

**MAA Call for Papers**  
**Joint Mathematics Meetings**  
**January 10 – 13, 2018, San Diego, California**

**Call for MAA Contributed Papers:** The MAA Committee on Sessions of Contributed Papers solicits papers pertinent to the sessions listed below. Any paper that fits the subject of one of the themed sessions should be submitted directly to that session. All others should be submitted to the general sessions, which will accept abstracts in all areas of collegiate mathematics, mathematical pedagogy, and the undergraduate mathematics curriculum. Presentations in the themed sessions are normally 15 minutes in length while presentations in the general sessions are limited to 10 minutes each.

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 (exclusive or). If a 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 session rooms are equipped with computer projectors and screens. Please note that the dates and times scheduled for these sessions remain tentative.

Abstracts may be submitted electronically at <http://jointmathematicsm meetings.org/meetings/abstracts/abstract.pl?type=jmm>  
**The deadline for submission of abstracts is Tuesday, September 26, 2017.** Questions concerning the submission of abstracts should be addressed to [abs-coord@ams.org](mailto:abs-coord@ams.org).

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## **CONTRIBUTED PAPER SESSIONS WITH THEMES**

### **1. Innovative Mathematical Outreach in Alternative Settings**

*Thursday afternoon*

**Organizers:** Jennifer Switkes, Cal Poly Pomona, and Hector Rosario, University of North Carolina, Chapel Hill

**Description:** There is a growing number of innovative outreach programs taking place in alternative settings around the country. These settings include prison education programs, inner-city social justice organizations, alternative high schools, and immigrant education programs. Many of these programs include mathematics, ranging from GED preparation, to mathematics circles, to advanced problem solving courses. A tremendous variety of creative structures and pedagogy is used. In this session, we invite speakers who have led or volunteered in mathematical programs in

alternative settings to share their educational philosophy, personal experiences, and student outcomes. Attendees will be inspired to consider engaging in important and unique forms of mathematical outreach.

## **2. Philosophy of Mathematics as Actually Practiced**

*Friday morning*

**Organizers:** Bonnie Gold, Monmouth University (emerita); Sally Cockburn, Hamilton College; and Thomas Drucker, University of Wisconsin-Whitewater

**Description:** The philosophy of mathematics has often failed to account for actual mathematical practice as mathematics is developed, concentrating only on the finished product, theorems and proofs, and even then, not proofs as mathematicians give them, but the formal proofs by which they could be replaced. In the last quarter of the 20<sup>th</sup> century, many philosophers of mathematics began to be interested in considering mathematics as it is actually developed, leading to the formation of the Association for the Philosophy of Mathematical Practice in 2009.

This approach requires that the philosopher of mathematics have a good understanding of mathematics, how it develops, and how it is taught and learned. It therefore requires a significant interaction with the mathematical community. This session invites contributions that discuss philosophical issues involved with mathematics as it is actually practiced. Papers that bring out issues that have not yet been discussed by philosophers but that involve philosophical issues with current mathematical practice are especially welcome. Other topics in the philosophy of mathematics will be considered as time allows.

**Sponsor:** The SIGMAA for the Philosophy of Mathematics (POM SIGMAA)

## **3. Mathematics and Sports**

*Wednesday afternoon*

**Organizers:** Drew Pasteur, College of Wooster, and John David, Virginia Military Institute

**Description:** The expanding availability of play-by-play statistics and video-based spatial data, for professional and some collegiate sports, is leading to innovative kinds of research, using techniques from various areas of the mathematical sciences. By modeling the outcome distributions in certain situations, researchers can develop new metrics for player or team performance in various aspects of a sport, comparing actual results to expected values. Such work often has implications for strategic game management and personnel evaluation. Classic areas of study, such as tournament design, ranking methodology, forecasting future performance, insight into rare or record events, and physics-based analysis, also remain of interest. This session will include both presentations of original research and expository talks; topics related to the use of sports applications in curriculum are welcome. With a broad audience in mind, all talks are requested to be accessible to undergraduate mathematics majors. Undergraduates and their mentors are particularly encouraged to submit abstracts for consideration.

