

**MAA Contributed Paper Sessions
Joint Mathematics Meetings
Seattle, January 6 – 9, 2016**

CONTRIBUTED PAPER SESSIONS WITH THEMES

TCPS#1. Experiences and Innovations in Teaching Probability Theory

Wednesday morning

Description: We invite papers and scholarly presentations on improving the teaching of probability theory, at the undergraduate or beginning graduate level, by innovative methods. Possible topics could include: inquiry-based learning, projects, mathematical writing, real-world applications, connections to other areas of mathematics, integration of technology, or simulation. The focus of this session will be on the teaching of probability theory (the construction, analysis, and theoretical properties of probabilistic models) rather than statistics or data analysis. Reports on student outcomes, either anecdotal or empirical, are encouraged.

Organizers: Jonathon Peterson, Purdue University, and Nathaniel Eldredge, University of Northern Colorado

TCPS#2. Topics and Techniques for Teaching Real Analysis

Wednesday afternoon

Description: Real analysis is a core component of the mathematics program. It has traditionally been considered difficult for students but is also challenging to teach since the student body can be diverse and there are many choices in subject matter. Students may end up applying their knowledge of real analysis in differential equations, functional analysis, probability, even economics and physics. There are many exciting topics that can be covered and many possible strategies for success. Speakers at this session can present topics that could be added to real analysis courses and can discuss improved presentation techniques of traditional topics.

Organizers: Erik Talvila, University of the Fraser Valley; Paul Musial, Chicago State University; Robert Vallin, Lamar University; and James Peterson, Alma College.

TCPS#3. Using Philosophy to Teach Mathematics

Thursday morning

Description: Courses in the philosophy of mathematics are rare, but philosophical questions frequently arise in the regular curriculum, often presenting difficulties to teachers who haven't prepared to respond to them. In recent years a growing number of teachers of mathematics are discovering that addressing philosophical issues deliberately in their courses not only eases the strain but also enhances students' ability to grasp difficult mathematical concepts. The upcoming MAA Notes volume, *Using the Philosophy of Mathematics in Teaching Collegiate Mathematics*,

illustrates the ways a wide variety of teachers have found to introduce philosophical questions as an exciting part of presenting standard mathematical material. This session invites teachers at all levels to discuss ways they have found to include philosophy in the mathematics classroom. Papers on other topics in the philosophy of mathematics will be considered as time permits.

Organizers: Carl Behrens, Alexandria, VA, and Dan Slougher, Furman University
Sponsor: POM SIGMAA

TCPS#4. Common Core State Standards (CCSS) for Mathematics Practices and Content: The Role of Math Departments in Preparing Math Education Candidates for New Assessments

Thursday afternoon

Description: The Common Core State Standards for Mathematics have been widely adopted and implemented nationally. Mathematics Departments share responsibility with Teacher Education Programs to prepare future teachers who are ready to teach school mathematics so that their students can meet both the content and especially mathematical practices standards. Mathematics faculty also collaborate with the K-12 system to ensure a smooth transition from school to higher education, one of the primary purposes of the CCSS. This session seeks reports of mathematics faculty experiences with their department's implementation of the CCSS mathematics standards with a focus on the requirements of new assessments. We invite contributed papers describing efforts, including evidence of their impact, that

- (a) Investigate how well their math education candidates are prepared with the knowledge and skills necessary to assess that their students meet the CCSS for mathematics content and practices;
- (b) Partner with K-12 educators to focus on the implications related to the assessments (such as PARCC and Smarter Balanced) being used;
- (c) Discuss changes mathematics departments have made to their programs implementing the CCSS and assessments for the mathematical education of teachers, or
- (d) Discuss departmental initiatives to ensure a smooth transition from school to higher education in light of the CCSS and their associated assessments.

Organizers: William Martin, North Dakota State University; Karen Morgan, New Jersey City University; Gulden Karakok, University of Northern Colorado; and James A. Mendoza Epperson, University of Texas--Arlington

Sponsors: MAA Committee on the Mathematical Education of Teachers (COMET) and the MAA Committee on Assessment

TCPS#5. The Teaching and Learning of Undergraduate Ordinary Differential Equations

Friday morning

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 non-standard topics and how such topics can lead to student engagement and interest.

