SCHEDULE

AMS Fall Western Sectional Meeting special session on:

Characteristics of a Successful Mathematics Gateway Program

November 4-5, 2017 at UC Riverside

TIME	SPEAKER	TITLE
SATURDAY		
8-8:40	Eric Hsu	Equity, Placement and Practice: Student Success in California State College Gateway Courses.
9-9:40	Guadalupe Lozano	Supporting pre-calculus teaching and learning through mentorship and problem-solving: a collaboration focused on better outcomes for 2-year HSI students and 4-year transfers.
10-10:40	Shandy Hauk	Supporting Gateway Success with the College Mathematics Instructor Development Source (CoMInDS).
11-11:40	***Plenary Talk***	
Lunch		
2-2:40	***Plenary Talk***	
3-3:40	Marilyn Carlson	Improving Student Success and Student Learning in Precalculus Level Courses: One Promising Approach.
4-4:40	Danielle Champney	Transforming our Classrooms into Calculus Communities, and the Role of Productive Failure.
5-5:40	Discussion	
SUNDAY		
8-8:40	Michael Tallman	Strategies for Improving Students' Perseverance in Mathematics Gateway Courses.
9-9:40	Stacy Musgrave	Understanding and Improving Instructors' Mathematical Meanings for Teaching.
10-10:40	Sepideh Stewart	Moving between three Worlds of Mathematical Thinking in Linear Algebra.
11:11:40	***Plenary Talk***	
Lunch		
2-2:40	Discussion	

Organizers:

Sara Lapan (UC Riverside) Jeff Meyer (CSU San Bernardino) David Weisbart (UC Riverside)

http://www.math.ucr.edu/~slapan/Conferences/CSMGP2017

ABSTRACTS

AMS Fall Western Sectional Meeting special session on:

Characteristics of a Successful Mathematics Gateway Program

November 4-5, 2017 at UC Riverside

Equity, Placement and Practice: Student Success in California State College Gateway Courses.
Eric Hsu, San Francisco State University

We examine research literature on the (in)effectiveness of placement strategies and curriculum for algebra and precalculus college courses. We also share the promising results from an NSF-supported approach to developmental algebra in the context of the California State University system, combining conceptual learning, team problem-solving, and an unusual online homework system.

Supporting pre-calculus teaching and learning through mentorship and problem-solving: a collaboration focused on better outcomes for 2-year HSI students and 4-year transfers.
Guadalupe Lozano, The University of Arizona

Evidence Based Pedagogies (EBPs), specifically peer-collaborative problem-solving courses, have been particularly successful in improving performance of engineering STEM majors at our university. Spurred by this success, we explore the impact of such pedagogies in supporting the mathematics performance and persistence of the growing population of transfer students from 2-year Hispanic Serving Institutions (HSIs). Working in collaboration with community college faculty, we focus mostly on pre-calculus level students before and after transfer. In this talk I will describe successful elements of this project from various perspectives, including addressing the transition from 2-year to 4-year colleges, supporting undergraduates' success in pre-calculus/calculus, and growing internal capacity to teach mathematics using EBPs, at various levels.

Supporting Gateway Success with the College Mathematics Instructor Development Source (CoMInDS).
Shandy Hauk, WestEd

The purpose of the National Science Foundation-funded College Mathematics Instructors Development Source (CoMInDS) is to provide readily accessible resources for teaching-related professional learning for college mathematics instructors. The project is creating an infrastructure, housed and supported by the Mathematical Association of America (MAA), to enhance the mathematics community's ability to provide high quality supports for improving college teaching, particularly in service and gateway courses commonly taught by novice college mathematics instructors (e.g., Teaching Assistants (TAs), recent doctoral and master's graduates). CoMInDS project components are designed to address the needs of three core groups whose efforts have significant influence on the quality of undergraduate mathematics instruction: Providers – faculty who provide seminars or course coordination to TAs and other instructors. Scholars – faculty and graduate students whose research or other scholarly activity centers on the teaching of undergraduate mathematics. TAs – graduate students whose responsibilities include teaching mathematics courses. The session will include attendee participation in example activities for instructor professional learning.

Improving Student Success and Student Learning in Precalculus Level Courses: One Promising Approach.

