



# Mathematics Pathways and Student Success: Transitioning through the Educational Ecosystem

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A photograph showing several students in a classroom environment, focused on their work at desks. They are writing in notebooks and looking at papers. The scene is slightly blurred, suggesting a busy, active learning environment.

The Right Math at the Right Time for Each Student

# About the Dana Center

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The **Charles A. Dana Center** at The University of Texas at Austin works with our nation's education systems to ensure that every student leaves school prepared for success in postsecondary education and the contemporary workplace.

Our work, based on research and three decades of experience, focuses on K–16 mathematics education with an emphasis on strategies for improving student engagement, motivation, persistence, learning and achievement.

We develop innovative curricula, tools, protocols, and instructional supports and deliver powerful instructional and leadership development.  
**We work in 26 states.**



The University of Texas at Austin  
Charles A. Dana Center

# The Dana Center Mathematics Pathways in Texas

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A **partnership** of:

- The Charles A. Dana Center at The University of Texas at Austin
- All 50 community college districts in Texas, represented by the Texas Association of Community Colleges and the Texas Success Center
- Collaborating with the university systems

A **systemic approach** to improving student success by reforming developmental and gateway mathematics

# DCMP Vision

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All students have equitable access to and the opportunity for success in rigorous mathematics pathways that are aligned and relevant to their future aspirations, propelling them to upward economic and social mobility.

The DCMP seeks to ensure that ALL students in higher education will be:

- **Prepared** to use mathematical and quantitative reasoning skills in their careers and personal lives,
- **Enabled** to make timely progress towards completion of a certificate or degree, and
- **Empowered** as mathematical learners.

## Public Two Year Colleges

Fall 2011

Cohort Total 128,702

Of first-time degree-seeking students who enroll	100	
	Full-time	Part-time
Enroll	50	50
Graduate in 3 years or less	8	4
Associate/Bachelor's	6	2
Certificate	2	1
Graduate in 4 to 6 years	9	6
Bachelor's	7	3
Associate	2	3
Certificate	0	0
<b>Total graduates</b>	<b>17</b>	<b>10</b>
Still enrolled after 6 years	4	4
No longer enrolled, no degree	29	36

27

Number of every 100 Texas public two-year college students who earn a postsecondary degree or certificate at a two- or four-year institution within six years:

## Public Universities

Fall 2011 Cohort

Cohort total: 72,600

Of first-time degree-seeking students who enroll	100	
	Full-time	Part-time
Enroll	94	6
Graduate in 4 years or less	31	1
Graduate in 5 to 6 years	26	1
<b>Total graduates</b>	<b>57</b>	<b>2</b>
Still enrolled after 6 years	9	1
No longer enrolled, no degree	28	3

59

Number of every 100 Texas public university students who earn a postsecondary degree within six years:

THECB, 2018 Texas Public Higher Education Almanac

**The status quo is unacceptable.**

**Thousands of students fail higher education math courses every year.**

**Hundreds of thousands more students pass courses that do not prepare them for their futures.**

# MATHEMATICS AS BARRIER AND OPPORTUNITY

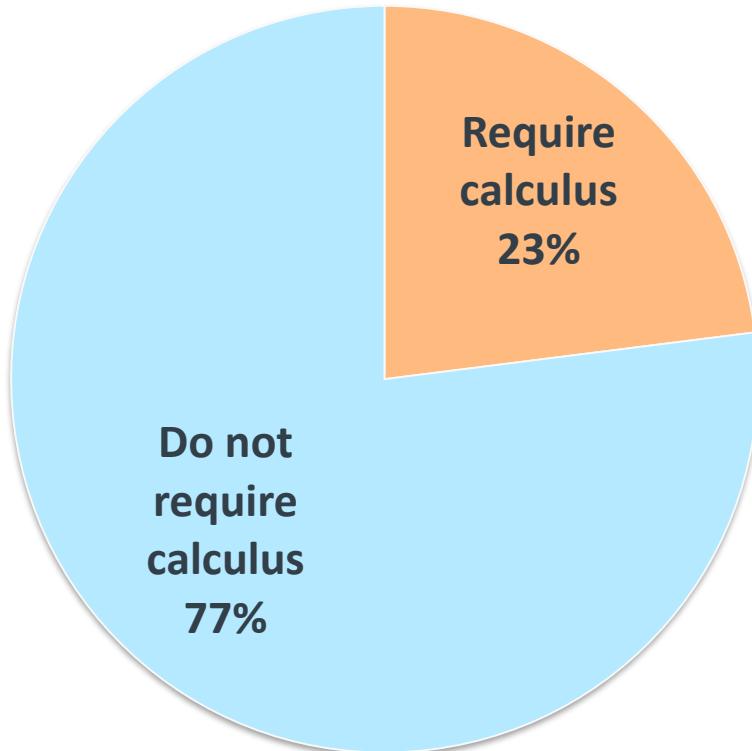
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The Dana Center identifies four major issues that negatively impact student success and completion and require structural reform across institutions.

