a view of the future challenges and rewards for actuarial science faculty. Dwayne Husbands and Jonathan Applewhite, representing the International

Association of Black Actuaries will discuss a new initiative involving a pilot program at Florida State University. The next panel section, "From the Field," will feature working actuaries from the Atlanta area; this popular tradition of the sessions generates lively questions from the audience. Because exam content and credentialing requirements change much faster than the usual academic pace, annual updates from the major credentialing organizations are essential: Rick Gorvett represents the Casualty Actuarial Society and Stuart Klugman represents the Society of Actuaries—there are big changes in the exams structure and content which are anticipated very soon. Panelists are: **James Daniel**, University of Texas; **Stuart Klugman**, Society of Actuaries; **Rick Gorvett**, Casualty Actuarial Society; **Dwayne Husbands** and **Jonathan Applewhite**, Ernst and Young, representing the International Association of Black Actuaries; two Atlanta area practicing actuaries.

Mathematically Bent Theater, featuring **Colin Adams** and the **Mobiusbandaid Players**; Friday, 6:00–7:00 pm. *Which Greek letter has more cachet, epsilon, delta or sigma? How many mathematicians does it take to change a light bulb? Who walked off with my copy of "Green's Kernels and Meso-Scale Approximations in Perforated Domains" at the Project NEXt Reception at the Seattle Joint Meetings?* These are just a few of the questions we will not answer in this theatrical presentation of several short mathematically inclined humorous pieces.

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!

Roadblocks for Implementing Active Learning Strategies in Calculus Courses, organized by **Debbie Gochenaur**, Shippensburg University, and **Larissa Schroeder**, University of Hartford; Saturday, 9:00–10:20 am. Faculty members who would like to begin implementing active learning strategies in their Calculus course(s) may become overwhelmed by apparent roadblocks, often quitting before getting very far. Panelists will discuss roadblocks they have encountered through their own journey towards integrating active learning in calculus courses, as well as successful models for implementation. Ample time will be given for questions from the audience. Panelists are: **Angie Hodge**, University of Nebraska Omaha; **Matthew Boelkins**, Grand Valley State University; and **Darryl Yong**, Harvey Mudd College.

Outside the Equation - Exploring Alternative Forms of Mathematical Communication, organized by **Samuel Hansen**, ACMEScience; Saturday, 9:00–10:20 am. Talks, classes, articles, and books. We all know the basics about how mathematics is typically communicated, but there is no reason to limit ourselves to such a narrow set of communication tools. The more ways mathematics is communicated the more people will develop a meaningful connection to mathematics and the more people with a deep connection to our beloved subject the more positive the public perception of mathematics, which is something we can all would be a boon. There are many

cases of different types of mathematical communication in the world from videos to art to audio shows to live performances to music. This panel will feature talks from the people on the front lines of this work discussing how they transform mathematics from the classroom and the page into something engaging and new to be enjoyed by many types of different audiences. The panel is made up of people who communicate mathematics through music, mime, art, and podcasts. Panelists are: **Anna Haensch**, DUSQUENSE UNIVERSITY; **Robert Schneider**, Emory University; **Edmund Harriss**, University of Arkansas; and **Tim Chartier**, Davidson College.

Weird Ways to Multiply (and Isn't the Spelling of "Weird" Weird?), organized by **Deanna Haunsperger**, Carleton College; Saturday, 10:00–10:50 am. Presenter, **James Tanton**, MAA, will share a whole slew of strange and wild techniques for performing multiplication. Will you be able to figure out why these crazy techniques work? This interactive lecture welcomes students of all ages, and teachers, parents, mathematicians, and math enthusiasts of all ages. Sponsored by the MAA Council on Outreach.

Me and My Gadgets—Teaching with Technology, organized by **Karl R. B. Schmitt**, Valparaiso University; **John Travis**, Mississippi College; **Thomas Hagedorn**, The College of New Jersey; and **Michael Scott**, California State University at Monterey Bay; Saturday, 10:00–11:55 am. Constantly changing technology presents an exciting and shifting opportunity to engage students and improve learning. This electronic poster session will consist of live, interactive demonstrations of applets, widgets or other technology for teaching mathematics. Rather than preparing a traditional printed poster, presenters will showcase how students engage mathematics through their application using some electronic device such as a tablet, smartphone, or laptop. Preference will be given to presenters demonstrating their own or new applications or to novel approaches in using existing ones.

In addition to the active displays, all participants will give a 3–5 minute "Lightning Talk" to demonstrate their application, highlighting where it fits into a mathematics curriculum. These will be scheduled in the middle of the session, and included in the program.

Abstracts should include a short description of the application/software (or a web-link to it) and explain the pedagogical use of the application.

Sponsored by the MAA Committee for Technology in Mathematics Education (CTIME) and Web SIGMAA.

The Impact of High School Calculus on the Transition to College Mathematics, organized by **David Bressoud**, Macalester College, and **Brendan Murphy**, John Bapst High School; Saturday, 10:35–11:55 am. Three-quarters of the students who begin calculus each year do so in high school. Roughly half of all students who matriculate as full-time undergraduates in a four-year program have completed a calculus course before leaving high school. The MAA, NCTM, and College Board are all concerned about differences between students who have and those who have not had access to calculus in high school, particularly the effects on both students' interest in taking and the success experienced in college mathematics courses. This panel will report on what we know about the effects

of this “rush to calculus” and discuss what we might need to know and how such information can be gathered. Panelists are: **Vilma Mesa**, University of Michigan; **Dixie Ross**, Pflugerville High School; **Philip Sadler**, Harvard University; and **Bill Trapp**, The College Board. This panel is sponsored by the College Board/MAA Joint Committee on Mutual Concerns.

