

Clearing pathways through modern mathematics

The New Mathways Project Transfer Champions Initiative

An update for presidents at participating institutions of higher education

Context

College mathematics requirements are changing to meet the evolving needs of students, the economy, and society at large. As leaders of the major mathematics professional associations note in a recent essay,¹ trends in collegiate mathematics include aligning mathematics preparation for students' programs of study, accelerating and contextualizing developmental coursework, and engaging students through active-learning pedagogy.

Enrollments in statistics and quantitative reasoning courses are on the rise,² as more colleges and universities determine that the traditional mathematics sequence that was designed to prepare students for calculus and mathematics-intensive fields is not the appropriate preparation for all students.

Instead, there is growing consensus that multiple mathematics course pathways aligned to programs of study provide a more useful undergraduate experience. The New Mathways Project, which serves underprepared college students in Texas, is one instantiation of a multiple-mathematics-pathways approach.

In this brief, we provide an update on your institution's participation in the NMP's Transfer Champions Initiative, a university outreach and mobilization effort launched in November 2013. The Transfer Champions work supports implementation of multiple mathematics pathways in Texas by fostering regional collaboration between community colleges and universities. The purpose of this collaboration is to improve communication about mathematics requirements for programs of study and to help students transition to majors at four-year transfer institutions.

The New Mathways Project is an initiative of the 50 Texas community college districts in collaboration with the Charles A. Dana Center at the University of Texas at Austin and the Texas Association of Community Colleges which began in 2012.

Through the NMP, Texas community colleges are implementing mathematics pathways that enable students placed in developmental mathematics to complete, on an accelerated timeline, a credit-bearing, transferable mathematics course in statistics, quantitative reasoning, or STEM-prep.

Your institution's leadership

Last fall, your institution was one of 17 universities invited to join the NMP's Transfer Champions Initiative.

Four-year institutions play a crucial role in informing community college advising and course requirements for programs of study. While the NMP mathematics pathways use standard entry-level college math courses approved by the state for transfer, students need clear guidance on how these courses in statistics, quantitative reasoning (contemporary mathematics), and STEM-prep connect to majors and fulfill core curriculum requirements.

In the 2013–2014 academic year, nine *codeveloper* community colleges began implementing the NMP approach (with 13 additional colleges slated to begin implementation in 2014 or 2015, and another 26 in 2015 or 2016).

In November 2013, each of these codeveloper colleges invited their primary transfer partners to join them in learning more about the NMP, improving communication about mathematics core curriculum and mathematics requirements for all majors, and clarifying the applicability of math courses to four popular programs of study—nursing, criminal justice, communications, and social work. All 17 of the universities invited agreed to participate.

Since November, paired colleges and universities have been holding regional kickoff meetings that include faculty and administration representatives from each institution. Kickoff discussions centered on the NMP approach to developmental and gateway mathematics, as well as on the implications of diversifying mathematics course pathways from a one-size-fits-all algebra and calculus approach for core curriculum and major requirements. Each institution also shared detailed math course requirement information with paired institutions and the Dana Center.

While there may be learnings from these meetings that could inform future policy discussions, the focus of this work is to surface and address the issues that colleges encounter in implementing the NMP at the institutional level.

In particular, participants began to address a key implementation concern raised by participating colleges: **if community colleges modernize their mathematics course offerings at the developmental and gateway levels, what will happen to students who transfer to institutions with more traditional mathematics course sequences?**

The discussions have been characterized by openness and a desire for further engagement about improving institutional practice.

Through this process, the New Mathways Project **identified seven Texas universities leading the way in creating and implementing modern mathematics course pathways:**

- Stephen F. Austin State University
- Texas Tech University
- University of Houston–Downtown
- University of North Texas
- The University of Texas at Austin
- The University of Texas at Tyler
- The University of Texas–Pan American

Each university has already built modern mathematics pathways aligned to different programs of study. These universities offer a course pathway through statistics (for students in the social sciences and health fields), quantitative reasoning (for students in the liberal arts and fine arts fields), and the calculus preparation sequence (for students in STEM majors). The mathematics course pathways are aligned to the learning outcomes of standard introductory mathematics courses guaranteed for transfer through the Texas Higher Education Coordinating Board’s *Academic Course Guide Manual (ACGM)*.

At these seven universities, requirements for our special-focus majors—nursing, communications, criminal justice, and social work—align with the recommendations of key professional associations of these disciplines and the professional associations of mathematics.

Community colleges implementing the NMP pathways will find them well aligned to these universities’ requirements.