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

Sponsor: Community of Ordinary Differential Equations Educators (CODEE)

TCPS#6. Innovative and Effective Ways to Teach Linear Algebra

Friday afternoon

Description: Linear algebra is one of the most interesting and useful areas of mathematics, because of its beautiful and multifaceted theory, as well as the enormous importance it plays in understanding and solving many real world problems. Consequently, many valuable and creative ways to teach its rich theory and its many applications are continually being developed and refined. This session will serve as a forum in which to share and discuss new or improved 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 and enlightening connections between ideas that arise in linear algebra and ideas in other mathematical branches; (4) interesting and 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 and useful approaches or pedagogical tools.

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

TCPS#7. Helping Students See Beyond Calculus

Saturday afternoon

Description: We need more and better educated mathematics and science students. Too many high school and beginning college students think of mathematics merely as Calculus and the topics leading to it. Many talented and promising students lose interest in mathematics—some never take a single math class in college and some drop out of the math major soon after beginning—because they are never exposed to the beauty and usefulness of the many other areas of mathematics. Students—and society—would immensely benefit from the students’

being exposed to other areas of mathematics before leaving high school or during their first semesters in college. Papers submitted for this session should describe classroom presentations and materials which provide students with the exposure described above. Such classroom presentations and materials should be:

- An introduction to a specific mathematical idea or application;
- Accessible to high school or early college-level students;
- Self-contained (including information on how to most effectively use the presentation or materials);
- Comprised of power points, video or audio clips, online or printed handouts, materials or tools for experimentation and visualization, etc.; and
- Interesting, entertaining, and possibly captivating.

The organizer hopes that speakers will make their classroom presentations available online (on their own web sites) for use by other instructors.

Organizers: David Strong, Pepperdine University; James Tanton, MAA; Courtney Davis, Pepperdine University; and Angela Spalsbury, Youngstown State University

Sponsor: SIGMAA TAHSM

TCPS#8. Mathematics and Sports

Saturday morning

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 mathematics majors. Undergraduates and their mentors are particularly encouraged to submit abstracts for consideration.

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

TCPS#9. Preparation, Placement and Support of Elementary Mathematics Specialists

Thursday morning

Description: Over the last decade, there have been numerous calls for the use of mathematics specialists in elementary and middle schools. In 2013, the Association of Mathematics Teacher Educators (AMTE) created a set of *Standards for Elementary Mathematics Specialists* (amte.net/publications) to encourage states to address the urgent need to increase the mathematical knowledge and expertise of elementary

school staff by establishing an elementary mathematics specialist (EMS) license, certificate, or endorsement. Elementary mathematics specialists are teachers, teacher leaders, or coaches who are responsible for supporting effective mathematics instruction and student learning at the classroom, school, district, or state levels.

Recently some institutions have begun degree or certificate programs to educate these elementary mathematics specialists. Papers will report on the preparation, placement, and support of mathematics specialists in the elementary grades as well as on the development of degree or certificate programs to educate these mathematics specialists. Papers may describe programs to prepare preservice or inservice teachers to become elementary mathematics specialists, or may describe efforts with school districts to create positions and support for these specialists. Reports on the successful installation and implementation of elementary mathematics specialists are also welcome. Papers should include evidence of success or the potential for application to other institutions or districts.

Organizers: Laurie J. Burton, Western Oregon University; Cheryl Beaver, Western Oregon University; and Klay Kruczek, Southern Connecticut State University

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

TCPS#10. Trends in Undergraduate Mathematical Biology Education

Friday morning

Description: Several recent reports emphasize that aspects of biological research are becoming more quantitative and that 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 biomathematics 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 biomathematics courses, preparation for graduate work in biomathematics and computational biology or for medical careers, and assessment issues.

Organizers: Timothy Comar, Benedictine University, and Daniel Hrozencik, Chicago State University

Sponsor: SIGMAA BIO, the SIGMAA on Mathematical and Computational Biology

TCPS#11. Mathematics and the Arts

Wednesday morning and afternoon

Description: Presentations exploring connections between Mathematics and the Arts are invited from any of various perspectives, including mathematical aspects of

traditional art, mathematical topics represented by or incorporated into art, and artistic and aesthetic aspects of mathematical topics. All artistic areas are welcome: visual, poetical, dramatic, musical, literary, dance, fiber arts, and so forth.