#### **4. The Scholarship of Teaching and Learning in Collegiate Mathematics**

*Wednesday morning and afternoon*

**Organizers:** Jacqueline Dewar, Loyola Marymount University; Tom Banchoff, Brown University; Curt Bennett, Loyola Marymount University; Pam Crawford, Jacksonville University; Edwin Herman, University of Wisconsin-Stevens Point; and Lew Ludwig, Denison University

**Description:** In the scholarship of teaching and learning, faculty bring disciplinary knowledge to bear on questions of teaching and learning and systematically gather evidence to support their conclusions. Work in this area includes investigations of the effectiveness of pedagogical methods, assignments, or technology, as well as inquiries into student understanding. The session goals are to: (1) feature scholarly work on the teaching of postsecondary mathematics, (2) provide a venue for teaching mathematicians to make public their scholarly investigations into teaching/learning, and (3) highlight evidence-based arguments for the value of teaching innovations or in support of new insights into student learning. Appropriate for this session are preliminary or final reports of investigations of post-secondary teaching methods, student learning difficulties, curricular assessment, or insights into student (mis)understandings. Abstracts should have: (1) a clearly stated question that was or is under investigation and (2) should indicate the type of evidence that has been gathered and will be presented. For example, papers might refer to evidence such as student work, participation or retention data, pre/post tests, interviews, surveys, think-alouds, etc.

#### **5. Innovative and Effective Ways to Teach Linear Algebra**

*Thursday morning*

**Organizers:** David Strong, Pepperdine University; Gil Strang, MIT; and Megan Wawro, Virginia Tech

**Description:** Linear algebra is one of the most interesting and useful areas of mathematics, because of its multifaceted theory and the enormous importance it plays in understanding and solving many real-world problems. Consequently, many creative ways to teach its theory and applications are continually being developed and refined. This session will serve as a forum in which to share teaching ideas and approaches. These innovative and effective ways to teach linear algebra include, but are not necessarily limited to: (1) hands-on, in-class demos; (2) effective use of technology, such as Matlab, Maple, Mathematica, Java Applets or Flash; (3) interesting connections between concepts in linear algebra and other mathematical branches; (4) compelling examples and problems involving particular ideas being taught; (5) comparing and contrasting visual (geometric) and more abstract (algebraic) explanations of specific ideas; (6) other novel approaches or pedagogical tools.

## **6. The Teaching and Learning of Undergraduate Ordinary Differential Equations**

*Saturday afternoon*

**Organizers:** Christopher S. Goodrich, Creighton Preparatory School, and Beverly H. West, Cornell University

**Description:** The teaching of undergraduate Ordinary Differential Equations (ODEs) provides a unique way to introduce students to the beauty and applicative power of the calculus. ODEs are also rich with aesthetically pleasing theory, which often can be successfully communicated visually and explored numerically. This session will feature talks that describe innovative teaching in the ODEs course as well as the description of either projects or pedagogy that can be used to engage students in their study of ODEs. Successful contributions could include but are not limited to: (1) innovative ways of teaching standard topics in the ODEs course; (2) strategies for teaching both differential equations and linear algebra simultaneously; (3) the inclusion of technology in the ODEs course; and (4) descriptions of applications or nonstandard topics and how such topics can lead to student engagement and interest.

**Sponsor:** The Community of Ordinary Differential Equations Educators (CODEE)

## **7. Trends in Undergraduate Mathematical Biology Education**

*Wednesday morning*

**Organizer:** Timothy D. Comar, Benedictine University

**Description:** Several recent reports emphasize that aspects of biological research are becoming more quantitative. Consequently, life science students, including pre-med students, should be introduced to a greater array of mathematical, statistical, and computational techniques and to the integration of mathematics and biological content at the undergraduate level. Mathematics majors also benefit from coursework at the intersection of mathematics and biology because there are interesting, approachable research problems, and mathematics students need to be trained to collaborate with scientists in other disciplines, particularly biology. Topics may include scholarly work addressing the issues related to the design of effective and relevant course content, courses and curricula, the integration of biology into mathematics courses, student recruitment efforts, the gearing of content toward pre-med students, undergraduate research projects, effective use of technology in mathematical biology courses, preparation for graduate work in mathematical and computational biology or for medical careers, and assessment issues.

**Sponsor:** The SIGMAA on Mathematical and Computational Biology (BIO SIGMAA)

## **8. Inquiry-Based Teaching and Learning**

*Friday morning and afternoon*

**Organizers:** Brian P. Katz, Augustana College; Eric Kahn, Bloomsburg University; and Victor Piercey, Ferris State University

**Description:** The goal of Inquiry-Based Learning (IBL) is to transform students from consumers to producers of mathematics. Inquiry-based methods aim to help students

develop a deep understanding of mathematical concepts and the processes of doing mathematics by putting those students in direct contact with mathematical phenomena, questions, and communities. Within this context, IBL methods exhibit great variety. Activities can take place in single class meetings and span entire curricula for students of any age; students can be guided to re-invent mathematical concepts, to explore definitions and observe patterns, to justify core results, and to take the lead in asking new questions. There is a growing body of evidence that IBL methods are effective and important for teaching mathematics and for fostering positive attitudes toward the subject. This session invites scholarly presentations on the use of inquiry-based methods for teaching and learning. We especially invite presentations that include successful IBL activities or assignments, that support observations about student outcomes with evidence, or that could help instructors who are new to IBL to try new methods.

