

MAA THEMED CONTRIBUTED PAPER SESSIONS

The Mathematical Association of America will hold its summer meeting in the Duke Energy Convention Center, 525 Elm Street, Cincinnati, Ohio, July 31 – August 3, 2019. 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. 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. For the second 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 1 – 3. 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 2019, go to www.maa.org/mathfest/abstracts and follow the instructions found there. The deadline for submission of abstracts is April 30, 2019. Early submissions are encouraged.

1. Understanding Mathematics Through its History

Description: Many mathematical concepts experienced a long and complex evolution before arriving on the pages of today's undergraduate textbooks. Often, understanding some of this history can greatly enhance a student's understanding of mathematics. Moreover, an exploration of history can show how mathematics is connected to the wider world of human inquiry, affected by the same cultural values and prejudices as other subjects. This session seeks to share interesting historical episodes or developments linked to undergraduate mathematics, for the benefit of students and teachers alike.

Organizers: Erik Tou, University of Washington

Sponsor: The Euler Society

2. Plug and Play Data Science Lessons

Description: With the rapid expansion of careers in data science, the need for data science content increases. A pressing need is for professors to gain experience in this field and to incorporate methods from data science into the courses they teach. By connecting existing course content to data science, faculty can take their first step in this exciting new area, while also motivating students with an interest in this field. In this session, papers will include data science lessons that attendees can seamlessly incorporate into courses such as Finite Math, Calculus, Linear Algebra, Discrete Mathematics, Mathematical Modeling, and others. Presentations will include such elements as an overview of the lesson, student learning objectives, assessments, and a summary of the effectiveness of the lesson if available. Want to jump into data science but don't know where to direct your leap? This session is intended to give you guidance.

Organizers: Michael Boardman, Pacific University; Timothy Chartier, Davidson College; Jason Douma, University of Sioux Falls

Sponsor: CUPM

3. Ethics in the Mathematics Classroom

Description: The use and misuse of data has erupted into a global ethics conversation exemplified by scandals such as Cambridge Analytica, the Russian hacking of U.S. election machinery, and the NSA hacking of private individual phone and online records. The mathematical sciences have a central role in this crisis and it is time for all mathematicians to recognize the importance of taking the role seriously by training the next generation of mathematicians to identify and resolve ethical issues in their professional lives. This session aims to describe the integration of ethics into the mathematics classroom and ethical issues surrounding the teaching of mathematics. The talks can address any classroom environment, from service and general education courses to courses in programs in the mathematical sciences (broadly construed). We welcome speakers describing entire courses dedicated to ethics in STEM or courses that integrate some ethical conversations into a standard course. Talks should specify, as applicable, how ethical considerations were addressed, include reflection or assessment on success, and describe challenges and barriers to implementation with strategies to address those barriers. This session is connected to a Special Issue of PRIMUS: Ethics in Mathematics Education.

Organizers: Victor Piercey, Ferris State University; Catherine Buell, Fitchburg State University

Sponsor: Special Issue of PRIMUS: Ethics in Mathematics Education.

4. History of Mathematics in a Math Circle

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, activities, and problems of a historical nature or have a historical component for use in a math circle. This can include such ideas as working a class of problems using historical methods, discovering methods of calculation from a former time or culture, discovering how mathematical concepts were discovered or used historically or culturally, or building a hands-on model that is a replica of a historical item or depicts a historical mathematical idea. If space allows, non-historical math circle topics will also be considered.

Organizers: Amy Shell-Gellasch, Eastern Michigan University; Philip Yasskin, Texas A&M University

Sponsor: SIGMAA on Math Circles for Students and Teachers (MCST) and The History of Mathematics SIGMAA (HOM SIGMAA)

5. 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. Sponsored by the SIGMAA on Inquiry-Based Learning (IBL SIGMAA).