Practitioners from anywhere along the spectrum of math and the arts as well as educators with experience at this intersection are invited to report on their experiences, whether primarily artistic, mathematical, pedagogical, or blended.

Organizer: Douglas Norton, Villanova University

Sponsor: SIGMAA ARTS, the SIGMAA on Mathematics and the Arts

TCPS#12. The Broad Impact of Math Circles

Thursday afternoon

Description: A mathematics circle is an enrichment activity for K-12 students or their teachers, which brings them into direct contact with mathematics professionals, fostering a passion and excitement for deep mathematics in the participants. Math circles provide a unique opportunity to reach a wide variety of audiences and have a lasting impact. This session is focused on how math circles have served this variety of populations and the effect of this service. Talks are invited that address how math circles have served nonstandard or often underrepresented audiences. Talks are also invited that describe the lasting impact of math circles on various audiences; for example, talks that describe how math circles impacted you as a young mathematician are welcome.

Organizers: Katherine Morrison, University of Northern Colorado, and Philip Yasskin, Texas A&M University

Sponsor: SIGMAA MCST, the SIGMAA on Math Circles for Students and Teachers

TCPS#13. Mathematics Experiences and Projects in Business, Industry, and Government

Friday afternoon

Description: The MAA Business, Industry and Government Special Interest Group (BIG SIGMAA) provides resources and a forum for mathematicians working in Business, Industry and Government (BIG) to help advance the mathematics profession by making connections, building partnerships, and sharing ideas. BIG SIGMAA consists of mathematicians in BIG as well as faculty and students in academia who are working on BIG problems. Mathematicians, including those in academia, with BIG experience are invited to present papers or discuss projects involving the application of mathematics to BIG problems. The goal of this contributed paper session is to provide a venue for mathematicians with experience in business, industry, and government to share projects and mathematical ideas in this regard. Anyone interested in learning more about BIG practitioners, projects, and issues, will find this session of interest.

Organizers: Carla D. Martin, Dept. of Defense, and Allen Butler, Wagner Associates

Sponsor: BIG SIGMAA, the SIGMAA on Business, Industry and Government

TCPS#14. The Scholarship of Teaching and Learning in Collegiate Mathematics

Wednesday morning and afternoon

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 probes of student understanding. The goals of this session are to: (1) feature scholarly work focused 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 post-secondary classroom-based investigations of teaching methods, student learning difficulties, curricular assessment, or insights into student (mis)understandings. Abstract submissions should have a clearly stated question that was or is under investigation and should give some indication of the type of evidence that has been gathered and will be presented. For example, papers might reference the following types of evidence: student work, participation or retention data, pre/post tests, interviews, surveys, think-alouds, etc.

Organizers: 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

TCPS#15. The Contributions of Minorities to Mathematics Throughout History

Friday morning

Description: The history of mathematics is filled with inspiring stories of mathematicians. This session will focus on the stories of minority mathematicians (people of color, native peoples, women, and other peoples historically underrepresented in mathematics) of the distant and not so distant past and the impact they have had on mathematics and its teaching.

Organizers: Amy Shell-Gellasch, Montgomery College, and Lloyd Douglas, University of North Carolina

Sponsor: HOM SIGMAA

TCPS#16. Incorporating the History of Mathematics into Developmental Math Courses

Saturday morning

Description: Developmental math courses and courses prerequisite to the calculus sequence such as college algebra and precalculus are challenging for many students. By incorporating the history of mathematics into these courses, a deeper level of understanding and interest may be achieved. This session seeks papers which offer ideas for incorporating the history of mathematics (generally or specifically) into these courses.

Organizers: Van Herd, University of Texas Austin, and Amy Shell-Gellasch, Montgomery College

Sponsor: HOM SIGMAA

TCPS#17. Integrating Research into the Undergraduate Classroom

Saturday afternoon

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.