What We Talk About When We Talk About Mathematics, organized by **Samuel Hansen**, ACMEScience; Saturday, 10:35–11:55 am. Mathematics is not always the easiest thing to talk or write about, especially when the audience is not other mathematicians. This panel of journalists, authors, and online mathematical communicators will discuss how they take high level mathematics and present them to a general audience in such a way that the audience can not only understand but enjoy the mathematics. The panel will be moderated by Samuel Hansen, the host of the mathematics podcast *Relatively Prime*. Panelists are: **Beth Malmskog**, Villanova University; **Evelyn Lamb**, Scientific American Blog Network and Freelance Journalist; and **Colin Adams**, Williams College and Author

Math Circle Demonstration, organized by **Gabriella Pinter**, University of Wisconsin Milwaukee; **Tatiana Shubin**, San Jose State University; and **Bob Klein**, Ohio University; Saturday, 11:00–11:55 am. 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.

Introductory Statistics: Where Are We and Where Do We Need to Go? organized by **Gail Burrill**, Michigan State University; Saturday, 2:35–3:35 pm. The content and focus of current introductory statistics courses vary considerably across institutions. In this session, the panelists will discuss the changing audience for the course, new approaches to structuring a course to meet the needs of more students, the changing landscape for the role of statistics and how it is taught, the overarching concepts that should be part of any course, and what the statistics education community should be doing to prepare teachers at all levels for these changes. Questions for the audience will include what they see as barriers to rethinking current courses, what might be done to overcome these barriers, and suggestions for other concerns and considerations in promoting better student learning. Panelists are **Roxy Peck**, Cal Poly, San Luis Obispo; **Uri Triesman**, University of Texas at Austin; **Rob Gould**, University of California Los Angeles; and **Nathan Tintle**, Dordt College. This panel is sponsored by MAA/College Board Mutual Concerns Committee.

SAT Test Development Committee Reflections, organized by **Bill Trapp**, College Board; Saturday, 1:00–2:20 pm. The College Board administered a fully

redesigned SAT in March 2016. Some of the changes to the SAT included a narrower content focus, separate calculator portion and no-calculator portion, and no penalty for guessing. Subject matter experts in mathematics began reviewing new questions in 2013 and continue to review hundreds of new questions yearly. This panel will share their experiences and their impressions which have been gathered during their participation as SAT question reviewers for the College Board. Panelists are: **Rinav Mehta**, Central Piedmont Community College; **Gloria Barrett**, North Carolina School of Mathematics and Science; **Luke Wilcox**, East Kentwood High School; and **Katrina Piatek-Jimenez**, Central Michigan University. This panel is sponsored by the College Board/MAA Committee on Mutual Concerns.

Math Wrangle, organized by **Mark Saul**, MAA; **Ed Keppelmann**, University of Nevada Reno and **Paul Zeitz**, University of San Francisco Saturday, 1:00–2:30 pm. 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-MCST.

Special Interest Groups of the MAA (SIGMAAs)

SIGMAAs will be hosting a number of activities, sessions, and guest lectures. There are currently twelve 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 to noon; chaired by **Andrew Miller**, Belmont University.

SIGMAA on Mathematics and the Arts (SIGMAA ARTS)

Mathematics and the Arts, Wednesday morning (see MAA Contributed Paper Sessions).

Poetry+Math, Thursday, 5:30–7:00 pm.

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).

PIC Math and Preparing Students for Nonacademic Careers, Saturday morning (see MAA Contributed Paper Sessions).

Guest Lecture, Friday, 5:30–6:20 pm.

Business Meeting and Reception, Friday 6:20–7:30 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, **Martin Meltzer**, Centers for Disease Control.

Trends in Undergraduate Mathematical Biology Education, Friday afternoon (see MAA Contributed Paper Sessions).

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

SIGMAA on Environmental Mathematics (SIGMAA EM)
Modeling and Understanding Environmental Risks, Wednesday (see MAA Invited Paper Sessions).

SIGMAA on the History of Mathematics (HOM SIGMAA)
Business Meeting, Wednesday, 6:00–6:30 pm.

Reception, Wednesday, 6:30–7:00 pm.

Guest Lecture, Wednesday, 7:00–7:50 pm, **Glen Van Brummelen**.

Preserving and Writing the History of Mathematics Departments, Friday morning (see MAA Contributed Paper Sessions).

SIGMAA on Inquiry Based Learning (SIGMAA IBL)

Perspectives on Inquiry Based Learning: Novice, Experienced, and Master, Thursday, 1:00–2:20 pm (see MAA Panels).

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

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

Unexpected Topics for a Math Circle, Friday morning (see MAA Contributed Paper Sessions).

Math Wrangle, Saturday, 1:00–2:30 pm.

SIGMAA on the Philosophy of Mathematics (POM SIGMAA)

Do Mathematicians Really Need Philosophy?, Saturday afternoon (see MAA Contributed Paper Sessions).

SIGMAA on Quantitative Literacy (SIGMAA QL)

New Directions in Quantitative Literacy for General Education, in honor of Lynn Steen, Saturday morning (see MAA Invited Paper Sessions).

SIGMAA on Research in Undergraduate Mathematics Education (SIGMAA RUME)

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

SIGMAA on Statistics Education (SIGMAA Stat Ed)

Preparing for the Data Deluge: Mathematics Programs and the Future of Undergraduate Statistics Education, Wednesday, 2:15–3:35 pm (see MAA Panels).

