UCLA

We are Mathematics

Gateway to Success for Middle School Students of Color

Research in K-12 mathematics education has shown that completion of Algebra 1 (typically taken by the end of the 9th grade in the United States) is a key metric in determining who will graduate from high school. Only one in five students will reach this important educational milestone without Algebra 1. Nationwide, Black and Latinx students, English learners and students affected by poverty disproportionately fail Algebra 1.

Photo by Allison Shelley/The Verbatim Agency for EDUimages

In 2020, Curtis Center Executive Director Heather Dallas saw an opportunity to increase opportunities for Black and Latinx middle-schoolers in South Los Angeles when the Bill & Melinda Gates Foundation announced its Balance the Equation: A Grand Challenge for Algebra 1 grant. This call for new, innovative programs aims to improve the algebra learning experience for Black and Latinx students, English learners and/or students from economically disadvantaged homes. The center promptly submitted a proposal, the Applied Mathematics Mentorship Project (AMMP), one of over 400 submissions from 26 countries around the world.

The foundation chose 15 projects for Phase 1 of the grant in early 2021, including the The Curtis Center's AMMP, and awarded each project $100,000 to support program study and planning. Focusing on enrichment over remediation, AAMP proposed a pioneering project to position Black and Latinx students on small research teams under STEM mentors of color. By investigating scientific questions relevant to their community, the students can become doers and creators of mathematics.

In the summer of 2021, the foundation advanced AMMP to Phase 2, awarding The Curtis Center $1 million for project implementation. Under the guidance of Michelle Welford, Curtis Center director of special projects, team leaders are now working to develop and field-test the curriculum. Training for the project's teaching staff will follow. Implementation of the program is set for fall 2022.

The challenge for Curtis Center staff is to develop authentic and culturally relevant research-like experiences for students that support learning and meet the California Common Core State Standards for Mathematics as sequenced in their textbooks. Department faculty and experts from local industry and schools will contribute

Applied Mathematics Mentorship Program

immeasurable expertise. All of these efforts will culminate in the following three research investigations, which promise to provide a range of meaningful opportunities for active engagement in real-world scientific investigation:

GRADE 7 INVESTIGATION: Students will investigate environmental heat islands in their neighborhood using sensing hardware and data democratization software, designed by the Los Angeles startup company, Conservify. This topic was chosen by Travis Holder, principal of Barack Obama Global Preparation Academy and former UCLA applied mathematics alumnus.

GRADE 8 INVESTIGATION: Students will examine the impact of Covid-19 on their neighborhood, a topic suggested by Edray Goins, a Pomona College mathematics professor and South Los Angeles public school alumnus. The curriculum is being co-developed with UCLA applied mathematics professor Marcus Roper.

ALGEBRA 1 INVESTIGATION: Students will pursue mathematics questions related to the launching and docking of a spacecraft at the International Space Station. This investigation is being co-developed with a team of South Los Angeles aerospace engineers led by Dynamite Obinna, who serves as a mission management lead at SpaceX.

Within the context of these investigations, students will work on authentic questions using mathematical methods. They will first gather data using an array of tools, like data collection devices, online graphing utilities and computer simulations. Then, based on structures and patterns they observe in the data, they will develop and test models and conjectures. In a culminating event titled "Community Applied Math Night," student research teams will present their findings to an audience of parents, families, teachers and local community members. In addition, Black and Latinx mathematicians and scientists will share their personal journeys and current professional activities.

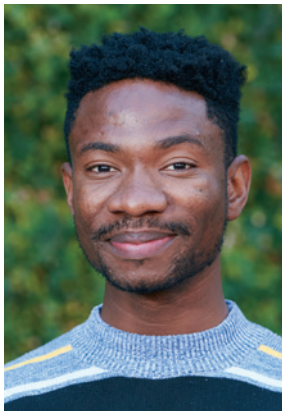
The AMMP student research teams will be guided by practicing teachers and undergraduates recruited from the UCLA Math for LA program, which trains students for careers in K-12 education. It is anticipated that over 60 percent of the undergraduate instructors will be Black or Latinx, giving the children additional and ongoing interactions with STEM mentors of color. Other undergraduate students who are interested in mathematics or science may participate in leading the student research teams as well.

Measurement of both student progress and teacher training will be conducted by The Curtis Center in collaboration with the American Institute for Research during and post-program. Measurement will be constructed to evaluate the following student outcomes: Increased proficiency with rigorous mathematics, self-identification with role models, positive experiences within a mathematics learning environment and level of excitement about pursuing STEAM careers.

AMMP ADVISORS

Edray Goins, Professor of Mathematics, Pomona College

Travis Holden, Principal, Barack Obama Global Preparation Academy



Dynamite Obinna, Aerospace Engineer, SpaceX

Estimated Student Enrollment and Demographics in the Applied Mathematics Mentorship Program (AMMP)

	Barack Obama Global Prep Academy	Charles Drew Middle School	Nathaniel Narbonne High School
Grade 7 estimated enrollment 2021–22	127	421	0
Grade 8 estimated enrollment 2021–22	105	389	0
Algebra 1 estimated enrollment 2021–22	153	0	581
% Hispanic students	70%	86%	65%
% Black students	27%	13%	21%
% Socioeconomically disadvantaged students	94%	91%	76%
% English language learners	32%	27%	7%

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FROM THE CHAIR

It has been a challenging but fulfilling year as we transitioned to remote instruction for all classes under the constraints of COVID-19. We have learned much about teaching and learning and gained even more from each other. We better appreciate what we had and what we continue to enjoy and do.

I want to express my gratitude to the faculty and staff for their extraordinary efforts under very difficult circumstances and to commend all of our students on their grit and resilience.

Mario Bonk
Professor and Chair
UCLA Department of Mathematics

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Mathematics
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