



Integrating Computer Science into Math Education to Close the Achievement Gap

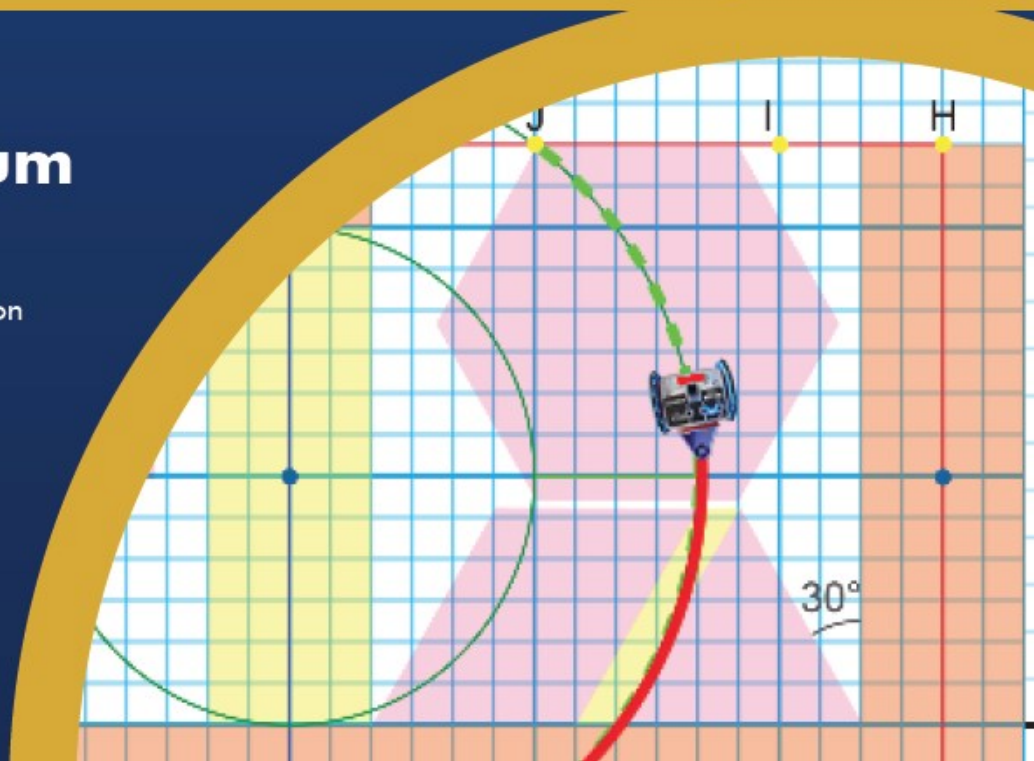
Third Annual C-STEM Symposium

April 21st, 2022

San Bernardino County Office of Education

UCDAVIS
C-STEM Center

San Bernardino
County
Superintendent of
Schools
Ted Alejandro, County Superintendent



Message from the C-STEM Center Director



Dear C-STEM Symposium Attendees,

The UC Davis C-STEM Center, in collaboration with Redlands Unified School District and the San Bernardino Superintendent of Schools, is pleased to co-organize the Third Annual C-STEM Symposium on Integrated Computing and STEM Education in Southern California on April 21, 2022. Educators across California are invited to this one-day event packed with inspiring speeches and hands-on sessions about transforming math, CS, and CTE education with coding and robotics. The theme of the Symposium is **Integrating Computer Science into Math Education to Close the Achievement Gap**.

We are very pleased to have 2019 C-STEM Teacher of the Year Greg Miller as our keynote speaker. He teaches third grade at McPherson Magnet School in Orange Unified School District and will share his experiences in increasing SBAC Math Scores by an incredible 72% in four years. Experienced C-STEM Superintendents, including Mauricio Arellano from Redlands Unified School District, Randal S. Bassett from Fontana Unified School District, and Dr. Alfonso Jimenez from Hacienda La Puente Unified School District, will discuss how the C-STEM program has a lasting impact on student engagement and performance district-wide. They will share insights on how new districts can start integrating C-STEM coding and robotics in STEM classrooms to close the math achievement gap.