MAA Minicourse: Incorporating Randomization Methods into Introductory Statistics, Part A: Wednesday 9:00–11:00 am and Part B: Friday 9:00–11:00 am (see MAA Minicourses).

MAA Minicourse: Statistical Education of Teachers, 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).

Reception, Thursday, 5:30–6:00 pm.

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

Guest Lecture, Thursday, 6:50–7:40 pm, **Brian Gurbaxani**, Centers for Disease Control and Prevention, *Applied Mathematics and Statistics at the CDC-2017 and Beyond*

Modern Data Sets for the Intro Statistics Classroom and Beyond, Friday afternoon (see MAA Contributed Paper Sessions).

SIGMAA on the Teaching of Advanced High School Mathematics (SIGMAA TAHSM)

SIGMAA on Undergraduate Research (UR SIGMAA)

SIGMAA on Mathematics Instruction Using the Web (WEB SIGMAA)

Reception, Friday, 5:30–6:00 pm.

Guest Lecture, Friday, 6:00–6:50 pm, **Rob Beezer**, University of Puget Sound, *Textbooks for the Web from MathBook XML*.

Poster Session: Me and My Gadgets-Teaching with Technology, Saturday, 10:00–11:55 am.

MAA Sessions for Students

Radical Dash! organized by **Stacey Muir**, University of Scranton, and **Janine Janoski**, Kings College; **Radical Dash Kickoff Meeting:** Wednesday, 10:00–10:45 a.m and **Radical Dash Prize Session:** Friday, 10:00–10:45 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 4, 10:00–10:45 am 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 6, 10:00–10:45 am. Questions? E-mail us at MAARadicalDash@gmail.com. The Radical Dash! is sponsored by MAA Committee on Undergraduate Student Activities and Sections (CUSAC).

What Every Student Should Know about the JMM, organized by **Violeta Vasilevska**, Utah Valley University;

Wednesday, 2:15 –3:35 pm. 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 Matt DeLong, Taylor University, 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: **JJoyati Debnath**, Winona State University; **Michael Dorff**, Brigham Young University; and **Matt DeLong**, Taylor University. This panel is sponsored by the MAA Committee for Undergraduate Student Activities and Chapters (CUSAC).

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 about 300 students met with representatives from 60 graduate programs. If your school has a graduate program and you are interested in participating, a table will be provided for your posters and printed materials for US\$80 (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 **Matthew Richey**, St. Olaf College, on *Take What You Have Gathered from Coincidence: Understanding and Using Randomness*.

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 7, 2016. Notification of acceptance or rejection

will be sent by November 1, 2016. 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 award certificates will be mailed to presenters with the highest scores. 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 results will be available at the MAA Pavilion in the Exhibit Hall the following day until the exhibits close.

Questions regarding this session should be directed to Chasen Smith csmith@georgiasouthern.edu and Eric Ruggieri eruggier@holycross.edu. This session is sponsored by the MAA Committee on Undergraduate Student Activities and Chapters.

Weird Ways to Multiply (and Isn't the Spelling of "Weird" Weird?), organized by **Deanna Haunsperger**, Carleton College; Saturday, 10:00–10:50 am. Presenter, **James Tanton**, MAA, will share a whole slew of strange and wild techniques for performing multiplication. Will you be able to figure out why these crazy techniques work? This interactive lecture welcomes students of all ages, and teachers, parents, mathematicians, and math enthusiasts of all ages. 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 **Daniel Goroff**, Sloan Foundation on *Behavioral and Bayesian Approaches to Classroom Decision Making*.

See details about the reception on Friday in Social Events.

Other MAA Events

Board of Governors, Tuesday, 9:00 am–5:00 pm.

Department Liaisons Meeting, Wednesday, 9:30–11:00 am.

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 **Francis Su**, Harvey Mudd College, and organized by MAA Secretary **Barbara Faires**, Westminster College.

MAA Workshops

Implementing and Orchestrating Active Learning Strategies in Calculus, organized by **Larissa B. Schroeder**, University of Hartford, and **Debbie Gochenaour**, Shippensburg University; Thursday, 1:00–2:20 pm. In this workshop,

participants will engage in pedagogical discussions focused on developing practical strategies for incorporating active learning strategies (e.g., student presentation, inquiry-based learning activities, writing to learn, etc.) into their Calculus courses. The emphasis will be on using existing curricular materials (e.g., activities from Active Calculus (Boelkins, Austin, & Schlicker, 2015), classroom voting questions, concept tests, etc.) to support active learning. Active learning strategies are those that engage students in activities that promote analysis, synthesis and evaluation of course content. This workshop, intended for the novice user, will include small group discussions and interactive discussions with the organizers and will focus on helping participants move beyond the initial difficulties associated with first-time implementation of active learning strategies.

Course Design with Active Learning, organized by **Victor Piercey**, Ferris State University, and **Luke Tunstall**, Michigan State University; Thursday, 2:35–3:55 pm. Faculty are often called upon to create new courses and redesign existing courses. Participants in this workshop will outline the design for a sample learning module using “backwards design.” Backwards design is a technique for course design which begins with what students should be able to do or demonstrate at the end of the course, followed by how this will be assessed, and concludes with preparing learning activities. We will identify learning outcomes appropriate for active learning, discuss assessment techniques, and conclude by outlining supporting learning activities. Regardless of whether you are addressing general education reform or redesigning advanced courses for graduate students, if you are working on a designing a new course then this workshop will be for you.