**Sponsor:** The SIGMAA on Inquiry-Based Learning (IBL SIGMAA)

## **9. Teaching Abstract Algebra: Topics and Techniques**

*Saturday morning*

**Organizers:** Kristi Meyer, Wisconsin Lutheran College, and Jessie Lenarz, St. Catherine University

**Description:** Abstract algebra is a core component of the mathematics curriculum. It is often one of the more theoretical courses taken by undergraduate students, making it challenging for students who are not familiar or comfortable with this level of abstraction. In this session, we invite papers and scholarly presentations that share and discuss innovative ideas and approaches to improve the teaching and learning of abstract algebra at the undergraduate or beginning graduate level. These innovative approaches may include, but are not limited to, inquiry-based learning, mathematical writing, integration of technology, projects, activities, and alternative methods of assessment. Reports on student outcomes and the effectiveness of the approaches presented are encouraged.

## **10. Meaningful Modeling in the First Two Years of College**

*Saturday afternoon*

**Organizers:** Stuart Boersma, Central Washington University, and Jason Douma, University of Sioux Falls

**Description:** Most major mathematical organizations, including the MAA in its 2015 CUPM Curriculum Guide, have encouraged programs to incorporate modeling at all levels of the mathematics curriculum, including the first two years of undergraduate coursework. There are good reasons to include modeling experiences in the first two years. These opportunities allow students majoring in mathematics to gain experience with an important (and often challenging) approach to problem-solving that will benefit them later in their coursework and careers, and all students—regardless of major—may find that they appreciate the role and value of mathematics more deeply by applying it to meaningful situations. This session welcomes papers

that describe substantive mathematical modeling experiences for students who would typically be in their first two years as an undergraduate student, including (but not limited to) courses for non-majors and courses that do not have calculus as a prerequisite. Ideally, papers should also evaluate the effectiveness of the approach being taken.

**Sponsors:** MAA Mathematics Across the Disciplines (MAD) Subcommittee and the MAA Curriculum Renewal Across the First Two Years (CRAFTY) Subcommittee

### **11. Arts and Mathematics: The Interface**

*Wednesday morning and afternoon*

**Organizer:** Douglas Norton, Villanova University

**Description:** Do you utilize mathematics as a source, an inspiration, or a tool for making art? Do you discover mathematics within the essence of works of art? Do you use mathematics in your art, use art in your mathematics, or use art and mathematics inextricably linked, in your creations or in your classrooms? Whether from increased awareness, acknowledgment, or embracing, the interface between mathematics and the arts has continued to grow. Contribute to this session to share your explorations, creations, or classroom experiences at this interface. Attend this session to learn of these experiences from colleagues in mathematics, in the arts, or in a category at the interface that refuses to be classified!

**Sponsor:** The SIGMAA on Mathematics and the Arts (SIGMAA ARTS)

### **12. Lightning Talks and E-Posters: Me and My Gadgets, Teaching with Technology**

*Saturday morning*

**Organizers:** Karl RB Schmitt, Valparaiso University; John Travis, Mississippi College; Michael B. Scott, California State University; and Tom Hagedorn, The College of New Jersey

**Description:** 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 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. Potential presenters must submit a detailed description of their application and its pedagogical use (1-2 pages) to receive approval for inclusion in this session.

**Sponsors:** Sponsored by Committee on Technology in Mathematics Education (CTiME) and the SIGMAA on Mathematics Instruction Using the WEB (WEB SIGMAA)

### **13. Mathematical Knowledge for Teaching Grades 6-12 Mathematics**

*Thursday morning*

**Organizers:** Bonnie Gold, Monmouth University; David C. Carothers, James Madison University; and Yvonne Lai, University of Nebraska-Lincoln

**Description:** Although there have been quite a number of publications on mathematical knowledge for teaching elementary school mathematics, there are fewer on the mathematical and statistical knowledge teachers must have to be effective middle school and high school mathematics teachers. This session will focus on identifying mathematical and statistical understandings, abilities, and habits of mind important for these secondary teachers. Reports that connect mathematical and/or educational theory with empirical data are especially welcome. Speakers should be familiar with the Program Reports for preparing Middle and High School teachers in the 2015 CUPM Curriculum Guide (at <http://www.maa.org/node/790342>) and the MET II report (at <http://cbmsweb.org/MET2/index.htm>). We welcome work that provides evidence either in support of these recommendations, or introduces issues that are not in the recommendations. Contributions on mathematical knowledge for teaching elementary mathematics will be considered if time allows.