We will also feature a plenary presentation with Dr. Kenneth Wagner, Assistant Superintendent of Educational Services for Redlands USD, on how Redlands is integrating computer science into math education, and a second plenary session with Annette Webb, the Associate Director of Academic Affairs and Director of Education Programs for UC Riverside, on the new Joint UC Riverside and UC Davis Computer Science Supplementary Teaching Credential Authorization Program. Breakout sessions will provide teachers in different grade bands (K-3, 4-6, and 7-12) information on how to get started with the C-STEM program and integrate coding and robotics into their regular STEM courses with a focus on math. The Symposium will wrap up after lunch with a plenary panel and an opportunity for all participants to share their experiences in implementing computer science into formal and informal math education.

The C-STEM program continues to inspire all students through exciting, hands-on, interdisciplinary curriculum with a focus on math with coding and robotics; we encourage you to take advantage of the strategies and resources presented today to enhance creative problem solving with robotics in your classrooms and beyond.

We would like to give a special thanks to Redlands Unified School District and the San Bernardino Superintendent of Schools for partnering with us to co-organize this Symposium, as well as all the presenters and participants in this symposium. We look forward to continuing our collaboration to bring hands-on coding and robotics to K-12 classrooms to close the math achievement gap.

Sincerely,

Harry H. Cheng

Professor and C-STEM Center Director

Symposium Location:

Dorothy Inghram Learning Center
San Bernardino County Superintendent of Schools
670 E. Carnegie Drive
San Bernardino, CA 92408

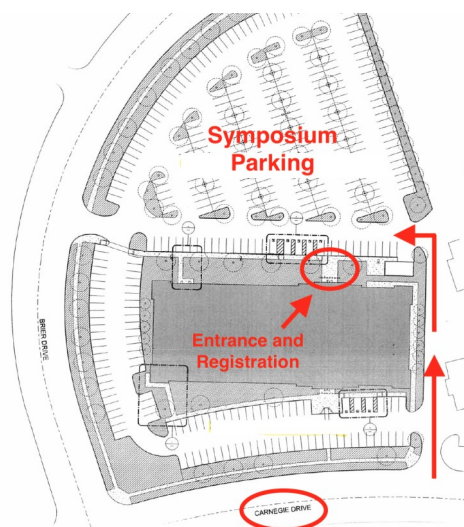
WiFi login:

Network: sbcss_guest

Use email address to log in, no password required

**Link to download software to control
hardware robots:**

www.roboblockly.com/download



Keynote Speaker

Increasing SBAC Math Scores by 72% in 4 Years

Greg Miller

McPherson Magnet School, Orange USD



Greg Miller has been a teacher in the Orange Unified School District for 24 years. Most of his time has been at McPherson Magnet School, a K-8 school founded with a STEM focus. Mr. Miller has experience teaching 3-6 grades in elementary school, as well as middle school Algebra, Pre-Algebra and German. Six years ago he started including C-STEM in his 3rd grade class. He noticed his students were enthusiastically embracing math through the activities and has made C-STEM an integral part of his curriculum. Through his leadership, McPherson now includes C-STEM in all 3rd-5th grade classes. He is also working with other schools in the district to include C-STEM. Read about his success story and other success stories at <http://c-stem.ucdavis.edu/about-us/success>.

