

## Call for Papers: Contributed Paper Sessions at MAA MathFest 2018

The Mathematical Association of America will hold its ninety-sixth summer meeting in the Sheraton Denver Downtown Hotel, 1550 Court Place, Denver, Colorado, August 1 – 4, 2018. Full information regarding the program will appear in the April/May issue of *MAA FOCUS* and much of the program is already available online at [www.maa.org/mathfest](http://www.maa.org/mathfest). The purpose of this announcement is to alert participants to the themes of contributed paper sessions. MathFest participants are invited to submit abstracts of papers consistent with the themes of the sessions described below.

This year the general contributed paper sessions are being replaced by an MAA Poster Session. The accompanying article contains information about the poster session.

The contributed paper sessions will be scheduled for Thursday, Friday, and Saturday, August 2 – 4. Information about scheduling will be posted on the MathFest website as soon as it is available.

Presentations in the contributed paper sessions are normally 15 minutes in length. Each participant may make at most one presentation in a contributed paper session. If your paper cannot be accommodated in the session for which it was submitted, it will automatically be considered for the MAA poster session.

Each session room will be equipped with a computer projector and a screen. Speakers are encouraged to make use of the computer projector but must provide their own laptop computer or have access to one.

To submit an abstract for MAA MathFest 2018, go to [www.maa.org/mathfest/abstracts](http://www.maa.org/mathfest/abstracts) and follow the instructions found there. The deadline for submission of abstracts is April 30, 2018. Early submissions are encouraged.

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### MAA CONTRIBUTED PAPER SESSIONS

#### **Priming the Calculus Pump: Fresh Approaches to Teaching First-Year Calculus**

**Description:** The majority of first-year college calculus students have had a previous encounter with calculus in high school. These new college calculus students start out in Calculus I (or Calculus II) having seen much of the material, but with a weakness or a lack of confidence in some areas. (This previous experience may even be true for students still in high school. It is not unusual for advanced students to take AP Calculus AB one year and AP Calculus BC the next.) As such, this audience creates unique challenges to the instructor. This session seeks to share fresh approaches to engage this audience in first- or second-semester calculus. Such approaches may be curricular -- through a reorganization of the material, for example -- or structural -- such as innovative approaches to placement. This

session is in part inspired by and seeks to complement the MAA's NSF-sponsored project on Characteristics of Successful Programs in College Calculus.

**Organizers:** Chuck Garner, Rockdale Magnet School for Science and Technology, and Bob Sachs, George Mason University

**Sponsor:** The SIGMAA on Teaching Advanced High School Mathematics

### **Modeling-Based Teaching and Learning in Differential Equations Courses**

**Description:** This session features talks centered around modeling-based teaching and learning in differential equations courses. Presentations may include descriptions of modeling-based scenarios developed for these courses as well as shared experiences of using modeling in a course, from a one-time project to redesigning an entire course. We welcome speakers who are just beginning to use this method along with those with more experience. We are particularly interested in talks which feature real data (either collected or taken from the literature) and a full modeling process for students, i.e. stating assumptions, making identifications, creating a differential equation model, developing solution strategies, performing parameter estimations, rendering model validation, iterating this process, and communicating the results. Some evidence of the success of individual approaches should be offered

**Organizers:** Brian Winkel, Director SIMIODE; Lisa Driskell, Associate Professor of Mathematics at Colorado Mesa University; and Audrey Malagon, Batten Associate Professor of Mathematics, Virginia Wesleyan University

### **Mastery Grading**

**Description:** "Mastery grading" refers to a suite of assessment techniques including standards-based grading, specifications grading, and mastery-based testing. In these systems, a student's grade is directly tied to their mastery of specific objectives, rather than the accumulation of points and partial credit. Recent trends indicate that mastery grading encourages a growth mindset, reduces test anxiety, teaches students perseverance, develops student ownership of learning, and improves student learning gains in mathematics classrooms. In particular, mastery grading and active learning techniques often have complementary goals, and can be effectively used in combination. This session invites presenters to share the results of scholarly inquiry into mastery grading schemes and their impact in the classroom. We also welcome talks about these grading systems that focus on issues of practical implementation and potential pitfalls.