Using Interactive Dynamic Technology in Teaching Introductory Statistics: Simulation-Based Inference, organized by **Gail Burrill**, Michigan State University; presenters for this workshop are **Darren Starnes**, The Lawrenceville School; **Chris Franklin**, American Statistics Association; and **Beth Chance**, California Polytechnic State University, San Luis Obispo; Saturday, 9:00–10:20 am. The use of software packages to analyze data is considered a core part of introductory statistics courses. But technology can also be used to introduce fundamental concepts of statistical inference using simulation-based methods. This shift from methods based on the normal distribution can provide new insights into statistical reasoning. Participants will engage in activities using interactive dynamic technology to explore the underlying logic of confidence intervals and significance tests with real data.

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 **Matthew Foreman**, University of California

Irvine; **Clinton Conley**, Carnegie Mellon University; **Alfred Dolich**, Kingsborough Community College; **Rahim Moosa**, University of Waterloo; **Linda Brown Westrick**, University of Connecticut; **Alexandra Shlapentokh**, East Carolina University; and **Henry Towsner**, University of Pennsylvania.

Association for Women in Mathematics (AWM)

Thirty-Eighth Annual Noether Lecture, Thursday, 10:05 am, will be given by **Lisa Jeffrey**, University of Toronto, *Cohomology of Symplectic Quotients*.

Also see the sessions on *Symplectic Geometry, Moment Maps and Morse Theory*, jointly sponsored by the AWM, in the “AMS Special Sessions” listings.

Association for Women in Mathematics Panel: “Mentoring Women in Mathematics.” organized by **Michelle Manes**, University of Hawaii at Manoa; Wednesday, 2:15–3:40 pm. Mentors play many roles: They may give specific advice about mathematics, schools, and career; or they may convey informal “common wisdom” about the life of a mathematician and how to live it. They may be a role model, an embodiment of what might be possible down the line. They may be the person a student turns to for guidance when she faces a difficult situation either personally or professionally. Relationships with mentors might be official or unofficial, and they may be short-lived or decades long. Mentors might be teachers, advisors, collaborators, colleagues, or friends. Women in mathematics face all the same challenges as their male colleagues: the challenge of doing a very difficult job well, imposter syndrome, fear of failure, the job search, two-body problems, and work-life balance questions. But they are more likely than their male colleagues to face sexism, discrimination, and even harassment. Effective mentors offer guidance through difficult times, know about opportunities, and help with goal setting. Hear from panelists with extensive and varied experiences mentoring women at all stages of their mathematics studies and careers. This session is open to all JMM attendees. Panelists include **Helen Grundman**, Bryn Mawr College; **Ruth Hass**, Smith College; **Deanna Haunsperger**, Carleton College; **Kristin Lauter**, Microsoft Research, and other panelists to be announced. <https://sites.google.com/site/awmpanel2017/>

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

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 **Rosa Orellana**, Dartmouth College and **Anne Shepler**, University of North Texas. The Poster Judging Coordinator is **Sylvia Wiegand**, University of Nebraska at Lincoln.

AWM Workshop: Special Session on Number Theory, Saturday, 8:00–5:00 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/workshops.html. All JMM attendees are invited to attend the program. Organizers for this

workshop are **Alina Bucur**, University of California, San Diego and **Ellen Eischen**, University of Oregon.

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

See also the sessions cosponsored by the AWM on *Symplectic Geometry, Moment Maps and Morse Theory* on Friday in the “AMS Special Sessions” listings. Organizers for these sessions are **Lisa Jeffery**, University of Toronto, and **Tara Holm**, Cornell University.

National Association of Mathematicians (NAM)

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

Cox-Talbot Address, to be given Friday after the banquet by **Garikai Campbell**, Provost, Morehouse College, title to be announced. See details about the banquet on Friday in the “Social Events” section.

Panel Discussion; Transforming Post-Secondary Education (TPSE) Mathematics: Implications for the Preparation of African American Undergraduates and Institutions, Saturday, 9:00–9:50 am, Moderator: **Duane Cooper**, Morehouse; Panelists to be announced.

Claytor-Woodward Lecture, Saturday, 1:00 pm, **Wilfrid Gangbo**, Georgia Institute of Technology, *Paths of minimal lengths on the set of exact differential k-forms*.

See also the special session on Thursday co-sponsored by NAM in the “AMS Special Sessions” listings: **The Mathematics of the Atlanta University Center**, organized by **Talitha M. Washington**, Howard University, **Monica Jackson**, American University, and **Colm Mulcahy**, Spelman College.

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

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 exhibits. Times that staff will be available will be posted at the booth.

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, *The dynamics of systems interacting across statistical scales*, at 11:10 am on Thursday given by **Irene M. Gamba**, University of Texas at Austin, and a series of Minisymposia to include *Recent Advances in Linear Algebra*, **James Nagy**, Emory University; *Applications of Algebra, Geometry, and Topology*, **Frank Sottile**, Texas A&M University; *The GAIMME Report on Mathematical Modeling in K-16*, **Kathleen Fowler**, Clarkson University; *Topics in Analysis and Numerical Methods for Collisional Kinetic*

Equations, **Ricardo Alonso**, Pontifical Catholic University of Rio de Janeiro, **Irene M. Gamba**, University of Texas at Austin, and **Robert Strain**, University of Pennsylvania; *Recent Advances in Uncertainty Quantification*, **Noemi Petra**, University of California Merced, and **Juan C. Meza**, University of California Merced; *Recent Developments in Computational Inverse Problems and Imaging*, **Kui Ren**, University of Texas, Austin, **Fernando Guevara Vasquez**, University of Utah, and **Alexander V. Mamonov**, University of Houston; *Mathematics of Planet Earth*, **Hans Kaper**, Georgetown University; and *PDEs in Biology and Materials Science*, **Yuliya Gorb**, University of Houston, and **Sunčica Cancić**, University of Houston.

