2019 Mathematics & Teaching Conference
We enthusiastically welcome you the to the 11th UCLA Mathematics Department’s Philip C. Curtis Jr. Center for Math and Teaching Conference! During this day of meaningful and relevant talks by current teachers, research mathematicians and mathematics educators, we will work together to improve the mathematical experiences of all K-12 students.

Warm wishes,
Heather Dallas
Executive Director

THE UCLA CURTIS CENTER

The UCLA Curtis Center is a group of K-12 and university mathematics enthusiasts who work together to improve the quality of K-12 mathematics activity.

Currently, we work to:

- Provide effective opportunities for K-12 teachers to deepen their understanding of the mathematics they teach, extend their knowledge of mathematics, and learn how to apply their mathematical knowledge to the work of teaching.
- Provide effective training of undergraduates for careers in mathematics teaching and mathematics teacher leadership.
- Write mathematics curriculum for use in K-12 mathematics classrooms that engages students in sense making, justification, and application of mathematics.
- Develop mathematics assessments focused on problem solving, communicating reasoning, and application of mathematics in order to promote student readiness for college mathematics courses, careers, and in life.
- Provide high quality mathematics activities for students in local schools to give them a view of mathematics as a creative reasoning and problem solving activity with intrinsic beauty and meaningful application.

THE UCLA SITE OF THE MATHEMATICS DIAGNOSTIC TESTING PROJECT (MDTP)

MDTP is a joint CSU/UC project that develops diagnostic tests that measure student readiness for courses from prealgebra to calculus. MDTP’s 10 regional sites make these tests and associated written response items available to California teachers free of charge. These sites score tests, provide diagnostic test result reports, and offer assistance to teachers regarding the interpretation of test results and their use as part of formative assessment in their classes. These reports help teachers and students focus on topics, skills, and understanding that can increase the chances of students succeeding in learning collegiate mathematics. The UCLA site serves Los Angeles and Ventura counties.
Sybilla Beckmann is Josiah Meigs Distinguished Teaching Professor of Mathematics at the University of Georgia. She has a PhD in mathematics from the University of Pennsylvania. Beckmann has done research in Arithmetic Geometry, but her current main interests are mathematical cognition, the mathematical education of teachers, and mathematics content for PreK through Grade 8. Beckmann developed several mathematics content courses for prospective elementary school teachers at the University of Georgia and wrote a book for such courses, *Mathematics for Elementary Teachers*, published by Pearson Education. She is interested in helping college faculty learn to teach mathematics content courses for elementary and middle grades teachers. Beckmann was a member of the writing team of NCTM’s Curriculum Focal Points for Prekindergarten through Grade 8 Mathematics and a member of Committee on Early Childhood Mathematics of the National Research Council. She was a member of the mathematics writing team for the Common Core State Standards for Mathematics. Several years ago Beckmann taught a 6th grade mathematics class every day at a local public school in order to better understand school mathematics teaching.

**HOW IS MULTIPLICATION A COHERENT CONCEPT ACROSS WHOLE NUMBERS AND FRACTIONS?**

Many scholars in mathematics and mathematics education have advocated a coherent development of mathematical ideas. They argue that students should not experience mathematics as isolated bags of tricks but rather as a coherent, logically connected domain. How can multiplication be treated coherently? In whole number contexts, we often think of multiplication as repeated addition, but in fraction contexts, we may think of multiplication as taking a part of a part. How are these connected? There are also many different types of multiplication word problems, and some types of problems, such as area problems and problems about ordered pairs, seem very different from problems involving equal groups of objects. So what makes multiplication a single concept? In this session we will explore how a definition of multiplication can bring coherence to multiplication and can unite multiplication across different types of nonnegative numbers (whole numbers, fractions, decimals) and across different types of word problems. This definition of multiplication relies on measurement ideas and therefore also connects multiplication and measurement. We will explore some hands-on ways to get a feel for this definition of multiplication and to experience multiplication as coherent. We recommend that they bring a laptop, tablet, or smart phone with an internet connection.
Michael Fenton is a leader in mathematics education with a passion for designing engaging learning experiences. He serves as Lead Instructional Designer for Desmos, a leader in digital mathematics tools and curriculum. Drawing on his experience as a classroom teacher, graduate school instructor, curriculum writer, and professional development consultant, Michael explores how to use technology to spark curiosity, creativity, and collaboration. He graduated from UCLA with a Bachelor of Science in General Mathematics and holds a Master of Arts in Education and a Master of Arts in Mathematics. Michael currently lives in Fresno, CA, with his beautiful wife and four energetic children.

