TPSE Math
Transforming Post-Secondary Education in Mathematics

MAY 18–20, 2026

MODERNIZING UNDERGRADUATE MATH SUMMIT

A Vision for Modernizing Undergraduate Mathematics

DEPARTMENT OF MATHEMATICS
HARVARD UNIVERSITY

Convened by TPSE Math with support from

COMAP · AMS American Mathematical Society · ASA · SIAM Society for Industrial and Applied Mathematics · MAA Mathematical Association of America · AMATYC

"THE SUMMIT SHOWED THAT THERE IS REAL ENERGY ACROSS THE MATHEMATICAL AND STATISTICAL SCIENCES COMMUNITY FOR MODERNIZING UNDERGRADUATE MATHEMATICS. THIS VISION DOCUMENT GIVES US A SHARED STARTING POINT FOR THE DEEPER WORK AHEAD."

Dave Kung
Executive Director, TPSE Math

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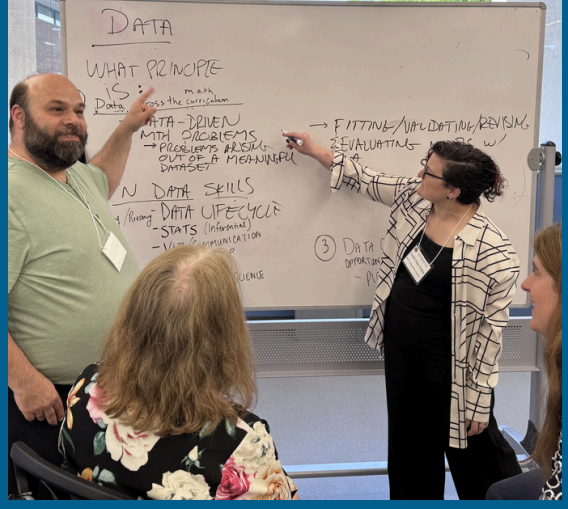
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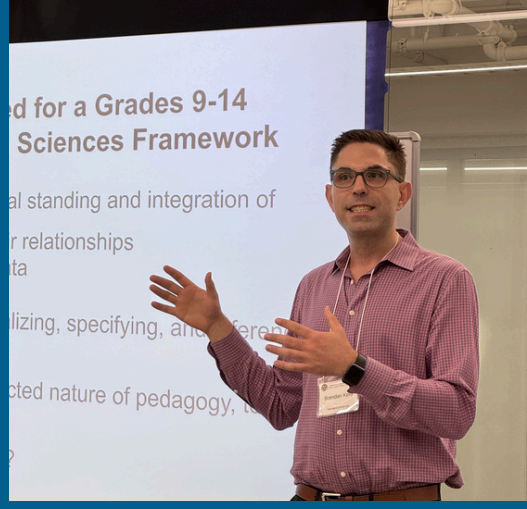
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AT THE MODERNIZING UNDERGRADUATE MATH SUMMIT,

leaders from across the mathematical and statistical sciences community came together around a shared conviction: undergraduate mathematics must evolve to meet the rapidly-changing world students are entering.

Ubiquitous data, AI, powerful computational tools, modeling, and increasingly interdisciplinary work are changing what students need from mathematics and how they will use it. At the same time, too many undergraduate courses remain disconnected from students' lives, fields of study, future work, and civic responsibilities.