C-STEM Overview

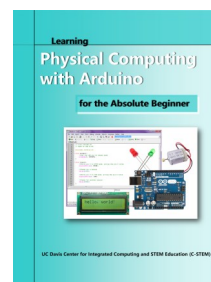
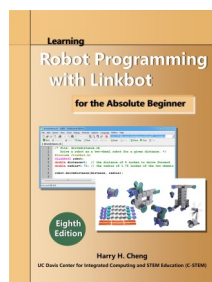
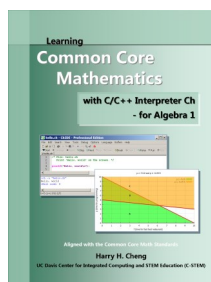
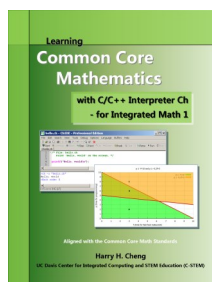
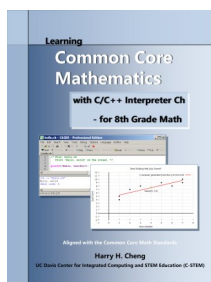
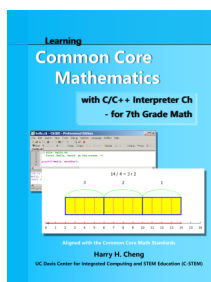
Learning Math with Coding and Robotics

C-STEM Math-ICT Curriculum

<http://c-stem.ucdavis.edu/curriculum>

C-STEM (Computing, Science, Technology, Engineering, and Mathematics) is a UC Approved Educational Preparation Program for Undergraduate Admission for both K-12 and Community College students to all UC campuses. The A-G approved C-STEM courses at the UCOP web site can readily be added in a high school's A-G course list. C-STEM Math-ICT Curriculum provides students with 13 years of experience learning math with coding and robotics. Integrating coding and robotics into math education facilitates an engaging, rigorous course that promotes critical thinking and creative problem solving. Many students who take C-STEM Math with Coding and Robotics courses have fun learning without associating the course with their struggles in a traditional math class. This unique hands-on approach provides students with the application-based learning they need to gain a thorough understanding of the materials.

Selected Samples of C-STEM Textbooks and Curricula



RoboPlay for Engagement and Project-Based Learning

<http://c-stem.ucdavis.edu/roboplay>

RoboPlay Competitions are theme-based level playing field robotics competitions for students in grades 5-12. The competitions are designed to engage students in project-based team activities and allow them to showcase their accomplishments and creativity. The competition arena and specific challenges are unknown to participants until the day of the competition. Using their math, programming, and problem solving skills, student teams try to most efficiently obtain the highest score for each task on their own. Schools and districts can host their own competitions using C-STEM resources.



Conference Schedule

Time & Room	Event
7:30 – 8:10 am Registration: Entrance Food & Drinks: Room D	Breakfast and Registration
8:10 – 8:25 am Rooms B, C, D, E, and 121*	Getting Started and Welcome Deepika Srivastava, STEAM & Innovation Coordinator, Redlands USD Welcome Mauricio Arellano, Superintendent, Redlands Unified School District
8:25 – 8:35 am Rooms B, C, D, E, and 121*	Welcome Dr. Harry Cheng, Professor & C-STEM Center Director, UC Davis
8:35 – 8:45 am Rooms B, C, D, E, and 121*	Keynote Speech: My C-STEM Experience on Increasing SBAC Math Scores by 72% in 4 Years Greg Miller, 3rd grade teacher and 2019 C-STEM Teacher of the Year, McPherson Magnet School (K-8), Orange Unified School District
8:45 – 8:50 am Rooms B, C, D, E, and 121*	Plenary Presentation: Redlands Story—Model District for Integrating Computer Science into Math Education Dr. Kenneth Wagner, Assistant Superintendent of Educational Services, Redlands Unified School District
8:50 – 9:20 am Rooms B, C, D, E, and 121*	Superintendent and Student Plenary Panel Session: Engaged Learning with Integration of CS into Math Education Moderator: Dr. Eduardo Mosqueda, Associate Professor, Department of Education, University of California, Santa Cruz Mr. Mauricio Arellano, Superintendent, Redlands USD Mr. Randal S. Bassett, Superintendent, Fontana USD Dr. Alfonso Jimenez, Superintendent, Hacienda La Puente USD Plus students from the three school districts
9:20 – 9:40 am Rooms B, C, D, E, and 121*	Plenary Presentation + Q&A: Joint UC Riverside and UC Davis Computer Science Supplementary Teaching Credential Authorization Program Annette Webb, Associate Director of Academic Affairs and Director of Education Programs, UC Riverside Harry Cheng, Professor and C-STEM Center Director, UC Davis
9:40 – 9:50 am	Break
9:50 – 11:30 am Session 1: Room C Session 2: Room E Session 3: Room B	Breakout Session 1: Hands-on Teaching Early Elem. (Gr. K-3) Math with Coding & Robotics Greg Miller, McPherson Magnet School (K-8), Orange Unified School District Breakout Session 2: Hands-on Teaching Elementary (Gr. 4-6) Math with Coding & Robotics Dr. Larry Lagerstrom, Chief Academic Officer, Barobo, Inc. Breakout Session 3: Hands-on Teaching Secondary (Gr. 7-12) Math with Coding & Robotics Jeff Hescox, Program Manager, UC Davis C-STEM Center
11:30 – 11:35 am	Break