PRINCIPLES FOR BUILDING AND FACILITATING EFFECTIVE DIGITAL ACTIVITIES

What do the most powerful digital math tasks have in common? What teacher moves allow students to get the most out of any lesson? In this session, we'll consider answers to these questions and use the Desmos Activity Builder as a lens for exploring the intersection of computers, teaching, and math.
Dr. Madison is a research psychometrician with a background in mathematics education. Specifically, he studies multidimensional psychometric models for extracting meaningful and diagnostic information from assessments. This talk will introduce the diagnostic measurement model framework, then demonstrate how this framework was used to evaluate an innovative instructional method in mathematics education. Results from the diagnostic model framework will be compared with traditional methods to highlight their utility in mathematics education research studies. Implications for research are discussed.

Learn how to deepen students’ understanding of fractions by tracing the progressions of fraction standards from 1st-5th grades and experiencing hands-on activities you can do with your students to help them develop number sense of fractions.

Illustrative Mathematics has just begun writing a new K-5 curriculum. We will share some of the important design principles such as:

1. Supporting arithmetic fluency through Number Talks
2. Genuine alignment with the CCSSM
3. Developing a mathematical community (for students and teachers)

We will engage in work together on sample activities (and Number Talks) to give a sense of the goals of the curriculum.
During this presentation, participants take on the role of an industrial engineer and model packaging efficiency through a highly engaging hands-on data-collection activity. They then apply measures of center and variability to improve the efficiency of a packaging assembly line.

This scenario is one of nine 1-week math PBL modules created by Georgia Tech as part of an NSF Math/Science Partnership project. All modules utilize a variety of manipulatives and simulations and require that students apply math concepts to solve scenario-based challenges. The modules apply Standards of Mathematical Practice within three STEM integration themes: Experimental Design, Data Visualization, and Data Based Decision Making.

This session is presented by 8th grade students from Da Vinci Connect: Kiana Mosley, Noah Chan, Tensaye Ballard, Xavier Ballard, and Will Baker. We will share some of our favorite math activities from studying linear functions in Helen’s class. We will share how we collected data from our experiments, how we used Desmos to graph our data, and how we used the math we learned to analyze our results. We will provide copies of the packets we used in class so you can do the activities with your students!

Collaborative learning is considered to be great for students, and it is. But what about our struggling students? What about when they struggle even in the collaborative setting? How can we better support them? This session will focus on specific instructional strategies that teachers can use to help their struggling students take full advantage of the opportunities that collaborative learning environments can offer.

Reflecting on student thinking can give us clues to design more effective, engaging, efficient instruction. We will connect diagnostic results, big math ideas, and general-purpose instructional routines to extend and deepen all students’ thinking. Free resources.
In order to support student engagement and critical thinking in the math classroom, teachers can implement applied math and current math research into their curriculum. Through the Curtis Center and the Applied Math Research Program at UCLA, teachers now have the opportunity to participate in summer research experiences and create corresponding lesson plans for their classes. In this workshop, participants will have the opportunity to engage in a lesson created from a summer research experience. The lesson focuses on Common Core standards S-ID 1 and S-ID 6a, and students will engage with MP 1 and 4.

We will experience lessons that build Taylor Polynomials from ideas learned early in calculus. We will see these beautiful objects as extensions of linearization. Increase your comfort level with Taylor Polynomials! Help your students understand and appreciate them too.
Francis Edward Su is the Benediktsson-Karwa Professor of Mathematics at Harvey Mudd College, and past president of the Mathematical Association of America. He received his Ph.D. from Harvard University. His research is in geometric combinatorics and applications to the social sciences. He also has a passion for teaching and popularizing mathematics and calling people to greater awareness of issues that contribute to inequitable mathematics education. From the Mathematical Association of America, he received the 2018 Halmos-Ford award for distinguished writing, and the 2013 Haimo Award for distinguished teaching. He authors the popular Math Fun Facts website and is creator of MathFeed the math news app. His book *Mathematics for Human Flourishing* will be published by Yale University Press in 2019.

**MATHEMATICS FOR HUMAN FLOURISHING**

Why does the practice of mathematics often fall short of our ideals and hopes? How can deeply human themes motivate our students to do and study mathematics? I have been advancing the message that mathematics helps people flourish, no matter what they choose to do with their lives or careers, because it is connected to basic human desires and it builds virtues that everyone benefits from. I believe this is an important message, especially for educators, and describe some of the reactions I’ve received.
In NCTM’s Principles to Actions, two of the essential elements discussed are Access and Equity and Assessment. Let’s analyze if: 1) Are our assessments equitable? 2) Do they provide access for all students? What evidence is there that they are?

