2017 Mathematics & Teaching Conference
In Memoriam: Philip C. Curtis Jr.

It is with great sadness that we announce the passing of Philip C. Curtis Jr. on December 19, 2016. As a UCLA Mathematics professor for over 50 years, Phil produced pioneering and internationally recognized work in the Banach Algebras. His service to the UCLA Mathematics Department, UCLA, and the UC Office of the President is unsurpassed. He served two terms as Chair of the UCLA Mathematics Department and laid the foundation of every Departmental K-12 mathematics activity in the last fifty years. Among these was the Joint Mathematics Education Program, by which he set the standard for K-12 mathematics teacher preparation in an elite mathematics research department. In addition, Phil founded the statewide CSU/UC Mathematics Diagnostic Testing Project. He was a long standing member of the University of California Board of Admissions and Relations with Schools and served on many other local, state, and national committees.

In 2007, the UCLA Mathematics Department established The UCLA Philip C. Curtis Jr. Center for Mathematics and Teaching in recognition of his lifelong commitment to the collaboration of university and K-12 mathematics instructors in the advancement of K-12 mathematics activity.

On a personal note, Phil was first my professor, then my mentor, then my colleague and finally my boss. He was a man of integrity, prudence and humility. A friend to the less fortunate. A man who demonstrated that gentleness and strength are sides of the same coin. A man who knew that the heart of leadership is service. An enthusiastic lover of life. A friend of teachers. We were all better persons when Phil was in the room. He will be sorely missed and impossible to replace.

Heather Dallas
Executive Director, The UCLA Philip C. Curtis Jr. Center for Mathematics and Teaching
WELCOME!

We enthusiastically welcome you to the annual UCLA Mathematics Department’s Philip C. Curtis Jr. Center for Math and Teaching Conference! The conference will focus on preparing teachers to teach mathematics and is composed of two plenary sessions and two sets of breakout sessions. This year’s plenary session speakers are Dr. Phil Daro, co-author of the Common Core State Standards for Mathematics, and Cathy Humphreys, Stanford-UCLA Early Mathematics Coaching Project. In addition, an outstanding group of mathematics educators, teachers, and mathematicians will lead our breakout sessions.

The UCLA Curtis Center
The Philip C. Curtis Jr. Center for Mathematics and Teaching exists to further high quality K-12 mathematics activity and mathematics education research. We are dedicated to developing and supporting quality mathematics programs that interface with the K-16 community, including outreach programs for K-12 students, continuing education programs for K-12 teachers, and mathematics teacher preparation programs for UCLA undergraduates.

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.

UCLA CalTeach-Math
UCLA CalTeach-Math is an undergraduate program that aims to graduate high quality, CA credential program-ready mathematics teacher candidates. The program prepares undergraduates for careers in teaching mathematics through early field experiences, career guidance, professional networking activities, a number of scholarships, and coursework focused on the mathematical and pedagogical knowledge necessary for teaching secondary school mathematics.
Dr. Phil Daro
Co-author of the Common Core State Standards for Mathematics

Phil Daro served on the writing team of the mathematics Common Core State Standards. He continues to work on implementation and policy issues related to the Common Core. He is the lead mathematics designer for the pad based Common Core System of Courses being developed by Pearson. He also leads the partnership of University of California, Stanford and others with the Oakland and San Francisco Unified School Districts for the Strategic Education Research Partnership (SERP), with a focus on mathematics and science learning among students learning English or developing academic English, develops research agenda and projects that address priorities identified in the school district.

Previously, Daro was a Senior Fellow for Mathematics for America’s Choice, where he focused on advancing the design and use of leadership tools for improving mathematics instruction at every level of the educational system. Prior to this, he was executive director of the Public Forum on School Accountability, directed the New Standards Project, and managed research and development for the National Center on Education and the Economy. Daro has directed large-scale teacher professional development programs for the University of California, including the California Mathematics Project and the American Mathematics Project.