**Sponsor:** MAA Committee on the Mathematical Education of Teachers (COMET)

### **14. Innovative Curricular Strategies for Increasing Mathematics Majors**

*Wednesday morning*

**Organizers:** Eric S. Marland, Appalachian State University; Stuart Boersma, Central Washington University; and Victor Piercey, Ferris State University

**Description:** Many colleges and universities are seeking information about new and strategic curricular efforts to increase the number of mathematics majors. Such curricular innovations may include alternate entry points to the mathematics major, alternate pathways to and through college-level mathematics courses, first-year seminars aimed at STEM majors, and strategies to attract and retain specific populations (such as students from underrepresented groups or students with AP Calculus credit). Ideally, papers should evaluate the effectiveness of the approach being taken.

**Sponsor:** MAA subcommittee on Curriculum Renewal Across the First Two Years (CRAFTY)

### **15. Flipped Classes: Implementation and Evaluation**

*Wednesday afternoon*

**Organizers:** Joel Kilty, Alex M. McAllister, and John H. Wilson, Centre College

**Description:** Many mathematics teachers have chosen to implement a “flipped” class pedagogy in an effort to deepen student learning, increase student engagement, and

promote further mathematical studies. The notion of a “flipped” classroom varies greatly from instructor to instructor and course to course, each bringing its own benefits and challenges. This session provides an opportunity for a variety of talks describing implementations of this format in any collegiate-level mathematics course; we are particularly interested in talks about calculus courses. The talks should address one or more of the following:

- the structure of the class both on a daily and semester level, including examples of specific in-class activities that have been used;
- how out-of-class assignments are designed and/or created, including a brief overview of any technology used; and/or
- evidence regarding the effectiveness of the approach, including but not limited to student evaluations, course management software statistics, number of video views, and changes in retention and progression to subsequent courses.

## **16. Humanistic Mathematics**

*Thursday morning*

**Organizers:** Eric Marland, Appalachian State University, and Gizem Karaali, Pomona College

**Description:** As a scholarly perspective, humanistic mathematics describes an approach to mathematics that views it as a human endeavor and focuses on the paths of inquiry that study its aesthetic, cultural, historical, literary, pedagogical, philosophical, psychological, and sociological aspects. As a pedagogical stance, humanistic mathematics explores and builds on the relationship of mathematics with its nontraditional partners in the humanities, the fine arts, and social sciences, providing additional perspective for the role of mathematics in a liberal arts education. Submissions on all humanistic aspects of mathematics are invited. We are especially looking for submissions that will stimulate discussion and further inquiry related to collegiate mathematics in the first two years. Submissions should be aimed at a broad mathematical audience.

**Sponsors:** MAA subcommittee on Curriculum Renewal Across the First Two Years (CRAFTY) and the Journal of Humanistic Mathematics

## **17. Mathematical Experiences and Projects in Business, Industry, and Government (BIG)**

*Friday morning*

**Organizers:** Bill Fox, Naval PostGraduate School, and Allen Butler, Wagner Associates

**Description:** The extraordinary growth of problems facing business, industry, and government seems overwhelming. It should not! As mathematicians, operations research analysts, and engineers, including those within academia, we experience and tackle these problems with experience, knowledge, and technological tools. We solve applied mathematics problems in business, industry, and government, including military applications, almost daily. We seek presenters to share examples of this type

of problem-solving. These may include problems where you have no clue how to proceed and are seeking ideas from our audience. Your talks will serve as inspiration to solve and tackle the real problems that we may face in the future. You do not have to be a BIG SIGMAA member to attend or present.