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

TCPS#18. Graduate Students Teach Too: Ideas and Best Practices

Saturday morning

Description: Graduate teaching assistants (GTAs) comprise a nontrivial portion of the teaching workforce at many universities. Though their duties vary, most are responsible for teaching introductory general education courses in some capacity. In fact, a 2010 AMS survey of four-year colleges and universities suggests that roughly 8% of introductory math courses (15% for statistics) are taught fully by graduate students. This responsibility may seem straightforward at first glance; however, there is a growing movement toward accountability for general education outcomes in such courses. Students in these classes deserve a positive, engaging experience - one that not only permits them to take future math courses (if desired), but also fosters gains in numeracy. In light of a GTA's workload and background, such an experience can be challenging to create. This session is designed to encourage dialogue among both graduate programs and graduate instructors. Talks might include reports on innovative preparation methods for new instructors, accountability measures for GTAs, means for infusing quantitative literacy into GTA-led courses, as well as novel ideas or reports from graduate students themselves.

Organizer: Samuel L. Tunstall, Michigan State University

TCPS#19. Mathematical Modeling in the Undergraduate Curriculum

Saturday morning

Description: Both the MAA's 2015 CUPM Curriculum Guide and SIAM's Modeling Across the Curriculum Report emphasize the value in teaching mathematical modeling as a dynamic problem-solving process. In addition to courses specifically dedicated to mathematical modeling and applied mathematics, many undergraduate mathematics programs have made an effort to infuse modeling into courses across their existing curriculum. This session welcomes papers concerning best practices, useful examples, or effective strategies in the design and teaching of undergraduate courses in which mathematical modeling comprises a significant activity or core learning objective. Collectively, the papers presented in this session will represent applications of mathematics to a broad range of fields.

Organizers: Jason Douma, University of Sioux Falls, and Rachel Levy, Harvey Mudd College

Sponsors: MAA CUPM Mathematics Across the Disciplines Subcommittee and the SIAM Education Committee

TCPS#20. Research in Undergraduate Mathematics Education

Thursday morning and afternoon

Description: This session presents research reports on undergraduate mathematics education. The session will feature 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 of such types of research 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 mathematics teachers, with intention to support and advance college students' mathematical thinking and activities. The presentation should report results of 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. We also welcome preliminary reports on research projects in early stages of development or execution.

Organizer: Karen A. Keene, North Carolina State University

Sponsor: SIGMAA on RUME

TCPS#21. Origami in the Mathematics K-12 Classroom

Saturday afternoon

Description: Programs that take advantage of paper folding to teach mathematics are thriving in many parts of the world. Presenters in this session will describe their innovative strategies for exploring mathematics in the K-12 classroom and/or with

future/in-service teachers using paper folding/origami as the means to reach the goals established by the Common Core. The focus of the session will be on rich mathematical explorations that are based on or enhanced by paper folding. Presentations are expected to be scholarly in nature.

Organizers: Roger Alperin, San Jose State University, and Perla Myers, University of San Diego

TCPS#22. Contemplative Pedagogy and Mathematics

Friday afternoon

Description: Contemplative pedagogy aims to incorporate contemplative/introspective practices into the classroom in order to deepen the educational experience. Students are challenged to engage more fully with the material and their experience of learning. Common techniques include in-class mindfulness activities, deep listening or dialoguing, journaling, and beholding. As more and more data comes in showing the efficacy and benefits of such practices in all aspects of life, the Contemplative Education movement has been gaining momentum, strengthening connections with established good pedagogy, and expanding to departments outside the humanities and social sciences. This contributed paper session solicits presentations from college-level educators with hands-on experience of contemplative pedagogy or contemplative practices. We welcome reports on successful, or unsuccessful, attempts at contemplative pedagogy, whether anecdotal or systematic. We also invite educators with personal out-of-class contemplative practices, to reflect on how that practice has informed their teaching.

Organizers: Luke Wolcott, Lawrence University, and Justin Brody, Goucher College

TCPS#23. Assessing Student Learning: Alternative Approaches

Wednesday morning

Description: Assessment is central to determining a student's level of mastery, yet traditional methods of assessment (such as exams, quizzes, and homework) may not accurately and robustly measure student understanding. With the recent increase in the popularity of non-lecture-based course structures, techniques that assess deeper learning are coming to the forefront. This session invites presenters to describe innovative methods of assessment with which they have experimented in the attempt to accurately reflect the diversity of ways students learn and understand course material. Presenters should focus on practical issues of implementation and discuss the level of success of the method in the college classroom. Presenters may also share methods to determine the validity of their assessments, advice for others looking to implement or create alternative assessment methods, or how these methods can help instructors evaluate the effectiveness of a non-traditional classroom.