Past, Present, and Future Tense

Instruction based on standards implies all students learn common standards. Furthermore, it is commonly believed that the high expectations defined by the standards require teaching all students “on” grade level. Yet the reality teachers face everyday is this: students come to each lesson with great differences in prior knowledge and readiness for grade level mathematics. The tension between the present lesson and the past learning is made much worse than it needs to be by long standing bad habits built in to the traditional mathematics curriculum and pedagogy. Surprisingly, these bad habits are not present in American teaching of other subjects (the U.S. does much better in other subjects on international comparisons). These problems are deeply related to the incoherence of the mathematics curriculum. We can make the tension between past and present much more manageable by improving coherence which requires paying attention to future mathematics. The talk will give examples and illustrate how this works.
AM BREAKOUT SESSIONS – 10:10-11:20

ELEMENTARY SCHOOL TALKS

Pedagogy for Coherence Between Whole Number and Fraction Addition, Subtraction, and Multiplication (K-5)  
This session empowers K-5 educators with research based pedagogical strategies for teaching arithmetic for whole number and fractional units. Participants see the coherence between whole number addition, subtraction, and multiplication and the same operations with fractions. Pedagogical tools such as the number bond, unit form, place value models, area models, and tape diagrams will be included.
Robin Ramos, The Ramos Group Director

Fractions on the Number Line (K-3)  
In early elementary grades, fractions are always a quantity, that is some number of equal parts of an explicit whole. In later elementary grades, fractions are often treated and manipulated as abstract numbers. A key transition point for this progression occurs in the third grade when the number line model for fractions is introduced (3.NF.A.2). We will examine this progression of ideas in detail, by working through explicit problems, with a special focus on third grade where the important transition from concrete quantity to abstract number begins.
Michael Nakamaye, University of New Mexico Math Professor

Playing with Units: From Kindergarten to Fractions (K-2)  
We will play math together to deepen your own content knowledge of the base ten system and fractions. Come explore how the primary grade experiences with units and the base ten system can connect with the upper elementary math concepts of fractions and decimals. This will be a hands-on, game-filled session designed for elementary school teachers.
Georgia Wood, Berkeley Unified School District New Teacher Induction Coordinator

MIDDLE SCHOOL TALKS

Strategies for Integer Understanding, Meaning, Fluency, and Fun  
Use games, patterns, the number line and real-world contexts instead of memorizing meaningless rules.
Bruce Grip, Claremont Graduate University Field Faculty Advisor
**Randomness Doesn’t Mean Chaos in the Classroom**

As a continuation of talks concerning the use of computational mathematics in K-12 education, I’ll be discussing the what, why, and how of random number generators. I’ll give several examples of using random number generators; examples of their use in student assignments and projects as well as their use by instructors to help bring a bit more order to the creative chaos in the classroom.

Chris Anderson, University of California, Los Angeles Math Professor

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**Making Math Accessible to Struggling Students**

Students who struggle with math often do so – not because they are “bad at math” or “don’t care” – but because the content presents an inaccessible subject (e.g., the birdie’s flight path in a game of badminton) or assumes the student’s foundational math skills are more developed than they actually are (e.g., she can easily divide fractions). This session will provide strategies on overcoming both obstacles by focusing on how to modify lessons to make them more relevant to your students and create entry points to the math while maintaining rigor.

Caline Khavarani Smith, Curtis Center Secondary Math Specialist

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**Making Math Connections, Lessening Misunderstandings**

Eliciting, analyzing, and responding to student misconceptions is a powerful way to deepen mathematical understanding and engage students in the CCSS Math Practices. In this session, we’ll explore several general purpose activities you can use in your classroom immediately. These activities encourage students to make mathematical connections, confront misunderstandings, fill-in gaps, and participate in meaningful discussion. Free resources will be provided.

Mary Sirody, UC/CSU Mathematics Diagnostic Testing Project UCLA Site Director

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**Some Basic Mathematics for Introductory Statistics**

Statistics is a science, and there are many opinions on what level of mathematics is required to study it. We will present some problems from introductory statistics that require more mathematics than would suffice for basic data analysis.

John Sarli, UC/CSU Mathematics Diagnostic Testing Project Workgroup Chair

Wallace Etterbeek, California State University, Sacramento Math Professor Emeritus
Intellectual Need: The Case of Complex Numbers

The talk is about a unit structured around a sequence of perturbation-resolution pairs progressing along a path that roughly parallels the development of complex numbers in the history of mathematics. The results from three teaching experiments demonstrate ways of thinking afforded and targeted by the unit; they include standards for mathematical practices outlined by the Common Core State Standards.