**Sponsor:** The SIGMAA on Business, Industry, and Government (BIG SIGMAA)

### **18. 20th Anniversary-The EDGE (Enhancing Diversity in Graduate Education)**

#### **Program: Pure and Applied Talks by Women**

*Thursday morning and afternoon*

**Organizers:** Shanise Walker, Iowa State University, and Laurel Ohm, University of Minnesota

**Description:** Since its beginning in 1998, over two hundred and thirty women have participated in the EDGE program. Approximately seventy are currently working towards a PhD, over one hundred and twenty have earned Masters and more than seventy have gone on to successfully complete PhDs. There are currently eleven EDGE clusters across the nation. This session will be comprised of research talks in a variety of different subdisciplines given by women involved with the EDGE program. For more information on the EDGE program see <http://www.edgeforwomen.org/>

### **19. Using Mathematics to Study Problems from the Social Sciences**

*Thursday afternoon*

**Organizer:** Jason Douma, University of Sioux Falls

**Description:** Although the term ‘applied mathematics’ may easily bring to mind problems arising in the natural and computational sciences, the power and utility of mathematics extend across the disciplines. A rich and effective mathematical education should engage students with the fullest possible scope of applications and tools to address such applications. In this spirit, papers in this session will focus on interesting problems from the social sciences that have been examined through mathematical modeling. Potential fields of application include—but are not limited to—political science, economics, operations research, psychology, sociology, and demography. Preference will be given to novel or surprising applications that would be accessible to an undergraduate student, either in the context of an undergraduate course or a student research experience. Papers discussing the integration of such applications into the curriculum are also welcome, but the primary focus should be on the problems and their solutions.

**Sponsor:** The MAA Mathematics Across the Disciplines (MAD) Subcommittee.

### **20. Research in Undergraduate Mathematics Education (RUME)**

*Thursday morning and afternoon*

**Organizers:** Megan Wawro, Virginia Tech; Aaron Weinberg, Ithaca College; and Stacy Brown, California State Polytechnic University

**Description:** This session presents research reports on undergraduate mathematics education. The session features research in a number of mathematical areas including calculus, linear algebra, advanced calculus, abstract algebra, and mathematical proof. The goals of this session are to foster high quality research in undergraduate mathematics education, to disseminate well-designed educational studies to the greater mathematics community, and to transform theoretical work into practical consequences in college mathematics. Examples include rigorous and scientific studies about students' mathematical cognition and reasoning, teaching practice in inquiry-oriented mathematics classrooms, design of research-based curricular materials, and professional development of teachers that supports college students' mathematical thinking and activities. Presentations should report on completed research that builds on the existing literature in mathematics education and employs contemporary educational theories of the teaching and learning of mathematics. The research should use well-established or innovative methodologies (e.g., design experiment, classroom teaching experiment, and clinical interview, with rigorous analytic methods) as they pertain to the study of undergraduate mathematics education. The session also welcomes preliminary reports on research projects in early stages of development or execution.

**Sponsor:** The SIGMAA on Research in Undergraduate Mathematics Education (SIGMAA RUME)

## **21. Environmental Modeling in the Classroom**

*Thursday morning*

**Organizers:** Ellen Swanson, Centre College, and Emek Kose, St Mary's College of Maryland

**Description:** Mathematics plays a vital role in investigating and explaining the current environmental issues, including but not limited to pollution of different kinds, sustainability, hazardous materials and climate change. Incorporating environmental modeling modules in mathematics classes is the perfect opportunity to expose students both to the power of mathematics and the timely and important environmental issues of our time. We seek presentations on undergraduate research projects, course materials and course ideas for classes that focus on or incorporate a module on environmental modeling.

**Sponsor:** SIGMAA for Environmental Mathematics (SIGMAA EM)

## **22. Technology and Resources for Teaching Statistics**

*Friday afternoon*

**Organizers:** Karl RB Schmitt, Valparaiso University; Sue Schou, Idaho State University; Stacey Hancock, Montana State University; and Soma Roy, California Polytechnic State University

**Description:** One of the five skill areas in the American Statistical Association's curriculum guidelines is "Data Manipulation and Computation" (pg 9), embracing the need for students to be competent with programming languages, simulation

techniques, algorithmic thinking, data management and manipulation, as well as visualization techniques. Additionally, the recently revised Guidelines for Assessment and Instruction in Statistics Education (GAISE) continue to encourage active learning, a focus on conceptual understanding and statistical thinking, and the use of real data with a context and purpose, with additional guidelines to incorporate multivariate thinking and teach statistics as an investigative process. This session invites presentations on innovative use of software or technology, classroom activities, resources, data sets, case studies, and effective pedagogical approaches in teaching statistics. Papers on modern approaches to teaching from a simulation-based perspective and incorporating programming and data science ideas into the course are particularly encouraged.