**Organizers:** David Clark, Grand Valley State University; Robert Campbell, College of Saint Benedict and Saint John's University; Jeb Collins, University of Mary Washington; Alyssa Hoofnagle, Wittenberg University; Mike Janssen, Dordt College; Austin Mohr, Nebraska Wesleyan University; Jessica OShaughnessy, Shenandoah University; and Cassie Williams, James Madison University

### **A Number is Never an Answer: Developing Mathematical Thinking and Communication Through Writing**

**Description:** Before students are introduced to proof-writing, they typically only experience mathematics as a discipline of calculations. Even if their instructors stress

mathematical reasoning, students are often only expected to produce unannotated lines of computation. While this skill is important, computations without explicit reasoning mask the logic and thinking that underlies that computation. In contrast, asking students to produce written-prose relating to a mathematical problem forces them to consider the reasoning underlying their assertions and highlights the logic behind their thinking. Furthermore, students who take a quantitative job in an interdisciplinary field need to be able to clearly communicate mathematics to a lay audience. As such careers become more common and as employers consistently emphasize writing ability, we as mathematics educators must help our students develop these skills. In this session we invite instructors to discuss their use of writing assignments in their mathematics courses, particularly in introductory, service, or interdisciplinary courses that do not require proof-writing. We encourage presentations on all types of writing, from informal reflection papers to formal essays, used in disciplinary or interdisciplinary courses involving mathematics.

**Organizers:** William Gryc, Muhlenberg College, and Linda McGuire, Muhlenberg College

### **The Capstone Experience for Mathematics Majors**

**Description:** Capstone experiences vary from research, service, and artistic projects, to oral or written exams, to study abroad, internships, and more. Come and share your experiences and learn what others are doing with culminating experiences for Mathematics majors. We encourage the submission of scholarly work including but not limited to original research, innovative ideas, projects, curricular materials, assessment models, etc. Successful and unsuccessful approaches are both encouraged with the evidence that supports the success or failure of the objectives. Proposals will be selected that show innovation, detail, and evidence-based results with a primary focus on pedagogy and curriculum related to senior capstone experiences.

**Organizers:** Jacci White, Monika Kiss, and Kevin Murphy, Saint Leo University

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

**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. (This session will include a themed sub-session devoted to IBL practitioners with mid-level experience, sponsored by the IBL Workshop Class of 2013.)

**Organizers:** Brian Katz, Augustana College; Eric Kahn, Bloomsburg University; Victor Piercey, Ferris State University; Candice Price, University of San Diego; Xiao Xiao, Utica College; Amanda H. Matson, Clarke University; Mindy Capaldi, Valparaiso University; Kayla Dwelle, Ouchita Baptist University; and Phong Le, Goucher College

### **Recreational Mathematics: Puzzles, Card Tricks, Games, Gambling and Sports**

**Description:** Puzzles, card tricks, board games, game shows, gambling, and sports provide an excellent laboratory for testing mathematical strategy, probability, and enumeration. The analysis of such diversions is fertile ground for the application of mathematical and statistical theory. Solutions to new problems as well as novel solutions to old problems are welcome. Submissions by undergraduates or examples of the use of the solutions of these problems in the undergraduate classroom are encouraged.

**Organizers:** Paul R. Coe, Dominican University; Sara B. Quinn, Dominican University; Kristen Schemmerhorn, Concordia University Chicago; and Andrew Niedermaier, Jane Street Capital

### **Teaching Undergraduate Mathematics with Primary Historical Sources**

**Description:** In recent years there has been an increasing interest in using primary historical sources to teach undergraduate mathematics. New textbooks and expository papers have demonstrated ways that this can be done, and a recent National Science Foundation-funded grant effort has encouraged dozens of instructors, including some with little background in the history of mathematics, to employ this approach. This session seeks to bring together developers of materials for teaching with primary sources, instructors with classroom experience in using primary sources in their own teaching, and researchers studying the effects of teaching mathematics using primary sources on both students and instructors. Individuals with background in any of these three areas are encouraged to submit a talk.

**Organizers:** Dominic Klyve, Central Washington University; Maria Zack, Point Loma Nazarene University; and Jeff Suzuki, Brooklyn College

### **Mathematics and the Life Sciences: Initiatives, Programs, Curricula**

**Description:** In the 2015 CUPM Curriculum Guide to Majors in the Mathematical Sciences, the life sciences were clearly identified as a key path through the mathematics major to graduate programs and the workforce. This account echoed many prior high-profile reports (e.g., Bio 2010 (2003), A New Biology for the 21st Century (2009), Vision and Change (2011), The Mathematical Sciences in 2025 (2013), and the SIAM white paper Mathematics: An Enabling Technology for the New Biology (2009)) that had previously discussed the changing landscape at the interface of mathematics and biology and had issued urgent calls for broadening students' exposure to mathematical methods for the life sciences. It appears that a wider array of curricular ideas, programs, and materials that can be scaled, modified, and assessed in a wide range of different institutions is still needed.