Guershon Harel, University of California, San Diego Math Professor

Hands-On Geometry: Investigate, Conjecture, Prove

We’ll use Magformers magnetic construction toys to investigate questions about honeycombs, kitchen floors, Platonic solids, and planets. We’ll formalize our observations into conjectures and then address high school algebra, geometry, and functions standards as we try to show our conjectures are true.

Michelle Sidwell, UCLA Curtis Center Director of Special Projects

ALL GRADE LEVEL TALKS

Evaluating Effective PD: STEM Models

After 10 years of evaluating local partnerships through the California Mathematics and Science Partnership program, Public Works (PW) will highlight findings related to coaching, lesson study and other professional development strategies. Learn about innovative PD models and how to evaluate them. In addition, PW will describe the methodology for the statewide matched control/treatment study and its findings.

Mikala Rahn, Public Works Chief Executive Officer
Andrew Thomas, Learning Works Charter School Consultant
Cathy Humphreys taught elementary, middle school, and high school mathematics for thirty years in California public schools. Throughout her teaching career she focused on helping students make sense of mathematics.

Cathy has been active in professional development and teacher education, serving as an instructor for Math Solutions, a middle school mathematics coach for the Silicon Valley Mathematics Initiative (SVMI), and as a lecturer in the Stanford Teacher Education Program (STEP), where she taught mathematics content and instruction courses for preservice elementary and secondary teachers. She is currently an instructor for the Mathematics Education Collaborative (MEC) and works as a coach for the Stanford-UCLA Early Mathematics Project.

Cathy is also the co-author of three books: *Making Number Talks Matter: Developing Mathematical Practices and Deepening Understanding, Graders 4-10* with Ruth Parker (2015); *Connecting Mathematical Ideas: Middle School Videocases of Teaching and Learning*, with Jo Boaler (2005); and *A Collection of Math Lessons for Grades 6-8* with Marilyn Burns (1987). In 2016, Cathy received her PhD in Mathematics Education at Stanford University.

**Letting Go: Cultivating Agency and Authority in the Mathematics**

In this session I share what I learned from my dissertation study of two high school teachers who were learning to enact Number Talks. I wanted to understand what teachers found most challenging and how coaching supported their learning. In examining the videos, however, I noticed that agency and authority in one of the classes grew considerably. My results in searching for "Why?" were interesting, and I hope they will be useful to teachers and teacher leaders alike.
PM BREAKOUT SESSIONS – 2:05-3:15

ELEMENTARY TALKS

Tasks, Tools, and Talk to Support Elementary Students to Construct Viable Arguments (K-2)  RESEARCH & RECOMMENDATIONS  MS 6201  28
Wondering how to support your students to construct viable arguments? In this session we will examine tasks, tools, and talk to engage students in CCSS Math Practice 3. Examples will be shared from primary classrooms.
Jody Guarino, University of California, Irvine School of Education Lecturer

Where’s the Math? Using Claims Data to Improve Math Instruction (2-5)  RESEARCH & RECOMMENDATIONS  MS 3915A  24
We will explore data from district developed Smarter Balanced-style math tasks and how teachers can use Claims results to improve mathematics instruction. Grades 2-5. Sample tasks will be shared.
Julie McGough, Azusa Unified School District Math Specialist

ELEMENTARY AND MIDDLE SCHOOL TALKS

Learning through Exploration: Using the Diagnostic Teaching Model  RESEARCH AND RECOMMENDATIONS  MS 6943  28
Through classroom video clips and model lessons, participants will see how the Diagnostic Teaching Model is helping teachers in Alhambra shift from teaching concepts and skills to facilitating conceptualization through exploration. Participants will receive lesson planning templates and a quick guide for implementing this model.
Sunny Chin-Look, Alhambra Unified School District Elementary Math Specialist