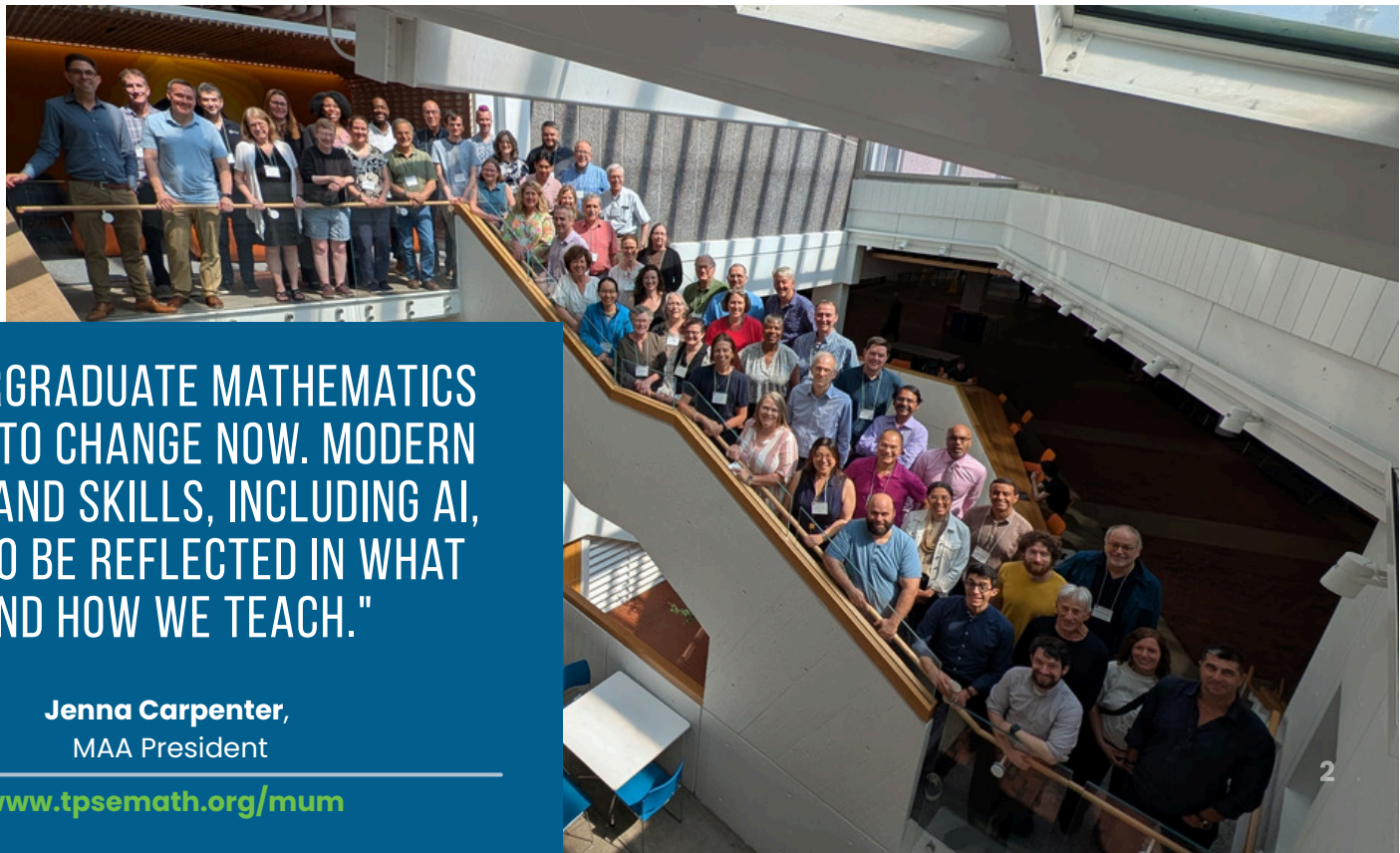
The summit was designed to seek consensus – and plan for action. Through presentations, panels, working groups, project discussions, and participant input, several clear areas of agreement emerged.

Undergraduate math must be rigorous, relevant, and usable

Modernizing Undergraduate Math is about preserving the discipline's core strengths, including problem solving, logical reasoning, justification, abstraction, structure, and proof, while expanding students' experience with modeling, statistical reasoning, computational thinking, data, and technology-enabled exploration. It is not about lowering expectations. Students should leave courses prepared to use mathematical ideas, tools, and ways of thinking in academic, professional, and civic life – and in everyday decision-making.

Students need stronger reasons to engage with mathematics

Mathematics and statistics courses should help students understand why mathematical ideas matter. Motivation, curiosity, inquiry, creativity, and play should not be treated as extras. They are part of how students come to see mathematics as meaningful, powerful, and worthy of sustained effort. This outcome of a modernized undergraduate math curriculum is particularly important for students who are taking their "last" mathematics course as part of a general education or disciplinary requirement.



"UNDERGRADUATE MATHEMATICS NEEDS TO CHANGE NOW. MODERN TOOLS AND SKILLS, INCLUDING AI, NEED TO BE REFLECTED IN WHAT AND HOW WE TEACH."

Jenna Carpenter,
MAA President

www.tpsemath.org/mum

Learning environments we provide must be more welcoming and intellectually safe

A welcoming and intellectually safe environment is a necessary condition for full participation by everyone. All students need classrooms where they can ask questions, share tentative ideas, disagree respectfully, make mistakes, revise their thinking, and see themselves as capable participants in mathematical work.

Data, statistics, computation, modeling, and technology must be more central to our courses and programs

Students need more experience reasoning with data, understanding uncertainty and variability, using computational tools, being strategic and critical users of technology (including AI), and doing mathematical modeling with meaningful problems. These should not be seen as add-ons. They are central to how mathematics is used in the world students are entering.