The Program also includes the following co-sponsored panel discussions: *AMS-SIAM Committees on Education, Panel on Broadening Research Experiences for Doctoral Students in the Mathematical Sciences*, Thursday, 1:00 – 2:30 pm (see AMS Panels); and the *MAA-AMS-SIAM Panel on Multiple Paths to Mathematics Careers in Business, Industry and Government (BIG)*, Thursday, 2:35–3:55 pm. (See AMS and MAA Panels).

In this panel, we will hear about efforts to improve the training of mathematical sciences doctoral students by involving them in research activities outside of their main dissertation research topic in order to better prepare them for a broader range of careers.

Programs have been designed to encourage connections between mathematical sciences and other academic departments, and between academia and business, industry, government, and non-profit organizations.

The aim is to produce students who are able to recognize opportunities for the development of mathematics and statistics in problems originating in a variety of settings, and who can apply advanced mathematics and statistics to help solve such problems.

See also the AMS-MAA-SIAM Special Session on *Research in Mathematics by Undergraduates and Students in Post-Baccalaureate Programs* in the “AMS Special Session” listings. The organizers for this session are **Darren A. Narayan**, Rochester Institute of Technology, **Tamas Forgacs**, California State University, Fresno, and **Ugur Abdulla**, Florida Institute of Technology

Others

Hrabowski-Gates-Tapia-McBay Session, organized by **Ricardo Cortez**, Tulane University; Wednesday, 9:00–9:50 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 2017 session will consist of a lecture will be given by **Mariel Vazquez**, University of California Davis.

From Calculus to a Bachelor's Degree: Encouraging and Developing Undergraduate Mathematics Majors, organized by **Jenna P. Carpenter**, Campbell University; Thursday, 1:00–2:30 pm. This panel will address how to identify, encourage, and develop undergraduate mathematics majors. This is of particular relevance to women, since recent studies show that only half as many women as men who start in first semester Calculus continue on to the second semester. The panel will cover steps that faculty members and departments can take to identify and develop majors, educate students about careers, and create exciting and relevant courses and opportunities. It will also be of particular interest to undergraduate students. Panelists are **Alison Henrich**, Seattle University; **Sylvia Bozeman**, Spelman, Infinite Possibilities; **Federico Ardila**, San Francisco State University; and **Christine Kelley**, University of Nebraska-Lincoln. Sponsored by the Joint Committee on Women in the Mathematical Sciences.

Mathematical Art Exhibition, organized by **Robert Fathauer**, Tessellations Company; **Anne Burns**, Long Island University C. W. Post Campus, **Nathan Selikoff**, Digital Awakening Studios, and **Elizabeth Whiteley**, studio artist, Washington, D.C. 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. Don't 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.

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 **December 29, 2016**. 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.

2017 AMS Dinner, Join your colleagues on this special occasion of celebration in the mathematical community. The AMS will recognize long-term members as well as

honor the recipients of Programs That Make a Difference Awards and the Exemplary Programs Award. Enjoy delicious meals from gourmet food stations, special entertainment, and enter to win fun prizes at the raffle table! This evening of celebration will be held on Saturday, January 7th with a reception at 6:30 pm and doors opening at 7:30 pm. Tickets are US\$69 including tax and gratuity. The student ticket price is US\$30.

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. The talk will be given by Satyan Devadoss from the University of San Diego. Students are encouraged to attend. Opportunity will be provided afterwards for delegates to go to dinner at local restaurants.

Association of Lesbian, Gay, Bisexual, and Transgendered Mathematicians Reception, Thursday, 6:00–8:00 pm. Annual reception for lesbian, gay, bisexual, and transgender mathematicians. We are affiliated with NOGLSTP, the National Organization of Gay and Lesbian Scientists and Technical Professionals, Inc. www.lgbtmath.org.

Association for Women in Mathematics Reception and Awards Presentation, the AWM Reception which is open to all JMM attendees 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 on Friday evening.

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

George Washington University Math Alumni Reception, Thursday, 7:00 - 8:00 pm. The George Washington University Department of Mathematics invites all of our graduates attending the Joint Mathematics Meetings in Atlanta. Please come and meet the math faculty and other alumni; refreshments will be served.

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, 5:30–7:30pm. 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.

Knitting Circle, Thursday, 8:00–9:30 pm. Bring your needlework and come knit (crochet, cross-stitch, etc.) with us while talking about math or other relaxing subjects. Catch up with your friends and meet new ones during this fun social event.

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

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. There will be hot and cold refreshments and a cash bar.

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! <https://icerm.brown.edu/events/mioh/2017>

MSRI Reception for Current and Future Donors, Thursday, 6:30–8:00pm. 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, Heike Friedman, Director of Development, hfriedman@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\$65 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.

PROMYS and Ross Reception for Alumni and Friends, Thursday, 6:30–8:30 pm. There will be hors d'oeuvres, a cash bar, old friends, new friends, and good conversation!

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.

University of Waterloo Alumni and Friends Reception, Thursday, 6:00–8:00 pm. Dean Stephen M. Watt would like to invite all UW Math Alumni and Friends attending the JMM to join him in celebrating the 50th Anniversary of the Faculty of Mathematics at the University of Waterloo.

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

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.

Registering in Advance

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, 2016**, 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 on the Lower Level 2 of the Hyatt Regency Atlanta. Please note that a replacement fee of US\$5 will be charged for programs and badges that were mailed but not brought to the meeting.

Online Registration: To register and reserve a hotel room online, visit www.jointmathematicsm meetings.org/meetreg?meetnum=2180. 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 e-mail to the e-mail address provided.