**Sponsors:** The SIGMAA on Statistics Education (SIGMAA STAT ED) and the MAA Committee on Technology in Mathematics Education (CTiME)

### **23. Innovative and Effective Online Teaching Techniques**

*Friday afternoon*

**Organizers:** Sharon Mosgrove and Doug Scheib, Western Governors University

**Description:** With the emergence of online learning over the past decade, there is a need to understand and overcome the challenges faced by both online learners and online educators. For this session, we invite presentations addressing any of the following topics: challenges faced by online learners, including non-traditional students, especially as they relate to time management, staying engaged in an online environment, and technological issues that arise; challenges faced by online educators, especially as they relate to keeping students motivated and preparing students to overcome challenges; techniques to prepare students for the online environment and engage students in online math courses; best practices for teaching online; ways to help students be successful in online math courses; opportunities and resources available to online educators.

### **24. Attracting, Involving, and Retaining Women and Underrepresented Groups in Mathematics—Righting the Balance**

*Saturday morning*

**Organizers:** Meghan De Witt, St Thomas Aquinas College; Semra Kiliç-Bahi, Colby-Sawyer College; Francesca Bernardi, University of North Carolina at Chapel Hill

**Description:** The disparities in mathematics in terms of gender, race, background, and ethnicity continue to remain problematic for the sustained prosperity of the field. Focused and intentional efforts are required to close the gap. For this session, we invite presentations describing programs that have been successful in attracting and involving women and underrepresented groups via innovations in the curriculum, outreach, extracurricular activities, and STEM community building efforts both inside and outside the classroom. Moreover, we invite presentations focused on building a support infrastructure, such as the establishment of effective mentoring

relationships, and scholarly efforts aimed to raise awareness on the issues surrounding these disparities, including plans to effectively target them.

**Sponsor:** MAA Committee on the Participation of Women

## **25. Good math from bad: crackpots, cranks, and progress**

*Friday afternoon*

**Organizers:** Samuel R. Kaplan, University of North Carolina Asheville, and Elizabeth T. Brown, James Madison University

**Description:** There are many purveyors of bad mathematics. People who have become so obsessed with a flawed or crackpot idea that they ignore evidence to the contrary are called cranks. Squaring the circle, doubling a cube and trisecting angles are just a few well-known ill-conceived pursuits. Crank mathematicians are not always amateurs and sometimes good ideas are generated on bad problems. There are also people who, knowingly or not, abuse mathematics to advance arguments outside of the mathematics. And finally, there are straightforward mathematical errors that are nevertheless useful in advancing mathematics.

The study of crackpot and other erroneous math exposes interesting history of classical problems as well as contemporary issues that arise from the ease of communication and proliferation of unsound math on the internet.

This unusual session offers the opportunity to explore good problems and some good mathematics with witty and sad stories of mathematicasters, coincidence, pseudo-science and eccentricity.

## **26. Discrete Mathematics in the Undergraduate Curriculum – Ideas and Innovations in Teaching**

*Wednesday afternoon*

**Organizers:** Elise Lockwood, Oregon State University; John Caughman, Portland State University; and Art Duval, University of Texas El Paso

**Description:** Discrete mathematics offers many accessible points of entry for students to engage in deep mathematical thinking. Discrete mathematics is a fundamental aspect of computer science, and it is increasingly relevant in our digital world. The aim of this session is for researchers and teachers to share ideas for how to improve the teaching and learning of discrete mathematics at all undergraduate levels. We characterize discrete mathematics broadly to encompass topics of sets, logic, proof techniques, recurrences, combinatorics, graph theory, relations, and more. We hope to facilitate communication between mathematics education researchers and those who teach these topics. We welcome scholarly presentations that speak to pedagogical aspects of discrete mathematics, which may include, but are not limited to: research on student thinking about relevant concepts, research demonstrating effective instructional strategies, ideas for incorporating technology into the discrete mathematics classroom, innovative activities or pedagogical interventions, or philosophies toward teaching discrete mathematics.

## **27. Scholarship on Teaching and Learning in Statistics Education**

*Saturday afternoon*

**Organizers:** Stacey Hancock, Montana State University; Sue Schou, Idaho State University; and Soma Roy, California Polytechnic State University

**Description:** Statistics education research is an emerging field that has grown out of several disciplines including mathematics education and educational psychology. Research in statistics education is both qualitative and quantitative and ranges from classroom studies of new pedagogical methods to multi-institution research projects investigating how students learn statistics to the development of theoretical learning models. Journals such as the Journal of Statistics Education, Technology Innovations in Statistics Education, and the Statistics Education Research Journal provide central channels for the dissemination of statistics education research. This session invites presentations on research and scholarship in the teaching and learning of statistics at all levels from K-12 through postsecondary to the training of professionals.