"MATHEMATICS EDUCATION HAS NEEDED TO CHANGE FOR SOME TIME. WITH THE EMERGENCE OF AI TOOLS, THAT CHANGE IS BECOMING INCREASINGLY IMPORTANT."

Joe Silverman,
AMS President Elect

Courses and degree programs need clearer purposes and more coherence

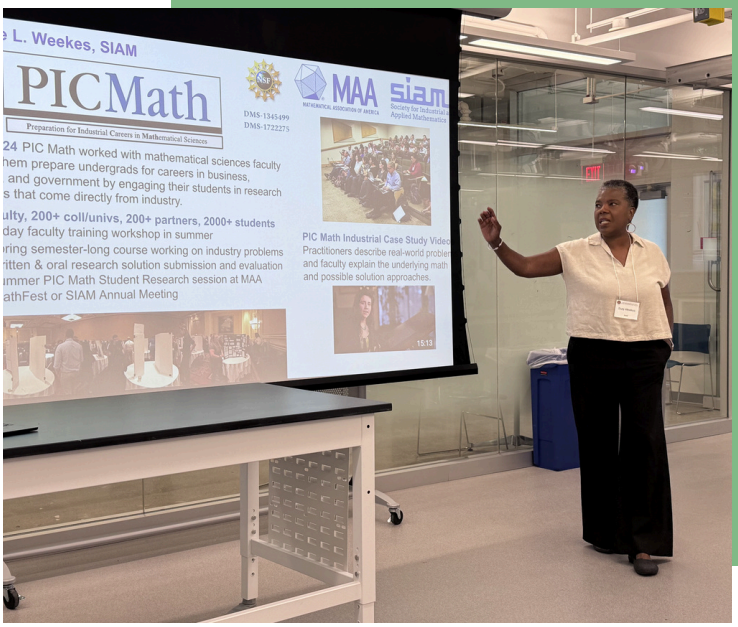
Students learn best when their courses and programs are organized around clear purposes, structures and narratives – not when they feel like a disconnected list of topics. Outdated, obsolete materials should be removed. Students should understand how the remaining ideas connect within each course, across courses, and to careers after graduation. Communication – to students, partner disciplines, advisors, and others – should center these purposes.

Promising innovations already exist, but they need to be promoted, connected, and scaled

We are not starting from scratch. Dedicated faculty have created strong exemplar courses, programs, reports, tools, and communities. Too often, however, they remain isolated or difficult for others to find, adapt, and scale. The next phase of work is to connect these efforts, clarify shared principles, identify and showcase concrete examples, and build the communication and implementation infrastructure needed for broader adoption.

Some aspects of modernization are ready for action

Participants identified project areas at different stages of development. Some are ready to be studied, adapted, and scaled immediately. Others need additional coordination, evidence, resources, or convening to move from promising ideas to clear, actionable models for the field.



READY TO ADAPT

- Introductory linear algebra to support modern uses (data science, cs, etc.) without calculus as a prerequisite
- Modeling-first calculus for the life sciences
- Refocusing entry-level mathematics to align courses with student needs, elevating Statistics and Quantitative Reasoning (QR) for non-STEM majors

READY TO ORGANIZE

- Greater agreement on content of college-level QR
- Integration of data analysis and data science into undergraduate mathematics
- Modernizing assessment for an AI-infused environment.

READY TO EXPLORE AND CONNECT

- Modeling-forward calculus for engineering
- Introductory mathematical modeling without calculus
- Stronger connections with community, education, business, industry, and government.

This work requires encouragement, coordination, and evaluation

This work is vital for our students, our institutions, and our world. It will require catalyzing a movement and gaining momentum by building community around support for these ideas – adjusting them as needed. We will not achieve the modernization of undergraduate mathematics by simply putting good ideas out there. We look forward to the hard work of gaining momentum by building evidence, examples, case studies, faculty support, partner organization engagement, funding, rigorous evaluation, active communications, and practical tools that make change easier to understand and implement.

Signers

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The University of Texas at Austin

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Citizen Math

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What Happens Next

TPSE Math will start by synthesizing the summit materials, participant comments, project notes, interviews, and follow-up commitments into a set of post-summit outputs, including a white paper, model project descriptions, case studies, and communications materials that partners and participants can use to carry the work forward.

The summit was an important beginning. The work ahead is to turn shared agreement into bold, coordinated action.

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Follow TPSE Math for Updates and Future Opportunities to Get Involved:

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