Paper Form Registration: Download and print the paper form that can be found at the following website: www.jointmathematicsm meetings.org/meetings/national/jmm2017/jmm17_regform.pdf. If you are using the paper form 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, 2016**.

Forms must be mailed or faxed to the MMSB at MMSB, P.O. Box 6887, Providence, RI 02940 or 401-455-4004. For security reasons, credit card numbers by e-mail 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. Someone from the MMSB will then call that person.

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, e-mail address, and subject classification code (if given). It will enable exhibitors to retrieve the same information they would receive from a business card with one quick scan. Allowing an exhibitor to scan the code on a badge will be strictly voluntary by each participant and any participant may choose to cover his or her code.

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 December 29, 2016, will be eligible to receive a 50 percent 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\$316	US\$416
Non-member	502	640
Graduate Student Member of AMS, ASL, CMS, MAA, SIAM	71	83
Graduate Student Non-member	113	125
Undergraduate Student Member of AMS, ASL, CMS, MAA, PME, KME, SIAM	71	83
Undergraduate Student Non-member	113	125
Temporarily Employed	258	295
Emeritus Member of AMS, MAA; Unemployed; High School Teacher; Developing Countries; Librarian	71	83
High School Student	7	13
One-Day Member of AMS, ASL, CMS, MAA, SIAM	N/A	226
One-Day Non-member	N/A	353
Non-mathematician Guest	20	20
Commercial Exhibitor	0	0
MAA Minicourses	100	100
Grad School Fair Table	80	80

AMS Short Course:

Member of AMS	112	146
Non-member	170	200
Student/Unemployed/Emeritus	60	81

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 verify 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 verify their membership status.

Emeritus: Any person who has been a member of the AMS for 20 years or more and who retired because of age

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

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

Unemployed: Any person who is currently unemployed, actively seeking employment, and is not a student is eligible. 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.

Temporarily Employed: Any person currently employed but who will become unemployed by June 1, 2017, and who is actively seeking employment is eligible.

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 a session or talk. Guests may also enter the exhibit area.

Commercial Exhibitor: Any person exhibiting in the Joint Mathematics Meetings Exhibits and 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 wants to attend sessions, talks, etc. is expected to register separately for the meeting.

Registration Deadlines

There are two separate registration deadlines, each with its own benefits:

ORDINARY meeting registration (hotel reservations, registration materials mailed)—**November 22**

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

Ordinary Registration: Participants who register by November 22 can still receive their materials by mail, if they choose. Participants may reserve rooms through the MMSB until **December 12**.

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. Registration materials may be picked up at the Meetings Registration Desk, located on the Lower Level 2 of the Hyatt Regency Atlanta.

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 2017, 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: Hyatt Regency Atlanta, Marriott Marquis Atlanta, and Hilton Atlanta. (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 14, 2016**, and at that time, rooms and rates will be based on availability. Any rooms reserved directly with the hotels after **December 14, 2016** are subject to rates higher than the JMM rates.

A link to the 2017 JMM housing site will be included in e-mail confirmations of all registrations. If a participant needs to have the link e-mailed again, requests should be sent to mmsb@ams.org. Participants requiring assistance reserving a hotel room should send e-mail to mmsb@ams.org.

Any participant who needs to reserve a hotel room and does not have a credit card 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 1, 2016**.

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: There is a 48-hour cancellation policy prior to check-in at the Hilton Atlanta.

There is a 72-hour cancellation policy prior to check-in: at both the Hyatt Regency Atlanta and Marriott Marquis Atlanta.

Check-in/Check-out: Check-in at the Hilton Atlanta is 3:00 pm and check-out is at 11:00 am. Check-in at the Hyatt Regency Atlanta is at 3:00 pm and check-out is at noon. Check-in at the Marriott Marquis Atlanta is at 4:00 pm and check-out is at noon.

Confirmations: An e-mail 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 12, 2016**. 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.

Deadlines: The deadline to make changes or cancellations to hotel reservations through the MMSB is **December 12**.

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

Internet Access/Wireless: Complimentary wireless internet is available in all public areas, the lobby, and all sleeping rooms at the Hilton Atlanta.

Complimentary wireless internet is available in the lobby and all sleeping rooms at the Hyatt Regency Atlanta.

Complimentary wireless internet is available in all public places and the lobby at the Marriott Marquis Atlanta. There is a daily charge of US\$14.95 for wired or wireless internet in the sleeping rooms. Free internet is provided in the guest room of any Marriott Rewards member. To become a Marriott Rewards member, visit <https://www.marriott.com/rewards/createAccount/createAccountPage1.mi?segmentId=elite.nonrewards> to sign up for a free membership if you do not already have one.

Location: The Hyatt Regency Atlanta and the Marriott Marquis Atlanta will be co-headquarter hotels for this meeting. The JMM Registration Desk, exhibits, poster sessions, and AMS Employment Center will be located in the Hyatt Regency Atlanta. Sessions, committee meetings, and other meetings will be held in both the Hyatt Regency Atlanta and the Marriott Marquis Atlanta. All three hotels will be connected by sky bridges and will together occupy approximately 3 city blocks.

Hyatt Regency Atlanta (co-headquarter); 265 Peachtree Street NE, Atlanta, GA, 30303. Room rates are US\$175 for a single/double and US\$140 for a single/double student rate room. This property is a smoke-free hotel. Restaurants on-site include *Sway*, *Polaris*, *Twenty-Two Storys Lobby Bar*, and *the Marketplace*. 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 some rooms with windows that open. Children under 16 are free in a room with an adult and cribs are available upon request at no additional charge. Rollaways are available for use in king-bedded rooms only. No pets allowed. Valet parking is available for a charge of US\$35 per day and includes in/out privileges. Parking rates are subject to change. This hotel does not offer an airport shuttle. Confirmations will be sent by e-mail only.