Marilyn P. Carlson, Arizona State University

The Pathways Project resulted from ongoing research into the mathematical meanings and instructional supports that result in greater student learning and success in precalculus level courses. This foundation knowledge informed the development, alignment, and ongoing refinement of our instructional goals, assessments, curriculum, and faculty professional development. This session will share results of what our project's research has revealed about effective ways to help instructors achieve greater student learning, confidence, retention, and success. I will focus on the content of quantitative reasoning to illustrate our approach, and use data to argue for the benefits of supporting beginning algebra through calculus level students engage in conceptualizing and representing quantitative relationships. I will illustrate how this way of thinking leads to students' developing both basic mathematical literacy, and foundational ways of thinking and understandings needed for continued STEM learning. I'll conclude with a few comments about the complexity of shifting an instructional culture toward conceptually oriented teaching, and the potential role of online curriculum in building students' quantitative reasoning abilities.

Transforming our Classrooms into Calculus Communities, and the Role of Productive Failure.

Danielle D. Champney, Calpoly, San Luis Obispo

Our students come to us from a variety of backgrounds, and go on to a variety of STEM degrees, but are first asked to join together for several quarters to build a diverse community of calculus learners and problem solvers. How do these emergent calculus communities come to support each other in their learning, and how do they use and value their time together in and outside of class? In many cases, students' prior experiences often lead them to prize perfectionism, answer-seeking, and efficiency rather than the winding problem solving journey that we recognize as the authentic calculus learning experience. During this talk, we will discuss how to build student attitudes that frame "failure" productively, how to harness students' struggle with difficult calculus concepts as an avenue along which they grow to help one another, and how to foster classroom communities that value this struggle and failure as critical components of success, and not roadblocks to success. In viewing our job as building a calculus community that prioritizes inquiry and struggle, rather than a simple calculus class, we can help our students to leverage calculus as a key piece of their lifelong commitment to STEM.

Strategies for Improving Students' Perseverance in Mathematics Gateway Courses.
Michael A Tallman, Oklahoma State University

Students' lack of perseverance is a primary factor contributing to low success rates in mathematics gateway courses. Perseverance in mathematics is a multifaceted construct involving students' interests and proclivities, their will and skill. Often perseverance is portrayed as a kind of trait that a student possesses—a kind of generalized intellectual toughness— rather than a behavior that emerges from a variety of subjective constructions and appraisals students make in the context of particular situations. In this presentation, I integrate a number of related lines of inquiry in the field of mathematics motivation to propose a model for the development of perseverance in mathematics. Specifically, I redefine perseverance as a self-regulatory strategy involving a dynamic interplay between mathematical tasks, mathematics as an intellectual pursuit, and the goals, interests, and resources students bring to the learning environment. The model of perseverance I describe includes four central aspects: interests and identity, establishing goals, utilizing resources, and anticipating consequences. For each of these aspects, I offer specific suggestions for how instructors can improve students' perseverance in mathematics gateway courses.

Understanding and Improving Instructors' Mathematical Meanings for Teaching.
Stacy M. Musgrave, CalPoly Pomona

At many universities, courses leading up to and including calculus are taught by graduate teaching assistants (GTAs). These typically novice instructors face the challenge of teaching ideas foundational to calculus, yet data suggests GTAs often hold impoverished meanings for those ideas themselves. In this presentation, I share data revealing the varied meanings held by GTAs regarding average rate of change, angle measure and the sine function, before and after being involved in an intervention designed to support them in developing richer meanings for these and other ideas found in algebra and pre-calculus courses. I then describe how a targeted intervention supported these instructors in developing richer and more connected meanings for the content, as well as increased their fluency in discussing foundational ideas for precalculus and calculus

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Moving between three Worlds of Mathematical Thinking in Linear Algebra.
Sepideh Stewart, University of Oklahoma

Linear algebra consists of many languages and representations. Instructors often move between these languages and modes fluently and expect students to follow along. In reality, many students do not have the cognitive framework to perform the move that is available to the experts. In this talk, employing Tall's three-world model, I present a set of linear algebra tasks that are designed to encourage students to move between the embodied, symbolic and formal worlds of mathematical thinking. We anticipate that creating opportunities to move between the worlds, will encourage students to think in multiple modes and to broaden their mathematical knowledge.