MIDDLE SCHOOL TALKS

Wedding Mathematics and Students  PEDAGOGY  MS 3974  30
This session for middle school educators illuminates research-based pedagogical choices that bind students to a deep understanding of, skill with, and love for mathematics. The focus will be on the coherence between work with whole numbers and fractions. This session empowers educators to teach whole number operations in such a way as to be directly foundational for work with fractions and to scaffold fraction multiplication and division to build directly on students work with whole numbers. Eureka Math/Engage NY materials will be the springboard for the experience.
Robin Ramos, The Ramos Group Director
**Middle and High School Talks**

**Justification and Proof in K-12 Mathematics**

What kinds of justification of mathematical claims should be presented to, and expected from, students at the K-12 levels? I will discuss three varieties of justification: showing THAT a claim is true, showing WHY it is true, and showing WHAT it is important for. I will give examples of numerical patterns that are simply “coincidental” and do not justify general claims.

Jeffrey Rabin, University of California, San Diego Math Professor

**Online Diagnostic Tests & Instant Results At No Charge to You from California’s CSU/UC MDTP!**

Explore the power and convenience of our new online platform which allows anytime access to all MDTP diagnostic tests and instant student results at no charge to CA teachers. In this session, you will learn how to set up your district, schools, teachers, and classes, proctor MDTP tests, and access/evaluate your students’ results. Exciting features include real-time results, analyses by topics and items, and individual student responses. Learn how to drill down to follow student thinking and see examples of how dynamic data can be used to facilitate formative teacher thinking around lesson and program design. Bring your laptops and your class rosters to this hands-on workshop and get set up on the spot! And don’t forget, it’s free!

Kimberly Samaniego, UC/CSU Mathematics Diagnostic Testing Project Director
Ann Trescott, UC/CSU Mathematics Diagnostic Testing Project State Coordinator Outreach & Support

**High School Talks**

**Using Mathematical Models to Understand our Ancestry**

To understand the amazing diversity of life on Earth, we must understand evolution. But evolution takes place over lifetimes, making it very difficult to see it in action. Accordingly, much of what we know about evolution comes from mathematical models. Assuming no biology background, I will describe some of these models, and their surprising predictions, focusing on models that can be explained and studied in the high school classroom. In particular, I will show how spreadsheet simulations and some ideas from probability theory can be used to study genetic drift -- the process in which small populations become more and more closely related over time. A surprising consequence of this theory is that we are all much more closely related than anyone previously imagined.

Marcus Roper, University of California, Los Angeles Math Professor
Conquering the Circle: Central Angles, Chords, Sectors

Do you find that your students struggle with the various circle theorems? In this workshop, participants will experience activities that provide variety and context for helping students understand and remember circle theorems.

Monique Evans & Amy Johnson, Environmental Charter High School Math Educators

Mathematical Modeling: Expectations of Students and Strategies for Teachers

Modeling is one of six conceptual categories for high school mathematics in the California Common Core State Standards (CCSS). The study of modeling is important in that it enables students to think mathematically about the world outside of their classroom. The expectation for rigor in modeling is such that traditional word problems will not suffice to meet the goals we have for our students. We will present some examples of mathematical modeling problems, talk about what we expect of our students while solving such problems, and discuss some teacher strategies that will enhance the experience of students.

Christopher Ograin, University of California, Santa Barbara Mathematics Lecturer with S.E.

Collaborating for Better STEM Education

For the last year, Glendale Unified science and math teachers, UCLA pre-service teachers, Curtis Center K-12 mathematics specialists, and university professors from across the country have been collaborating to create inquiry based mathematics and science lessons. The collaboration is part of a CA Math Science Partnership Grant and taking place over a specially developed online portal. In this session, a panel discusses this approach as a way to develop mathematically and pedagogically rigorous mathematics and science lessons and provide a forum for collaboration and learning between K-12 and university mathematics and science instructors.

Michelle Sidwell, UCLA Curtis Center Director of Special Projects
Kiran Gill, Glendale Unified School District Math Educator
Polly Jackson, Glendale Unified School District Math Educator

Coaches, Are You Really Listening?

Let’s look at two powerful perspectives with practical tools for connecting with, and meeting the needs of, your teachers (and students). The presenter taught peer counseling to students, taught mathematics for thirty years, supported new teachers for seven years and now is a part time field advisor for new teacher candidates.

Bruce Grip, Claremont Graduate University Field Faculty Advisor