Topics include scholarly contributions addressing initiatives, programs, curricula, and course materials at the interface of mathematics and the life sciences that have been implemented and tested successfully at institutions of higher education. In particular, these

may include theoretical or pedagogical frameworks and examples for integrating life sciences research in the mathematics curriculum; theoretical or pedagogical frameworks and examples for integrating mathematical models and approaches in the life sciences curriculum; the design, use, or assessment of teaching and learning materials at the interface of mathematics and the life sciences; the comparison of educational effects for life sciences majors from traditional mathematics courses vs. interdisciplinary variants involving the life sciences; and results from adopting innovative approaches to teaching mathematics material to students majoring in the life sciences. Speakers will be invited to submit their work for consideration in the upcoming PRIMUS Special Issue: "Mathematics and the Life Sciences: Initiatives, Programs, Curricula."

**Organizers:** Tim Comar, Benedictine University, and Raina Robeva, Sweet Briar College

**Sponsor:** the SIGMAA on Mathematical and Computational Biology

### **Mathematics Research Experiences for K–12 Teachers and Students**

**Description:** Mathematicians and educators are invited to share their experiences conducting mathematics research with K–12 teachers (both pre-service & in-service) and with high school students. One experience that will be shared is the Illinois State University Research Experiences for Undergraduates (ISU REU) Site for Pre-Service and In-Service Secondary Mathematics Teachers (<https://about.illinoisstate.edu/reu/>). Since 2007, the ISU REU has produced nearly 30 refereed research publications and over 40 conference presentations. Since 2012, the ISU REU has also included a model week-long Math Research Camp for 12-20 high school students, which is run by the ISU REU participants. The primary focus of this Contributed Session is on sharing problems suitable for such experiences. In addition to unsolicited contributions, the session will include invited contributions from persons with expertise on the topic.

**Organizers:** Saad El-Zanati, Illinois State University, and Cynthia Langrall, Illinois State University

### **Ready or Not: Corequisite Courses and Just-in-Time Review**

**Description:** Many students enter college not yet ready for college level mathematics. National efforts are exploring alternatives to the traditional lengthy sequence of prerequisite courses. For some students, just-in-time review embedded in a course can fill in small knowledge gaps, but for underprepared students many colleges and universities are showing greater success with "corequisite" courses which allow students to take what would normally be a prerequisite course simultaneously. By allowing coregistration, students can enter major coursework sooner and make quicker degree progress. Colleges, universities, and state legislatures that prescribe curriculum for statewide systems are increasingly calling for corequisite courses and other changes to increase college completion for underprepared students, especially students from underserved populations.

This session showcases successful simultaneous review models. Talks may highlight best practices in just-in-time review or corequisite course design, including examples of how content is coordinated between courses. Talks describing the curricular change process, with lessons learned, are also welcome, especially examples of successful response to rapid large-scale implementation requirements. Talks should include evidence of success.

**Organizers:** Rebecca Hartzler, University of Texas at Austin; Suzanne Doree, Augsburg University; and Frank Savina, University of Texas at Austin

### **Best Practices and Innovation in the Teaching of Discrete Mathematics**

**Description:** This session seeks presentations about innovative approaches to the teaching of Discrete Mathematics, the course generally required for computer science majors. With the advancement of interdisciplinary research, there is a new audience for the course, students majoring in bioinformatics, and other interdisciplinary majors. Presentations are sought on illuminating projects and exercises, and on new approaches to the traditional curriculum. Presentations could range from interactive open course textbooks or modules to innovative in class examples that are particularly suited for achieving certain learning goals. Presentations should focus on easily adaptable models and should discuss how stated learning objectives are attained through the examples or projects.

**Organizers:** Zsuzsanna Szaniszló, Valparaiso University, and Agnes Bercesne Novak, Peter Pazmany Catholic University, Hungary

### **Encouraging Effective Teaching Innovation**

**Description:** Faculty are eager to offer activities in the classroom that foster student success, but many are not formally trained in pedagogy. This session will consist of presentations of demonstrably effective and innovative classroom techniques. Talks will address the reasoning behind, design, and implementation of resources or activities. While these activities may be whole course techniques, we also seek presentations of drop-in activities to bolster student learning and reflection in any course. Techniques do not have to be original to the presenter, but sources must be credited and evidence of success (or failure and redesign) is expected. To maximize the session's usefulness, a Google Drive folder will be created and shared as a repository for the speakers' slides and supplementary materials.