Organizers: Victor Piercey, Ferris State University; Susan Crook, Loras College; Brian Katz, Augustana College; Eric Kahn, Bloomsburg University; Amy Ksir, United States Naval Academy

Sponsor: IBL SIGMAA

6. Enhance your teaching through best practices that align with the Instructional Practices Guide

Description: Speakers in this session share teaching innovations through a scholarly lens by pegging their work to specific evidence-based practices in the MAA Instructional Practices (IP) Guide. Each talk will clearly lay out both the pedagogical technique as well as how it pertains to at least one of the subsections of the IP Guide.

Organizers: Carolyn A. Yackel, Mercer University; Mindy Capaldi, Valparaiso University

Sponsor: CTUM

7. Mathematics and Sports

Description: The expanding availability of play-by-play statistics and video-based spatial data have led to innovative research using techniques from across the mathematical sciences, with impacts on strategy and player evaluation. Other areas of interest include ranking methods, predictive models, physics-based analysis, etc. Research presentations, expository talks, and contributions related to curriculum or pedagogy are all welcome. With a broad audience in mind, talks should be accessible to undergraduate mathematics majors, and projects involving undergrads are particularly encouraged for submission.

Organizers: Drew Pasteur, College of Wooster

8. Diversity, Equity, and Inclusion in Mathematics

Description: National data trends indicate a critical need to shift patterns of representation in the mathematical sciences with respect to diversity, equity, and inclusion. As a response, many individual departments and instructors have sought to understand the barriers that inhibit student persistence and success in mathematics, particularly among underrepresented minority, first-generation, low-income, and female students. This session invites presenters to share how they effectively engage diverse student populations through inclusive instructional practices, extra-curricular activities, and/or departmental policies. In particular, presenters should discuss the outcomes of their efforts, including the advantages and disadvantages of their approaches.

Organizers: Joel Kilty, Centre College; Ranthony Edmonds, The Ohio State University; Alison Marr, Southwestern University; Alex M. McAllister, Centre College

9. Mathematics Through Games

Description: This session invites speakers to share methods for engaging students in mathematics through the development or play of board, card, and video games. While it is generally accepted that developing a game often requires the application of mathematics, many neglect the fact that mathematical principles may appear in how one plays the game. Presentations could describe successful class activities, class projects, or undergraduate research applications of college-level mathematics in games. This session will be of interest to gamers and instructors looking for innovative examples to use in their classes.

Organizers: Heidi Hulsizer, Benedictine College; Nickolas Hein, Benedictine College; Mindy Capaldi, Valparaiso University; Martha Byrne, Sonoma State University

Sponsor: the SIGMAA on Mathematical and Computational Biology

10. Building Teaching Teams: Professional Development in Departments

Description: Mathematics departments often rely on students, post-doctoral fellows, sessional instructors, and early-career instructors to do a large portion of the instructional work within a department. Previous research has shown that required, sustained professional development programs play an important role in developing instructors who are more student-focused, but financial constraints, time limitations, and lack of buy-in often serve as barriers to offering these types of programs. This session seeks to showcase a wide range of mentoring and professional development programs situated within universities and mathematics departments that aim to develop the teaching capacity of sessional and early-career instructors. We encourage presentations on programs that work with early career instructors throughout their teaching assignments, are delivered in environments with limited resources, or are situated in smaller departments. Talks should include a description of the environment and delivery model, the philosophy underlying the program, and evidence of success.

Organizers: Sarah Mayes-Tang, University of Toronto; Jessica Deshler, West Virginia University

11. A Centennial Celebration of David Harold Blackwell

Description: David Harold Blackwell (April 24, 1919 - July 8, 2010) is arguably the most decorated and well-known of African Americans in the Mathematical Sciences. Blackwell would have turned 100 years old in 2019. To commemorate this, the National Association of Mathematicians (NAM) will host a Themed Contributed Paper Session for individuals to examine the influence Blackwell has had on the profession. Speakers in this session will explore his influence as a researcher by discussing the importance of the Rao-Blackwell theorem in Statistics and Operations Research, as well as his influence as a department chair as discussed by faculty from Howard University and the University of California. This Paper Session will complement the MAA-NAM David Harold Blackwell Lecture to be held at MathFest.