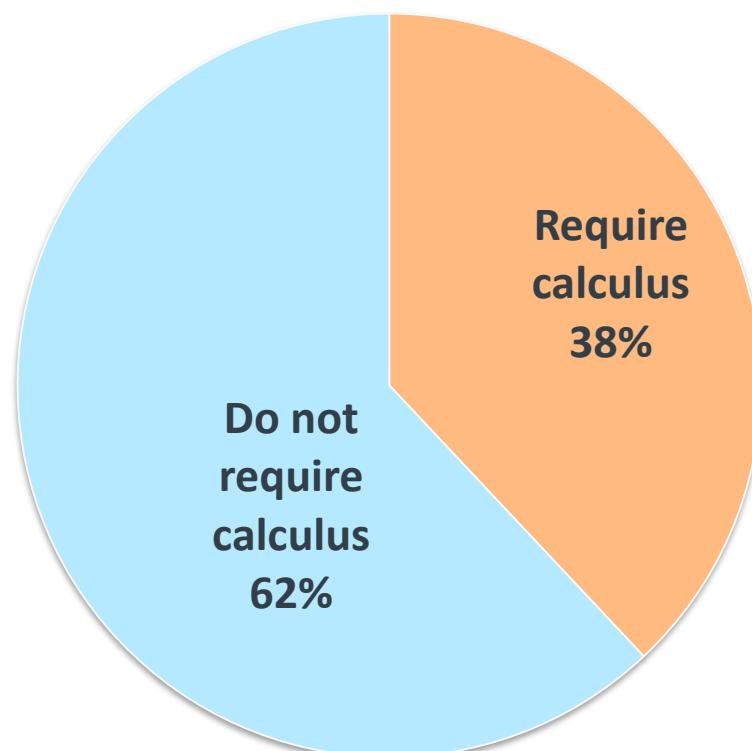
- General misalignment of developmental and gateway mathematics courses with the needs of students and programs, particularly the use of College Algebra as the default gateway math course for most students
- Long developmental education course sequences
- Poor placement practices
- Inconsistent and incoherent applicability of gateway mathematics courses to programs of study across institutions