***Room Locations for Plenary Sessions (for social distancing):**

Room B: Administrators and Secondary Teachers (Grades 7-12)

Room C: Early Elementary Teachers (Grades K-3)

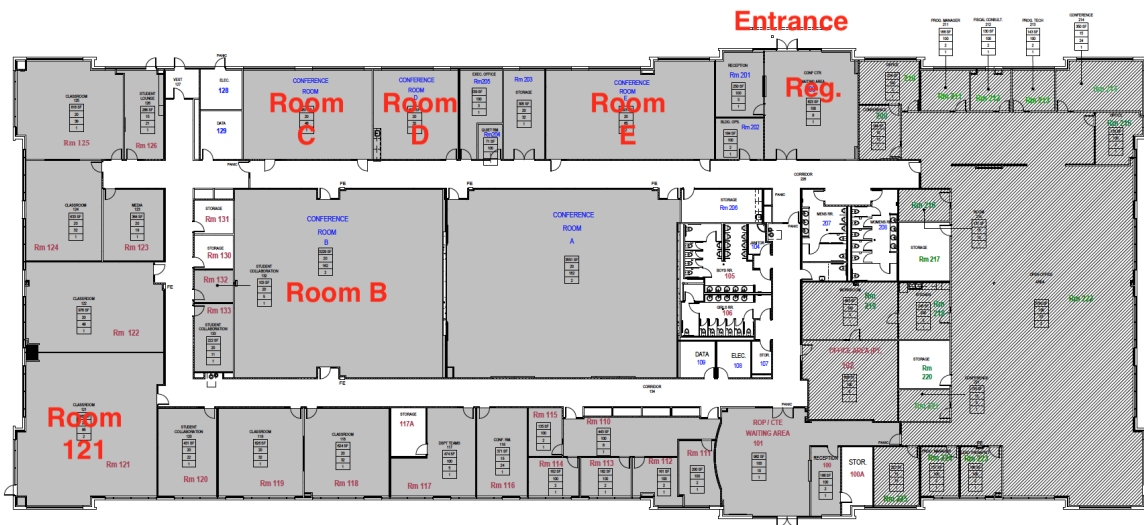
Room D: Food and Drinks

Room E: Upper Elementary Teachers (Grades 4-6)