Organizers: Edray Herber Goins, Pomona College; Janis D. Oldham, North Carolina A&T; Scott W. Williams, SUNY Buffalo

12. Showcase of Modeling to Motivate Differential Equations

Description: Modeling can motivate the learning of differential equations, which is a pivotal STEM course taught in high schools, two-year colleges, and four-year institutions. Student backgrounds and intended majors, faculty backgrounds, and departmental constraints provide for many variations in the course. Modeling can be incorporated into any version to introduce and motivate the study of differential equations and show its broad interdisciplinarity. Scholarly presentations will share modeling materials and data collection experiences that generate active, inquiry-oriented learning. Presenters may discuss the value of modeling to themselves as teachers and to their students as learners, as well as assessment techniques and pedagogical successes and challenges.

Organizers: Therese Shelton, Southwestern University; Rosemary Farley, Manhattan College; Patrice Tiffany, Manhattan College

13. 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

14. My Favorite Number Theory Proof

Description: This session invites presenters to share favorite number theory proofs suitable for introduction to proofs courses or undergraduate number theory courses, but not graduate-level number theory courses. While non-standard proofs for the *Fundamental Theorem of Arithmetic* or the *Chinese Remainder Theorem* may be submitted for consideration, standard versions of these proofs and other typical proofs such as the irrationality of the square root of two, for example, will not be considered. Presenters must do the full proof, discuss how the proof fits into the course, provide information regarding prerequisite topics for the proof, and discuss associated areas with which students experience difficulty and how such concerns are addressed so that students understand the proof. Presenters are invited to discuss how they have modified the proof over time, share historical information related to "classic" proofs, and discuss explorations/demonstrations which they use to help students comprehend related theorems and topics. Abstracts should include the theorem to be proved/discussed as well as brief background information.

Organizers: Sarah L. Mabrouk, Framingham State University

15. Math + X: Mathematics Courses, Curriculum, and Projects Serving Professional Disciplines

Description: Mathematics departments have been providing content in support of partner and professional disciplines for decades. For disciplines such as business and engineering, there are many resources available to help support a contextualized curriculum. However, in other disciplines or math pathways, there are fewer resources available to guide mathematics faculty to effectively support contextualized student learning. This session aims to highlight curricular elements for those professions, disciplines, and math pathways, where supporting materials are lacking. Of particular interest are successful examples of non-traditional curricula designed to match the future work environment of students. This session welcomes classroom activities, entire course designs, lessons learned, or processes developed to support the learning of mathematics for professional and partner disciplines.

Organizers: Francisco Savina, Charles A. Dana Center, University of Texas at Austin; Stuart Boersma, Central Washington University

16. Mathematics and the Life Sciences: Initiatives, Programs, Curricula

Description: The 2015 CUPM Curriculum Guide to Majors in the Mathematical Sciences identified the life sciences as a key path through the mathematics major to graduate programs and the workforce. 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 at institutions of higher education.

Organizers: Timothy D. Comar, Benedictine University; Raina Robeva, Sweet Briar College; Carrie Diaz Eaton, Bates College

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

17. 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; Andrew Niedermaier, Jane Street Capital

Sponsor: SIGMAA on Recreational Mathematics

18. Professional Development in Mathematics: Looking Back, Looking Forward, on the occasion of the 25th anniversary of MAA Project NExT

Description: Description: 25 years ago the MAA founded Project NExT as a professional development program for new math faculty. Since then, an entire generation of mathematicians have participated in it and other professional development programs. How have those programs impacted the teaching and learning of mathematics? How have they impacted the lives of mathematicians? How have the challenges faced by college math instructors changed over that time? Looking forward, how do we prepare today's new math instructors for the changes to come in the next 25 years? This session will feature a range of types of talks, including stories of

influential workshops, research on the effects of programs, and theoretical discussions about the future of professional development in mathematics.

Organizer: Dave Kung, St. Mary's College of Maryland