**Organizers:** Susan Crook, Loras College; David Failing, Lewis University; Russ Goodman, Central College; and Mami Wentworth, Wentworth Institute of Technology

### **Fostering Undergraduate Interdisciplinarity**

**Description:** Mathematics is one educational tool to develop complex problem solvers that are needed to address many of the largest and most challenging problems in society. As many of these important problems are interdisciplinary in nature, it creates the opportunity to expose students in other disciplines to the utility of mathematics as well as share disciplinary knowledge with mathematics students. This session invites speakers to present their efforts to foster interdisciplinary work by undergraduates within courses or outside the classroom. We particularly seek talks that show the development of math majors with a greater understanding of interdisciplinary problem solving and a willingness to tackle hard problems.

**Organizers:** Amanda Beecher, Ramapo College of New Jersey, and Chris Arney, United States Military Academy at West Point

**Sponsor:** Consortium for Mathematics and Its Applications (COMAP)

### **Great Circles, Great Problems**

**Description:** Math Circles are outreach programs led by mathematicians for K-12 students or teachers. Math Circles combine significant content with a setting that encourages a sense of discovery and excitement about mathematics through problem solving and interactive exploration. Great problems can often be solved by a variety of approaches working in concert.

During this session, presenters will share mathematical topics and problems, generally from their own Math Circle, that can lead to hours of exploration by the curious. While all topics and problems suitable for or pertaining to Math Circles or similar outreach programs are welcome, we encourage presenters to choose problems specifically with a focus on visual mathematics.

**Organizers:** Amanda Matson, Clarke University, and Diana White, National Association of Math Circles

**Sponsor:** SIGMAA on Math Circles for Students and Teachers

### **Innovative Mathematical Sciences Majors in Departments with Limited Resources**

**Description:** Many colleges find that they have limited resources available to offer robust majors in the mathematical sciences. This session will reveal innovative approaches departments have taken to offer effective mathematical sciences programs for students at such institutions. We seek expository talks on ways mathematics departments have collaborated with other entities (e.g., departments, industry, or colleges), have supplemented with online resources, have redesigned their curriculum, or have engaged in other novel activities to offer students a full spectrum of mathematical sciences offerings with limited resources. Presentations that include assessment results of the new program are especially encouraged.

**Organizers:** Michael Boardman, Pacific University, and Mary Pilgrim, Colorado State University

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

**Description:** Perhaps you teach at a small college or a large research institution that requires students to take a first-year seminar. These seminars often have a broad set of learning goals, including an introduction to college life and college-level academic culture through an emphasis on critical thinking, academic writing and research, information literacy, and collaborative learning. A mathematician tasked with teaching such a course may feel overwhelmed because the style of teaching and the assignments are typically very different from those in our mathematics classes. At the same time, teaching 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 ways exist to engage students in mathematics or mathematical related themes? We seek speakers who are willing to share their experiences, along with their successes and their failures. Interested speakers should submit the theme or title of their seminar, the major learning goals of the course, and the ways in which they incorporated mathematics and related topics into the class through course activities and assignments.

**Organizers:** Jennifer Schaefer, Dickinson College; Jennifer Bowen, College of Wooster; Mark Kozek, Whittier College; and Pamela Pierce, College of Wooster

### **Research in Undergraduate Mathematics Education**

**Description:** The goals of this session are to promote high quality research in undergraduate mathematics education, to disseminate well-designed educational studies to the greater mathematics community, and to facilitate a productive impact of research findings on pedagogy in college mathematics. Presentations may be based on research in areas such as calculus, linear algebra, differential equations, abstract algebra, and mathematical proof. 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 instructors that supports college students' mathematical thinking. 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 as they pertain to the study of undergraduate mathematics education.

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

### **Advancing Women in Mathematics: On the Ground Initiatives**

**Description:** The NSF INCLUDES: WATCH US (Women Achieving Through Community Hubs) grant program and the widespread acclaim of Margot Lee Shetterly's *Hidden Figures* both point to fertile ground for initiatives that advance women in mathematics. But how do these initiatives take shape on the ground? What can we do at our own institutions to advance not only the next generation of students but also each other? How do existing programs address obstacles to success? This session features talks by members of the mathematical community who are currently engaged in programs that intentionally advance women in mathematics. Each talk will address the aim of the project, intended audience, reflections on the implementation of the project, and thoughts about replication and scaling in other settings. These talks will offer a broad array of ideas that together form a frame for how to begin---or continue---a dedicated effort to move women forward in mathematics. They will also provide a forum for an exchange of ideas related to unique issues faced by women in the field.

**Organizers:** Della Dumbaugh and Heather Russell, University of Richmond