Room 121: Overflow

Conference Schedule

Time & Room	Event
11:35 am – 12:00 pm Session 1: Room C Session 2: Room E Session 3: Room B	Breakout Session 1: Integrating CS into Early Elementary School (Gr. K-3) Education + Q&A Moderator: Deepika Srivastava, STEAM & Innovation Coordinator, Redlands USD Dr. Andrea K. McClain, Principal, Chaparral Academy of Technology, Fontana USD Cynthia Au, 2nd Grade Teacher, Chaparral Academy of Technology, Fontana USD Greg Miller, McPherson Magnet School (K-8), Orange USD Breakout Session 2: Integrating CS into Upper Elementary School (Gr. 4-6) Education + Q&A Moderator: Alison O'Connor, Director of Elementary Instruction, Fontana USD Dr. Honey T. Sacro Swem, Elementary Coordinator, Curriculum and Instruction, Fontana USD Ruth Thompson, 5th Grade Teacher, Smiley Elementary Breakout Session 3: Integrating CS into Secondary School (Gr. 7-12) Education + Q&A Moderator: Dr. Christina Pierce, Director of Curriculum, Instruction & Academic Enrichment, San Bernardino County Superintendent of Schools Sam Higbee, Math Teacher, Orange Grove Middle School, Hacienda La Puente USD Marissa Blessum, Math Teacher, Cedarlane Academy, Hacienda La Puente USD Pamela Matea, Math Teacher, Southridge Middle School, Fontana USD Allen Thoe, Math and Computer Science Teacher, Citrus Valley High School, Redlands USD
12:00 – 1:00 pm	Lunch and Networking
1:00 – 2:00 pm Rooms B, C, D, E, and 121*	Plenary Panel and Interaction with All Participants: Implementation Experience on Integrating CS into Formal and Informal Math Education (regular classrooms, supporting classes, and afterschool and summer camps) Moderator: Jeff Hescox, UC Davis C-STEM Program Manager Dr. Monica K. Makiewicz, Associate Superintendent of Teaching and Learning, Fontana USD Dr. Judy Fancher, Assistant Superintendent for Curriculum, Hacienda La Puente USD Dr. Kenneth Wagner, Assistant Superintendent of Educational Services, Redlands USD Jennie Dyerly, Principal, Crafton Elementary School, Redlands USD Pamela Matea, Math Teacher, Southridge Middle School, Fontana USD Allen Thoe, Math and Computer Science Teacher, Citrus Valley High School, Redlands USD
2:00 – 2:30 pm Rooms B, C, D, E, and 121*	Closing Remarks and Raffle Announcer: Dr. Larry Lagerstrom, Chief Academic Officer, Barobo, Inc.



New C-STEM Professional Development Starting Summer 2022!

CS Supplementary Teaching Credential Program from the UC Davis C-STEM Center in partnership with UC Riverside Extension

<http://c-stem.ucdavis.edu/cs>



The UC Davis C-STEM Center has over a decade of experience in providing professional development for K-12 teachers, including those without any prior coding experience, on computer science (CS) and integrating CS into STEAM education. Starting Summer 2022 in partnership with UC Riverside Extension, C-STEM Professional Development will be centered around the California Computer Science Supplementary Teaching Credential Authorization.

The following sequence of professional development courses in the Computer Science Supplementary Teaching Credential Authorization Program will meet the California Commission on Teacher Credentialing (CTC) requirements. They will prepare K-12 teachers to teach a comprehensive computer science curriculum.

- **Introduction to Teaching Computer Science**
- **Programming and Integration of CS into STEAM Teaching**
- **Development of Integrated CS and STEAM Curriculum with Physical Computing**
- **Computer Programming in C**
- **Data Structures and Software Design**

Complete four courses to earn an Introductory Authorization and teach in grades 9 and below, or add the fifth course to earn a Specific Authorization to teach up through grade 12. Teachers will be able to teach CS classes or integrate CS and data science into their existing classroom teaching with computational thinking, computing practice and programming, impacts of computing, physical computing, Arduino as a device for data collection and analysis with visualization, data structures and algorithms, software design, etc., aligned with Common Core State Standards (CCSS) Math, Next Generation Science Standards (NGSS), and English Language Arts and Literacy Standards. Taking the courses for the Computer Science Supplementary Teaching Credential Authorization credits is optional. Teachers can also opt to receive CEU units.

"Oh my gosh! I barely can contain myself....soooo fun!!! So challenging and so rewarding at the same time!!!"

— Jessica Fernandez, Math Teacher, Glen Edwards Middle School, California

"I really loved this training. In over 20 years of teaching I can't remember another one I enjoyed so much."