Organizers: David Clark, Grand Valley State University; Jane Butterfield, University of Victoria; Robert Campbell, College of St. Benedict/St. John's University; and Cassie Williams, James Madison University

TCPS#24. Quantitative Literacy in the K-16 Curriculum

Wednesday afternoon

Description: Because of its nature, Quantitative Literacy is referenced at almost all levels of the educational system. Traditional mathematical topics such as "calculus" have relatively well-defined prerequisites and outcomes and an established location in the traditional mathematical curriculum sequence. Quantitative Literacy typically involves the use of a wide variety of pre-collegiate level mathematics to enable a deeper understanding within a non-mathematical context. As a result, changing requirements for K12 mathematics can have a significant impact on what we do at the collegiate level. Papers in this session will focus on the interface between the K12 curriculum and collegiate Quantitative Literacy. Given the breadth of this area, it is expected that papers with a variety of different focuses will be accepted. Papers which provide insights on the following questions are explicitly invited: requirements for K12 that impact collegiate level QL, QL requirements for two-year colleges, the distinction between K12 Quantitative Literacy standards and collegiate Quantitative Literacy standards, and the impact of changing requirements at the K12 and two-year schools on four-year school curricula.

Organizers: Aaron Montgomery, Central Washington University; Gary Franchy, Southwestern Michigan College; Gizem Karaali, Pomona College; Andrew Miller, Belmont University; and Victor Piercey, Ferris State University

Sponsor: SIGMAA QL

TCPS#25. Innovative Approaches to One-Semester Calculus Courses

Thursday morning

Description: Students who major in such fields as agriculture, architecture, biology, business, economics and liberal arts and human sciences often take a one-semester, terminal Calculus course with a focus on applications. One approach to these courses are focused, targeted versions of Calculus such as Applied Calculus, Business Calculus, or Calculus for the Life Sciences. Some schools cannot offer a wide range of Calculus courses and must design a single course to meet the needs of these students. This session invites presenters to share innovative course designs for a one-semester Calculus course for students interested in a variety of disciplines, particularly those that involve mathematical modeling. Presenters are expected to report their course design, how it meets the needs of students, and evidence for the effectiveness of their approach.

Organizers: Joel Kilty and Alex M. McAllister, Centre College

TCPS#26. Conversations with the Partner Disciplines: Collaborations to Improve the Mathematics Curriculum

Saturday afternoon

Description: The undergraduate mathematics curriculum is an essential component of the education of future scientists, health professionals, engineers,

computer scientists, business professionals, and social scientists, and supports the quantitative education of all students. Understanding and adapting to the evolving needs of the partner disciplines is critical to maintaining a vital and relevant mathematics curriculum. The 2013 NRC report “The Mathematical Sciences in 2025” revealed that “the educational offerings of typical departments in the mathematical sciences have not kept pace with the changes in how the mathematical sciences are used,” and a “community-wide effort is needed ... to make undergraduate courses more compelling to students and better aligned with the needs of user departments.” One national effort to improve such communication over the past decade has been the MAA’s “Curriculum Foundations Project: Voices of the Partner Disciplines.” This session presents successful collaborations with partner disciplines to revise mathematics courses or programs. Talks should identify the research basis for curricular change such as on-campus conversations, the Curriculum Foundations Project, or other professional reports or guidelines. Talks illustrating successful models for collaboration or interdisciplinary courses/programs developed from these partnerships are also welcome. Projects renewing mathematics courses in the first two years of the undergraduate curriculum are especially encouraged. Papers from the session may be considered for a special issue of PRIMUS.