Presentations may include current research projects in the classroom or across institutions as well as reviews of the statistics education research literature.

**Sponsor:** The SIGMAA on Statistics Education (SIGMAA STAT ED)

## **28. Integrating Research into the Undergraduate Classroom**

*Wednesday afternoon*

**Organizers:** Shannon R. Lockard, Bridgewater State University and Timothy B. Flowers, Indiana University of Pennsylvania

**Description:** Undergraduate Research is a high-impact practice that inspires student learning, builds crucial skills, boosts retention and graduation rates, and particularly benefits underrepresented and at-risk students. While students often engage in undergraduate research outside of the classroom, incorporating research projects into the classroom can bring this impactful experience to even more students. This session will focus on incorporating research into the undergraduate classroom, from introductory to upper level mathematics courses. Presentations may describe a particular research project or activity, faculty experiences in mentoring undergraduate research in the classroom, or student experiences and feedback. All talks should emphasize why the project(s) being discussed is considered undergraduate research rather than a typical assignment. Participants are encouraged to share the impact on the students involved if possible.

## **29. Quantitative Literacy Across the Curriculum**

*Saturday morning*

**Organizers:** Andrew J. Miller, Belmont University; Victor Piercey, Ferris State University; Catherine Crockett, Point Loma Nazarene University; and John Curran, Eastern Michigan University

**Description:** Most commonly, quantitative literacy or reasoning courses are housed in mathematics departments. Context is key, however, in quantitative literacy

education if it is to empower students to use mathematical thinking in their lives as consumers and citizens. Thus, quantitative literacy education on campus intersects many areas, influencing and being influenced by other programs. In this session, we invite papers that discuss advancing quantitative literacy in ways that lie in the intersection between mathematics and other programs on campus. Presenters might focus on QL courses or modules that pay special attention to the needs of partner disciplines; explicitly interdisciplinary courses that integrate QL; or even general education QL requirements that can be fulfilled by non-mathematics courses. Ideally, presenters will do more than simply describe a QL experience; we invite presentations, for example, that critically discuss the process of designing a cross-disciplinary QL experience, describe methods to achieve institutional buy-in and commitment to such an experience, or assess QL gains through such an experience with particular focus on the benefits and drawbacks of an “across the curriculum” approach.

**Sponsor:** The SIGMAA on Quantitative Literacy (SIGMAA QL)

### **30. Innovative Teaching Practices in Number Theory**

*Thursday afternoon*

**Organizers:** Thomas Hagedorn, The College of New Jersey; Patrick Gault, University of Arizona; and Mark Kozek, Whittier College

**Description:** Number Theory is an important component of the mathematics curriculum. Courses on the subject are taken by a diverse audience of students including those hoping to attend a mathematics graduate school, future mathematics educators, and computer scientists interested in cryptography. In this session, we invite papers and scholarly presentations that share and discuss innovative ideas and approaches to improve the teaching and learning of number theory at the undergraduate level, whether it is within a course by that name or a module within another course on Abstract Algebra, Cryptography, or Proofs. Such innovative approaches might involve inquiry-based learning, mathematical writing, technology, projects, undergraduate research, alternative methods of assessment. Reports on student outcomes and the effectiveness of the approaches presented are encouraged.

### **31. The Advancement of Open Educational Resources**

*Friday morning*

**Organizer:** Benjamin Atchison, Framingham State University

**Description:** This session will showcase the increasing popularity of open educational resources (OER) in mathematics and statistics. Examples may include, but are not limited to, the development or adoption of open source or open access course texts and related materials, the creation and/or implementation of course technological enhancements, such as instructional apps and video tutorials, and experiences with the inclusion of low or no-cost homework platforms or mathematics software systems in a particular course. Presenters should attempt to address the effectiveness (formally or informally assessed) of the adoption of such resources in

their courses. Preference will be awarded to presentations from community college and four-year undergraduate institutions.