Colleges and universities participating in the New Mathways Project transfer initiative

Two-Year (codevelopers)	Four-Year (primary transfer partners)
Alamo Colleges–Northwest Vista College	The University of Texas at San Antonio Texas A&M University–San Antonio
Austin Community College	The University of Texas at Austin** Texas State University
Brazosport College	University of Houston University of Houston–Clear Lake
El Paso Community College	The University of Texas at El Paso
Kilgore College	The University of Texas at Tyler** Stephen F. Austin State University** Texas A&M University–Commerce
Lone Star College–Kingwood	Sam Houston State University University of Houston–Downtown**
Midland College	Texas Tech University** The University of Texas of the Permian Basin
South Texas College	The University of Texas–Pan American**
Temple College	Texas A&M University–Central Texas University of North Texas**

**Leader universities

Ten additional Texas universities offer at least two mathematics course pathways, one for mathematically-intensive fields, and one for fields that are not mathematically-intensive. These pathways often align to ACGM courses, yet there is some variability in the use of standard ACGM courses and variability in mathematics requirements for majors in nursing, communications, criminal justice, and social work.

By the numbers	
50	Community college districts in Texas that supported the development and implementation of the New Mathways Project (making that support unanimous)
9	Codeveloper community colleges who are implementing the NMP mathematics course pathways in 2013–2014.
17	Universities invited to partner with NMP codeveloper community colleges to align gateway mathematics courses. All 17 accepted the invitation.
15	Universities that participated in regional kickoff convenings.
7	Universities who have established three clear mathematics course pathways aligned to students' programs of study. Requirements for key majors align with the recommendations of professional associations.
10	Universities that have established two mathematics course pathways and are willing to continue engaging with their community college partners

While ongoing discussion is needed to continue improving the predictability and applicability of mathematics course pathways in Texas, early findings suggest there is great promise in the current state of Texas university mathematics requirements.

Professor Sheldon Davis, chair of the Department of Mathematics at the University of Texas at Tyler, noted “there are no students who just need college algebra. The only reason to take college algebra is that you are intending to take some course in calculus. Students who do not need to learn calculus—those in the liberal arts, fine arts, humanities, and social sciences primarily—are better served by courses in statistics or quantitative reasoning where they learn rigorous problem solving, reasoning, and how to communicate quantitative information in sophisticated ways.”

Celia Williamson, vice provost for transfer and articulation at the University of North Texas, said “UNT already uses a differentiated set of courses to meet math requirements, and a discussion of 'what math fits' is part and parcel of our conversation as we develop program-to-program curricular alignments between specific community college programs and specific majors at UNT. It's a good time to be learning about the NMP and having this discussion with our community college partners.”

Improving the alignment and predictability of math course transfer will require ongoing work. Kickoff meeting participants identified three areas for ongoing college–university collaboration:

- Engaging a broader group of two-year and four-year mathematics faculty in discussions about changes in postsecondary mathematics education and the need to modernize.
- Working with advisors and counselors to increase their capacity to support the appropriate placement of students into different mathematics course pathways based on the students' academic and career goals.
- Fostering collaboration between mathematics faculty and those in other disciplines to ensure students are taking the mathematics most relevant to their success in subsequent coursework and careers. In particular, reforming college algebra requirements that are not useful for students pursuing particular non-STEM majors.

This spring, the Dana Center will release several briefs that synthesize recommendations for mathematics preparation in nursing, communications, criminal justice, and social work from professional associations of mathematics and of these disciplines. The codeveloper colleges are working with the Texas Association of Community Colleges and the Dana Center to plan for follow up discussions in the summer and fall.

If you'd like to learn more about the NMP, please visit our website (www.utdanacenter.org/higher-education/new-mathways-project) or email Jenna Cullinane (jenna.cullinane@austin.utexas.edu).

¹ David M. Bressoud, Eric M. Friedlander, and C. David Levermore. (2014 January 10). “Meeting the Challenges of Improved Post-Secondary Education in the Mathematical Sciences.” *Post-Secondary Education in Mathematics (TPSE Math)*. Retrieved on March 19, 2014, from http://www.tpsemath.org/meeting_the_challenges. A longer version of this essay was published by the Mathematical Association of America and can be found here: <http://www.maa.org/sites/default/files/pdf/MathReport2PCAST.pdf>.

Professor Bressoud, DeWitt Wallace Professor of Mathematics at Macalester College, is a former President of the Mathematical Association of America (MAA). Professor Friedlander, Dean's Professor of Mathematics, University of Southern California, has served since 2000 on the Board of Trustees of the American Mathematical Society and in 2012 became an AMS fellow. He is also immediate past president of the AMS. Professor Levermore, Professor, Department of Mathematics, and Institute for Physical Science and Technology, University of Maryland, served as chair of the Board of Mathematical Sciences and Applications (BMSA) from July 2006 to June 2012.

² Richelle Blair, Ellen E. Kirkman, and James W. Maxwell. (2013). “Statistical Abstract of Undergraduate Programs in the Mathematical Sciences in the United States: Fall 2010 CBMS Survey.” *Conference Board of Mathematical Sciences (CBMS) Survey Reports 2010*. Providence, RI: American Mathematical Society.