— Sandy Andersen, Math Teacher, La Sierra High School, California

"The trainers did an amazing job taking very divergent topics (programming, robotics, math) and making it all very accessible for me. It all came together."

— Glen Warren, McPherson Magnet, Orange Unified School District

"I learned that I love computer programming and if you can get me to love this than you must be doing something right! If I love it then it will be so much easier to inspire my students."

— Amber Rafferty at Cambridge Elementary

Afterschool and Summer Robotics Camps for Accelerated Math Learning

<http://c-stem.ucdavis.edu/robotics-camp>

C-STEM Afterschool and Summer Robotics Camps for Accelerated Math Learning are designed for our school and district partners to host for their students locally. The camps are designed in five grade bands and focus on the cognitive and socio-emotional aspects of learning, alleviating some of the distress caused by the pandemic and bringing fun back to learning. They empower K-12 students for accelerated and deeper math learning through robotics projects and the solution of real-world problems using math concepts, and at the same time provide students with recreational and teamwork opportunities with peer mentoring. Each C-STEM Robotics Camp is focused on learning key math concepts in the related grade levels through collaborative robotics. The C-STEM Robotics Camp curricula engage students in hands-on learning of **math**, seamlessly integrated with **coding**, **engineering**, **science**, **art**, and **music** via **robotics**. The campers will also learn teamwork, communication, presentation, and leadership skills.

Girls in Robotics Leadership (GIRL/GIRL+) Summer Camps

<http://c-stem.ucdavis.edu/girl>

GIRL and GIRL+ camps are designed as a Camp in a Box so that any school, district, college, or university can bring the program to their location. You can host your own GIRL and GIRL+ camps at your location using C-STEM GIRL/GIRL+ camp curriculum. To learn more reach out to us at girlcamp@c-stem.ucdavis.edu.

GIRL Camp

C-STEM's GIRL Camp is a week-long summer program geared for middle school girls entering 7th and 8th grade. This camp targets girls at a critical stage in their development when most girls lose interest in STEM. GIRL Camp aims to foster their interest in STEM subjects through peer mentoring and engaging hands-on coding and robotics activities. GIRL Camps facilitate a positive environment to explore science and technology beyond the classroom while boosting confidence and self-esteem through group projects and presentations. Campers are inspired to serve as leaders and role models to other young girls and encouraged to create and join robotics clubs in their schools.

GIRL+ Camp

High school girls entering 10th, 11th, and 12th grade can benefit from the C-STEM GIRL+ C-camps, which are specifically designed to motivate high school girls to pursue higher education in STEM fields. GIRL+ provides an in-depth look into more advanced coding and physical computing with Arduino and robotics. Girls learn teamwork and leadership skills through hands on coding, Arduino, and robotics activities. Campers are inspired to serve as leaders and role models to other young girls, as well as mentors to middle school girls.

Ujima (Collective Work and Responsibility) Girls in Robotics Leadership Project

The \$2.4M Ujima (Collective Work and Responsibility) Girls in Robotics Leadership (GIRL) Project, funded by the NSF, aims to address the significant challenges of inclusion and equity for Black/African American middle school and high school girls in STEM education. More than 2,000 Black girls will be nurtured through this project to lead in science, technology, engineering and mathematics (STEM) in their schools, communities and careers. The Ujima GIRL project uses hands-on coding and robotics as an engaging and fun vehicle for increasing positive attitudes toward STEM, and developing leadership skills for Black girls in middle school and high school through peer-mentoring with Black college female students. After participating in an Ujima GIRL Camp, campers will have support to organize Ujima GIRL Clubs in their schools to inspire peers and girls in feeder elementary schools, further expanding peer-mentoring and STEM engagement. Ujima GIRL/GIRL+ Camps will create a self-sustaining mentoring pipeline and community, as camp participants can return as counselors and mentors. The project is a three-year collaborative effort between the UC Davis C-STEM Center, the Umoja Community Education Foundation and its affiliated California community colleges, industry partners, and county offices of education and school districts in California.



Engagement
is Key
for Lasting Student Success