Sponsors: Curriculum Renewal Across the First Two Years (CRAFTY) and Mathematics Across the Disciplines (MAD) subcommittees of CUPM and the journal PRIMUS: Problems, Resources, and Issues in Undergraduate Mathematics Studies

Organizers: Victor Piercey, Ferris State University; Suzanne I. Doree, Augsburg College; Jason Douma, University of Sioux Falls; and Susan Ganter, East Carolina University

TCPS#27. Bringing the Community into the College Mathematics Classroom

Thursday afternoon

Description: Colleges and universities are often involved in the surrounding communities, typically through partnerships and outreach. But how often are communities present in college classrooms, in particular in mathematics classrooms? This session is concerned with collaborations between universities and the communities they serve that enhance student mathematical learning, while also building stronger ties with individuals and organizations based in these communities. Such collaborations can happen in any mathematics course, from liberal arts mathematics to the capstone; they can be implemented at any level, of an individual course or program-wide; and they can take many forms. For example, community members may share their expertise during a class visit; students may serve as consultants to a community-based organization; or course meetings can take place on-site in the community, to name a few. Proposals for this session should describe collaborations between mathematics courses or programs, and community members or organizations. These collaborations should be more than simple attempts to “fix” the communities, and should view communities as sources of knowledge rather than as deficient. All proposals must provide rich descriptions of the collaboration and the mathematics learning that took place, and should provide

evidence of the impact that the collaboration had on participants, both students and community members (if applicable). Accounts of internships will also be considered.
Organizer: Ksenija Simic-Muller, Pacific Lutheran University

TCPS#28. Innovative Targeted Solutions in Teaching Introductory Statistics

Thursday afternoon

Description: Statistics is a very rapidly growing field and enrollments in Introductory Statistics are expanding. The 2015 MAA Curriculum Guide recommends that all math majors learn effective data analysis. This is also a time of great innovation and change in the way Introductory Statistics is taught. This session invites papers on successful methods used in Intro Stats. These methods can range from an innovative full course curriculum overhaul to a single effective in-class activity. All papers should provide participants with a clear take-away idea for use in Introductory Statistics.

Organizers: Patti Frazer Lock, St. Lawrence University; Randall Pruum, Calvin College; and Sue Schou, Idaho State University

Sponsor: SIGMAA on Statistics Education

TCPS#29. New Ideas in Teaching Upper-Level Statistics Courses

Friday afternoon

Description: Much attention has been paid recently to improving student learning in the Introductory Statistics course. This session is focused on the rest of the undergraduate statistics curriculum. We invite submissions that provide details about innovative learning activities, technologies, resources, or teaching methods that have been used effectively in "Stat 2", Mathematical Statistics, or other statistics courses beyond the Intro Stat course. Submissions may range from single effective activities used in these courses to major curricular revisions or completely new courses. We welcome submissions that include partnerships with other disciplines. Presentations should explicitly address the objectives and effectiveness of the described activities.

Organizers: Patti Frazer Lock, St. Lawrence University; Randall Pruum, Calvin College; and Sue Schou, Idaho State University

Sponsor: SIGMAA on Statistics Education

TCPS#30. Addressing the Needs of Mathematics and Computer Science Majors in Discrete Mathematics Courses

Saturday afternoon

Description: The needs of mathematics and computer science majors in discrete mathematics courses differ: while a proof-based approach is typically desired for mathematics majors, computer science majors need to understand the connection between the mathematics and concepts they encounter in computer science coursework. Yet all students can benefit from both approaches: computer science majors from more mathematical rigor, and mathematics majors from more

programming applications. One possible approach to making discrete mathematics courses more meaningful to all students is through the use of technology, especially as computer software becomes more freely available (e.g. SAGE or Wolfram Alpha) and easier to use (e.g. newer versions of Maple and Mathematica). Other approaches include meaningful projects and activities.

For this session, we invite proposals that describe an activity, problem, assignment, or project that was successful in advancing the knowledge and engagement of students enrolled in a discrete mathematics course. Descriptions of entire courses are also welcome. While we are especially interested in proposals about courses that simultaneously serve computer science and mathematics majors by implementing computer software or programming, proposals describing other innovative approaches to teaching discrete mathematics in general will also be considered. Talks in this session should also describe outcomes, giving evidence of the success of the intervention.