Marriott Marquis Atlanta (co-headquarter), 265 Peachtree Center Avenue, Atlanta, GA, 30303. Room rates are US\$175 for a single/double and US\$140 for a single/double student rate room. This property is a smoke-free hotel. Restaurants on-site include *Sear*, *High Velocity*, *Pulse*, and *Starbucks*. 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. Windows in guest rooms do not 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 in king-bedded rooms only. No pets allowed. Valet parking is available for a charge of US\$35 per day and includes in/out privileges. Parking rates are subject to change. This hotel does not offer an airport shuttle. Confirmations will be sent by e-mail only.

Hilton Atlanta, 255 Courtland Street NE, Atlanta, GA, 30303. First tier room rates are US\$139 for a single/double and second tier rates are US\$149 for a single/double room. First Tier rates will be applicable while rooms in that category are available. Second Tier rates will only be available when the inventory of First Tier rates is entirely reserved. Participants who want First Tier rates are advised to reserve their rooms early. This property is a smoke-free hotel. Restaurants on site include *Trader Vic's*, *Marketplace*, *Nikolai's Roof*, and *Southern Elements*. 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. Windows in guest rooms do not open. Children under 17 are free in room with an adult and cribs are available upon request at no additional charge. Rollaways are available for use in king-bedded rooms only. Pets under 75 pounds are allowed in guest rooms. Valet parking is available for a charge of US\$36 per day and includes in/out privileges. Parking rates are subject to change. This hotel does not offer an airport shuttle. Confirmations will be sent by email only.

Parking: Please see the *parking* section under *Travel* for parking options. Parking information for each hotel has been listed above in the description of each property.

Rates: All rates are subject to applicable local and state taxes in effect at the time of check-in; currently the tax rate is 16% (8% State Sales Tax plus 8% Hotel Occupancy Tax), plus an additional State of Georgia Hotel/Motel fee of US\$5 per day.

Roommates: Looking for a Roommate? An interactive search board will be available for participants looking for a roommate. See jointmathematicsm meetings.org/jmm for more details

Miscellaneous

Audio-Visual Equipment: A projection screen is included as standard equipment in all Session rooms. Invited 50-minute speakers are automatically provided with an ELMO visual presenter (document camera/projector), and a laptop projector; AMS Special Sessions and Contributed Papers, and MAA Invited and Contributed Paper Sessions, are provided with a screen and a laptop projector. Blackboards and white boards are not available, nor are Internet connections in session rooms. Any request for additional equipment should be sent to meet@ams.org and received by November 1.

Equipment requests made at the meetings most likely

will not be granted because of budgetary restrictions. Unfortunately no audio-visual equipment can be provided for committee meetings or other meetings or gatherings not on the scientific program.

Child Care: The AMS and the MAA will provide reimbursement grants of US\$250 per family to help with the cost of child care for a number of registered participants at JMM 2017. The funds may be used for child care that frees a parent to participate more fully in JMM.

Information about child care grants and deadlines for requesting support will be available prior to the opening of advance registration in September; watch the website at jointmathematicsmetings.org/meetings/national/jmm2017/2180_childcare.

E-mail Services: Limited e-mail access for all Joint Meetings participants will be available in an e-mail center located in Hanover Hall, on the exhibit level in the Hyatt Regency. The hours of operation will be published in the program. Participants should be aware that **complimentary internet access** will also be available in that space.

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, P.O. 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 Atlanta.net

Photograph and Video Policy: The videotaping of any AMS or joint sponsored events, talks, and sessions is strictly forbidden without the explicit written permission of the AMS Director of Meetings and Conferences. The policy for videotaping of any MAA events, talks, and sessions is posted at www.maa.org/about-maa/policies-and-procedures/recording-or-broadcasting-of-maa-events. 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, attendees acknowledge that their photograph or a video that includes them may be published in material produced by the Joint Meetings, AMS or MAA. AMS and MAA are not responsible for unauthorized photographs or other images not taken by professional photographers hired by the Joint Mathematics Meetings or AMS and MAA staff.

Telephone Messages: It will be possible to leave a message for any registered participant at the meetings registration desk from January 4 through 7 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.

Travel/Transportation

The 2017 Joint Mathematics Meetings will be held in Atlanta, GA, at the Hyatt Regency Atlanta and the Marriott Marquis Atlanta. The Hyatt Regency is located at 265 Peachtree Street NE Atlanta, GA 30303, and the Marriott is located at 265 Peachtree Center Avenue, Atlanta, GA 30303. Both hotels are connected by a skywalk. Atlanta is on Eastern Standard Time.

Air Transportation

The principal airport in Atlanta is Hartsfield-Jackson Atlanta International Airport (ATL), which is served by most major airlines. See www.atlanta-airport.com. Hartsfield-Jackson is located 20 minutes south of downtown Atlanta. The address of the main terminal at Hartsfield-Jackson is 6000 North Terminal Parkway, Atlanta, GA 30320. The international terminal has a separate entrance at 2600 Maynard H. Jackson, Jr. Blvd, Atlanta, GA 20254. Terminal maps can be found at www.atlanta-airport.com/Passenger/Terminal/.

The official airline for this meeting is **Delta**. Participants are encouraged to book their flights for the meeting, if possible, with Delta and receive special pricing (in most cases, a 5 percent discount) on scheduled service to Atlanta. Discounts are applicable to US and Canada originating passengers. This discount is not valid with other discounts, certificates, coupons, or promotional offers.