**Sponsors:** MAA Committee on Technologies in Mathematics Education (CTIME) and the SIGMAA on Mathematics Instruction Using the WEB (WEB SIGMAA)

### **32. Implementing Recommendations from the Curriculum Foundations Project**

*Friday morning*

**Organizers:** Susan Ganter, Virginia Polytechnic Institute and State University; Mary Beisiegel, Oregon State University; Janet Bowers, San Diego State University; Tao Chen, City University of New York - LaGuardia Community College; and Caroline Maher-Boulis, Lee University

**Description:** The Curriculum Foundations Project (CFP) hosted a series of 22 workshops organized by the MAA CRAFTY committee to listen to faculty from the partner disciplines discuss what mathematics students need to know in their disciplines. Two key reports summarized the findings – Curriculum Foundations Project: Voices of the Partner Disciplines available at <http://tinyurl.com/CFP-Voices> and Partner Discipline Recommendations for Introductory College Mathematics and the Implications for College Algebra available at <http://tinyurl.com/CFP-Partners>. Recommendations included emphasizing conceptual understanding, problem-solving skills, mathematical modeling, and communication. Reports called for renewing introductory mathematics courses to strive for depth over breadth, increasing the number and variety of applications taught in calculus, replacing College Algebra with a modeling-based course, incorporating more active learning, and improving interdisciplinary cooperation. This session welcomes talks on how departments have implemented any of these recommendations. Presentations should reference relevant recommendations from CFP reports and include the results of the implementation. Talks presenting new research on the needs of the partner disciplines are also welcome.

**Sponsor:** The MAA Curriculum Renewal Across the First Two Years (CRAFTY) Subcommittee

### **33. Mathematical Themes in a First-Year Seminar**

*Friday afternoon*

**Organizer:** Pamela Pierce and Jennifer Bowen, The College of Wooster

**Description:** Perhaps you teach at a small college or in an honors program that requires students to take a first-year seminar. These seminars often have a broad set of learning goals, including critical thinking, effective writing, information literacy, examining issues from multiple perspectives, defending an argument, and community building, among many others. A mathematician asked to teach within such a program for the first time may feel overwhelmed because the style of teaching and the assignments are typically very different from those in our calculus classes. At the same time, teaching in such a seminar is a wonderful way to engage with students who may be open to learning more about the field. Since these courses typically have

no prerequisites, what types of ways are there to engage students in mathematics or themes related to mathematics? We seek speakers who are willing to share their ideas, along with their successes and their failures. Interested speakers should submit the theme or title of their seminar, some of the major learning goals, and the ways in which they incorporated mathematics and related ideas into the class.

### **34. Math Circle Topics with Visual or Kinesthetic Components**

*Thursday afternoon*

**Organizer:** Amanda Katharine Serenevy, Riverbend Community Math Center

**Description:** Math Circles are a form of education outreach and enrichment through which mathematicians and mathematical scientists share their passion with K-12 teachers and students. Math Circles combine significant content with a setting that encourages a sense of discovery and excitement about mathematics through problem solving and interactive exploration. Ideal problems are low-threshold, high-ceiling; they offer a variety of entry points and can be approached with minimal mathematical background, but lead to deep mathematical concepts and can be connected to advanced mathematics. During this session, presenters will share ideas for math topics that include a visual or kinesthetic component.

**Sponsor:** The SIGMAA on Math Circles for Students and Teachers (SIGMAA MCST)

### **35. Revitalizing Complex Analysis**

*Saturday morning*

**Organizer:** Russell W. Howell, Westmont College

**Description:** Papers at this session should be scholarly in nature, and collectively address a wide-range of questions: What are the essential components of an undergraduate complex analysis class from mathematical and scientific standpoints? What technologies seem to be promising? What pedagogical ideas have borne fruit? What interesting projects have worked well for student investigation? What novel connections have been made with other standard mathematics courses? In general, what innovative approaches might be suggested in teaching the subject? Presentations that include evidence of success or failure in the classroom are preferred.

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### **GENERAL CONTRIBUTED PAPER SESSIONS**

*Wednesday, Thursday, Friday, and Saturday, morning and afternoon*

**Organizers:** Tim Comar, Benedictine University, and James Reid, University of Mississippi

**Description:** The MAA's General Contributed Paper Session accepts contributions in all areas of mathematics, curriculum, and pedagogy. When you submit your abstract, you will be asked to classify it according to the following scheme.

- Assessment
  - History or Philosophy of Mathematics
  - Interdisciplinary Topics in Mathematics
  - Mathematics and Technology
  - Mentoring
  - Modeling and Applications
  - Outreach
  - Teaching and Learning Developmental Mathematics
  - Teaching and Learning Introductory Mathematics
  - Teaching and Learning Calculus
  - Teaching and Learning Advanced Mathematics
  - Algebra
  - Analysis
  - Applied Mathematics
  - Geometry
  - Graph Theory
  - Linear Algebra
  - Logic and Foundations
  - Number Theory
  - Probability and Statistics
  - Topology
  - Other
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