Organizers: Ksenija Simic-Muller, Pacific Lutheran University, and Tom J. Edgar, Pacific Lutheran University

TCPS#31. Proofs and Mathematical Reasoning in the First Two Years of College

Wednesday morning

Description: As more students begin their college education at a two-year college before transferring to a Bachelor's degree program, it is increasingly important to ensure that students choosing to major in mathematics are adequately prepared for the rigor of advanced mathematics courses. In particular, they will need to read, comprehend and write proofs. Most standard calculus sequences do not or cannot provide the needed preparation because they must serve a significantly diverse set of majors. Therefore many Bachelor degree programs in mathematics require an "Introduction to Proofs" style course that mathematics majors must take. This kind of course is not currently offered in most two-year college mathematics programs. We invite faculty from two and four-year institutions to share

- Introduction to Proofs and Mathematical Reasoning courses for students who have had a year of calculus and intend to take upper division mathematics courses especially as taught to students in two-year colleges;
- Methods of integrating the teaching and practice of proof-writing for mathematics majors into standard first and second-year mathematics courses; or
- Collaborative efforts between two and four-year institutions to create or facilitate transfer of Introduction to Proof and Mathematical Reasoning courses or course equivalents.

Organizers: Joanne Peeples, El Paso Community College; Chris Oehrlein, Oklahoma City Community College; and Dean Gooch, Santa Rosa Junior College

Sponsor: MAA Committee on Two Year Colleges

TCPS#32. Professional Development for Mathematicians: A Contributed Paper Session for MAA PREP Organizers and Participants

Wednesday afternoon

Description: MAA has supported professional development activities that have enhanced the mathematics profession through the PProfessional Enhancement Program (MAA PREP), funded by the National Science Foundation. A variety of professional development workshops have been conducted under the MAA PREP umbrella, and it would be beneficial for workshop organizations and participants to share their experiences and insights. This session will provide a venue for organizers to share their ideas with one another, and for participants to share their experiences.

Organizers: Jon Scott, Montgomery College; Barbara Edwards, Oregon State University; Nancy Hastings, Dickinson College; and Stan Yoshinobu, Cal Poly San Luis Obispo

Sponsor: MAA Committee on Professional Development

TCPS#33. Inquiry-Based Teaching and Learning

Friday morning

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.

Organizers: Brian Katz, Augustana College, and Victor Piercey, Ferris State University

TCPS#34. Recreational Mathematics: Puzzles, Card Tricks, Games, Game Shows and Gambling

Thursday morning

Description: Puzzles, card tricks, games, game shows and gambling provide an excellent laboratory for testing mathematical strategy, probability, and enumeration. Pencil and paper puzzles, board games, game shows, card tricks and card games all provide opportunities for mathematical and statistical analysis. Submissions to this session are encouraged that look at new problems as well as novel approaches to old problems. Submissions by undergraduates or examples of the use of the material in the undergraduate classroom are encouraged.

Organizers: Paul R. Coe, Sara B. Quinn, and Marion Weedermann, Dominican University

TCPS#35. Revitalizing Complex Analysis

Saturday morning

Description: Complex Analysis, despite its beauty and power, seems to have lost some of the prominence it once enjoyed in undergraduate mathematics, science, and engineering. Thanks to funding from NSF a national dialog has begun with the intention of remedying this situation. Two sessions at the 2015 San Antonio JMM focused on suggestions for curricular reform from a variety of perspectives: modifying the traditional course to include more modern ideas; including modules suitable for student investigation; and instituting a "transitions" course containing a meaty component of complex analysis. Papers at this session should likewise be scholarly, and focus on ways to enliven complex analysis as taught to undergraduates. The table is open to suggestions for technological innovation, pedagogical ideas, or other innovative approaches that seem promising.

Organizers: Russell Howell, Westmont College; Paul Zorn, St. Olaf College; and Alan Noell, Oklahoma State University

TCPS#36. The Development and Adoption of Open Educational Resources for Teaching and Learning

Friday afternoon

Description: This session will showcase the increasing popularity of open educational resources (OER) for courses in mathematics and the sciences. Examples of this may include, but are not limited to, the development, enhancement, 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. Presenters from all educational levels and STEM-related fields are encouraged to submit abstracts, with preference awarded to those topics focusing on the high school, community college, and undergraduate levels.

Organizers: Benjamin Atchison, Framingham State University, and Jeremy Russell, The College of New Jersey

GENERAL CONTRIBUTED PAPER SESSIONS

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

Organizers: Bem Cayco, San Jose State University; Timothy Comar, Benedictine University; and T. 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