To make a reservation, go to www.delta.com, and click on the box that says "Book a Trip". At the bottom of the drop-down, click on "Advanced Search". On the reservation screen, please enter the Meeting Event Code **NMNJC**. It is located to the right of "Number of Passengers." Reservations can also be made by calling Delta Meeting Network Reservations at 1-800-328-1111 and citing the meeting event code. A direct ticketing charge will apply for booking by phone.

Ground Transportation

Car Rental: All major rental car companies have offices at Hartsfield-Jackson. There is a separate rental car facility. From the north or south baggage claim areas, follow the overhead signs to the rental car center. Leave the west end of the terminal under the covered walkway, take the escalator up the station, and board the ATL SkyTrain for a five-minute ride to the rental car center. For more information and a map, please see www.atlanta-airport.com/Airport/Construction/RentalCarCenter/Access.aspx.

Hertz is the official car rental company for this meeting. A brochure with the information for this meeting is located at jointmathematicsm meetings.org/Hertz-info-Atlanta.pdf. To access the special meeting rates for the JMM at www.hertz.com, enter the standard information (pickup location, dates, etc.) and then click the box that says "Enter a discount or promo code" and enter **04N30007** as the convention number (CV#). Reservations can also be made by calling Hertz directly at 800-654-2240 (US and Canada) or 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. Vehicles must be returned to the renting location. Minimum rental age is 20 (age differential charge for 20-24 applies).

Weekend rentals are available in the continental US and Canada for pickup between noon Thursday and noon Sunday and must be returned no later than Monday at 11:59 pm. Thursday pick-up requires a minimum three-day keep. Friday pick-up requires a minimum two-day keep, and Saturday and Sunday pick-up require a one-day keep. Weekly rentals are from five to seven days. Extra day rate for weekly rentals will be one-fifth the Weekly Rate.

Shuttles: SuperShuttle provides transportation to the downtown Atlanta hotels. For reservations, book them online at www.supershuttle.com/Locations/Atlanta-ATL or call 1-800-BLUE-VAN. There is also a SuperShuttle ticket counter located in the domestic terminal's south side baggage claim area. It is staffed during the day, starting at 6:00 am. Shuttles that leave for downtown are approximately every 15 minutes. Currently, a one-way trip in a shared van to the meeting hotels is US\$16.50.

Taxi: Taxi service is located at the Yellow Bus Aisle. It is located on the west end of the terminal as you leave the baggage claim area. Taxi fare to the downtown hotels is approximately US\$32 one way.

Public Transportation: Atlanta's public transportation system is operated by the Metropolitan Atlanta Rapid Transit Authority (MARTA). It is a convenient and an easy way to travel around Atlanta. For general information about MARTA, there is a Ride Guide located at www.itsmarta.com/uploadedFiles/Using_Marta/How_to_ride_MARTA/MARTA-Ride-Guide.pdf. The main website is www.itsmarta.com.

The MARTA Airport Station is located near the baggage claim area of the domestic terminal, and information about the Airport Station is at www.itsmarta.com/ne-air-overview.aspx. Please check the schedules here for the latest information. To get to the meeting hotels, take the northbound train (Either the Red or the Gold Line) to the Peachtree Center Station stop, one stop north of the Five Points transfer station. When you leave the train, take

the escalator up towards Peachtree Center Mall. There is a covered walkway from the Mall to the Hyatt Regency. Currently, the fare is US\$2.50.

Driving Directions from the airport to the meeting hotels:

Hyatt and Marriott - Take 75/85 North, and take the right-hand exit 248-C to International Boulevard. Turn left onto International Boulevard, and turn right at the third traffic light onto Peachtree Center Avenue. The entrance to the Hyatt Regency Atlanta's Motor Lobby is one block down on the left. The entrance to the Atlanta Marriott Marquis is two blocks down on the right.

Hilton - Take 75/85 North, and take exit 249B to Peachtree Street. At the first light, turn right onto Peachtree Street. At the next light, turn left onto Ralph McGill Boulevard. At the next light, take a right onto Courtland Street. The entrance to the hotel is one block down on your left.

Parking: All three meeting hotels have parking garages. Please see the hotel section for more information. In addition, there are several parking garages nearby. See an interactive map at www.atlantadowntown.com/guide/getting-around/parking/garage. The following is a listing of some of the nearby garages. Please note that rates are subject to change.

Peachtree Center Parking Garage

221 Peachtree Center Avenue NE
Atlanta, GA 30303

www.atlantadowntown.com/go/221-peachtree-center-avenue

Current rates: US\$2 for 20 Minutes; US\$12 for two hours; daily maximum is US\$18; US\$5 after 4:00 pm.

227 Courtland St. NE

Atlanta, GA 30303
404-572-2900

www.atlantadowntown.com/go/227-courtland-street

Current rates: US\$2 for 20 Minutes; US\$12 for two hours; daily maximum is US\$20, US\$5 after 4:00 pm. If you arrive between 5:00 am and 9:00 am and leave between 2:00 pm and 7:00 pm, the early bird rate applies which is US\$6 per day. Weekend rate is US\$6 per day.

Peachtree Center Garage

161 Peachtree Center Ave NE
Atlanta, GA 30303

404-572-2900

www.atlantadowntown.com/go/161-peachtree-center-ave

Current rates: US\$2 for 15 minutes, US\$2 each additional 15 minutes; daily maximum is US\$20; US\$5 after 4:00 pm. If you arrive between 5:00 am and 9:00 am and leave between 2:00 pm and 7:00 pm, the early bird rate applies which is US\$6 per day. Weekend rate is US\$6 per day.