**ACCESS AND EQUITY WITH MEANINGFUL AND ALIGNED ASSESSMENT**

**TERRI GIBBS-BURKE**
Smarter Balanced Assessment Consortium

Most students, even those who desire to succeed in school, are intellectually aimless in mathematics classes because often they do not realize an intellectual need for what we intend to teach them. The notion of intellectual need is inextricably linked to the learner’s understanding of how and why a particular piece of knowledge came to be. In this talk, I will discuss ways to put students’ intellectual need at the center of the instructional effort, focusing mainly on four common core standards for mathematical practice: “model with mathematics,” “construct viable arguments,” “look for and make use of structure”, and “reason quantitatively.”

**ADVANCING STANDARDS FOR MATHEMATICAL PRACTICE BY FACTORING IN STUDENTS’ INTELLECTUAL NEED**

**GUERSHON HAREL**
University of California, San Diego

In this session we’ll think about how an instructional activity, choral counting, supports student and teacher learning. Choral counting builds students’ mathematical understanding while providing teachers with opportunities to engage in core practices of responsive teaching. We will engage in a choral count, analyze a classroom video, and plan a choral count you can use with your students.

**BUILDING NUMBER SENSE THROUGH SUBITIZING**

**KELLY ANN SASSONE**
Da Vinci Schools

Subitizing, “or instantly seeing how many,” builds number sense and algebraic thinking in our youngest learners, providing the foundation for their conceptual understanding of more complex mathematical concepts. Using subitizing games in the classroom allows teachers to create a mathematically rich environment that engages students and provides the opportunity for every learner to develop numeracy.

**CHORAL COUNTING: A TOOL FOR STUDENT AND TEACHER LEARNING**

**JODY GUARINO**
Orange County Department of Education

**SMATER BALANCED ASSESSMENT CONSORTIUM**

**ENTREPRENEUR**

**RESEARCH & RECOMMENDATIONS**

**K-12**

**PEDAGOGY**

**K-6**

**ILLUMINATION**

**K-6**

**LEGACY**

**K-12**

**OPTIMIST**
In this break-out session, we will explore a discussion structure for students to identify and explain the mistakes made by their classmates on a recent exit ticket. The session will include a model round of Debugging Common Errors. We will also discuss best practices for implementing this strategy and what the teacher needs to do behind the scenes to prepare. Participants will leave with a completed template to facilitate bringing these ideas back to their classrooms and their departments. Debugging Common Errors is relevant for math teachers of all grades K-12 and for administrators who support math teachers.

During this presentation, participants take on the role of a civil engineer and use an online simulation to collect data and apply linear functions to determine the most effective insulation material to use in the construction of a clean energy solar power plant.

This scenario is one of nine 1-week math PBL modules created by Georgia Tech as part of an NSF Math/Science Partnership project. All modules utilize a variety of manipulatives and simulations and require that students apply math concepts to solve scenario-based challenges. The modules apply Standards of Mathematical Practice within three STEM integration themes: Experimental Design, Data Visualization, and Data Based Decision Making.

Mathematical models are tools that connect mathematics to real world applications. Through mathematical models, mathematicians make predictions about future events, test scientific theories, and help others to make decisions about how to best use their money or resources. In this talk I will start by introducing the process by which models are built; by a courtship of mathematics and real world data, as well as the tough decisions about what to keep of the real world and want to ignore that modeling requires. Then I will discuss some real modeling problems that can be used in support of the Math Modeling Standard for Mathematical Practice. My goal will be to show you how topics that you may have taught many times can be used to study real world systems or problems.
In this session teachers design a pendulum from a basketball and string. They will apply what they know about trigonometric functions to find a model for the position of the basketball in reference to a position detector as a ball swings like a pendulum. They will analyze the relationship between the physical characteristics of the swinging basketball they observe to the parameters of the model they defined.

Participants will explore transformations and scale factor in a low-floor, high-ceiling standards-based lesson using Magformers magnetic shapes. Participants will build 2-D and 3-D figures and explore the effect of transformations on the area, surface area, and volume of their figures. They will create, revise, and defend conjectures based on their explorations. Expand your students’ understanding of what proofs in geometry look like while hitting Common Core geometry standards.
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