# Which mathematics?

Associate's Degrees Awarded

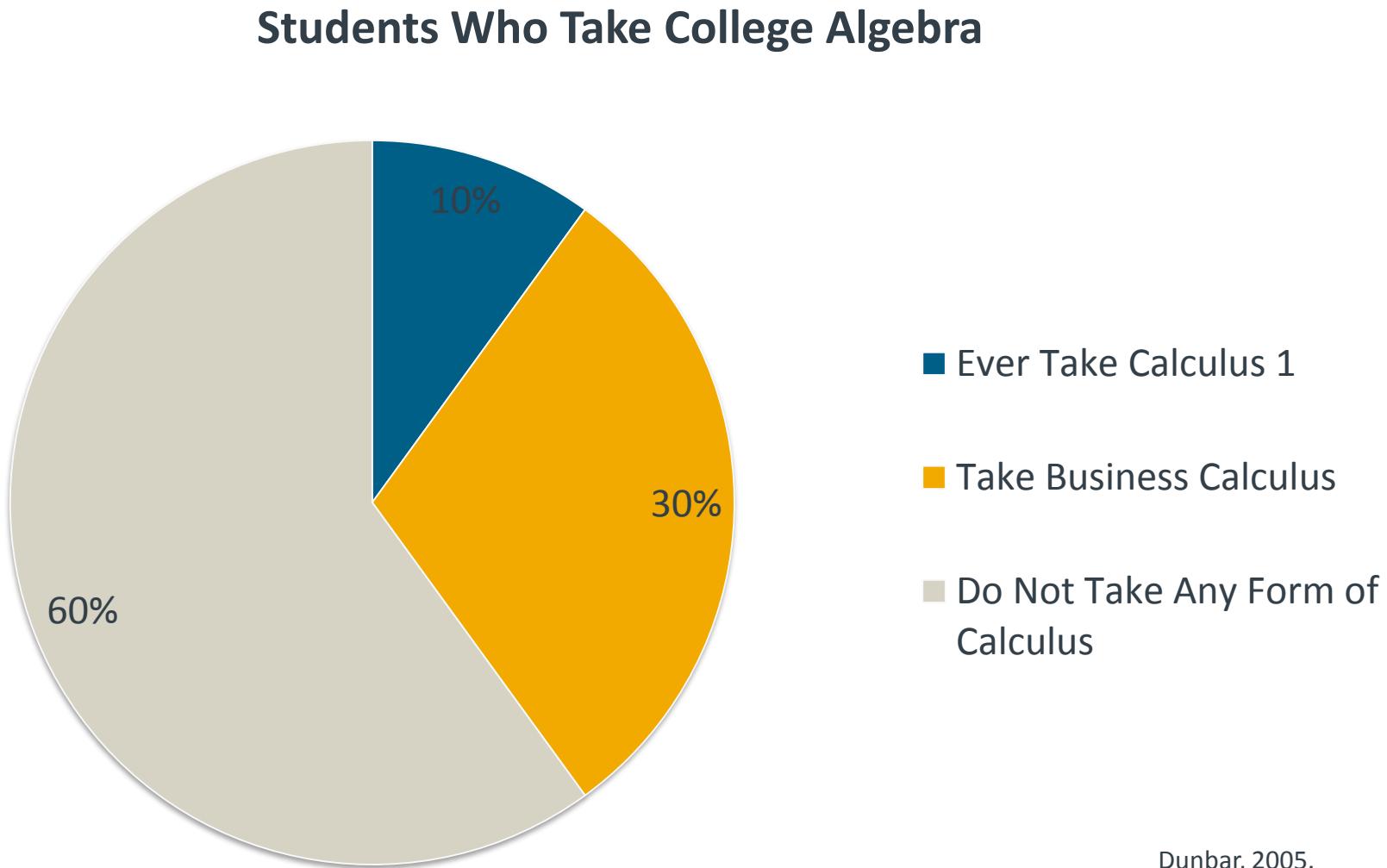


Bachelor's Degrees Awarded



Author's calculations based on data from the Texas Higher Education Coordinating Board, 2013: Degrees Earned by CIP Code.

Many students who begin on an algebra path never reach—or never intend to reach—calculus.



# What are Mathematics Pathways?

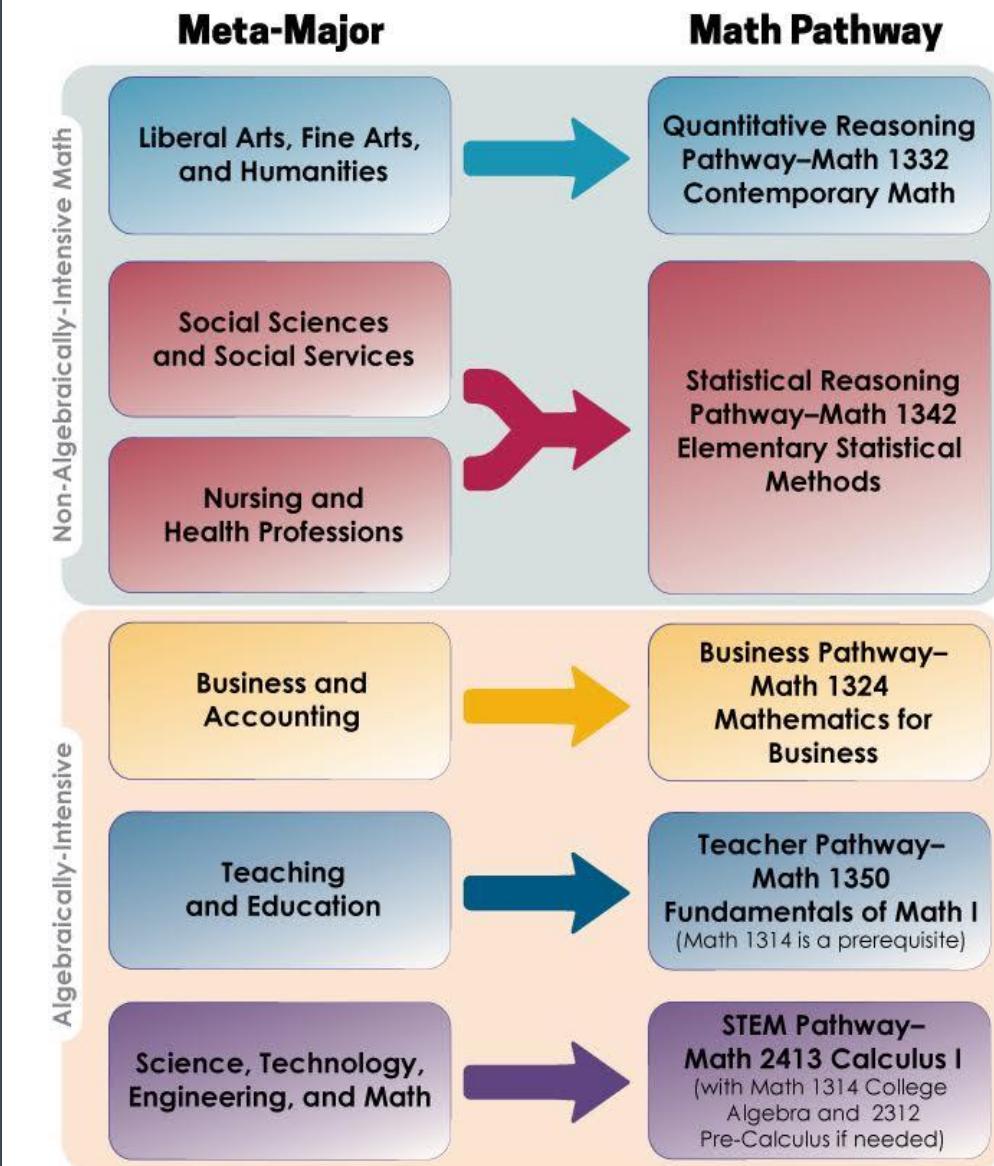
A course or sequence of courses that students take to meet the requirements of their program of study and prepare for future career.

Quantitative Reasoning

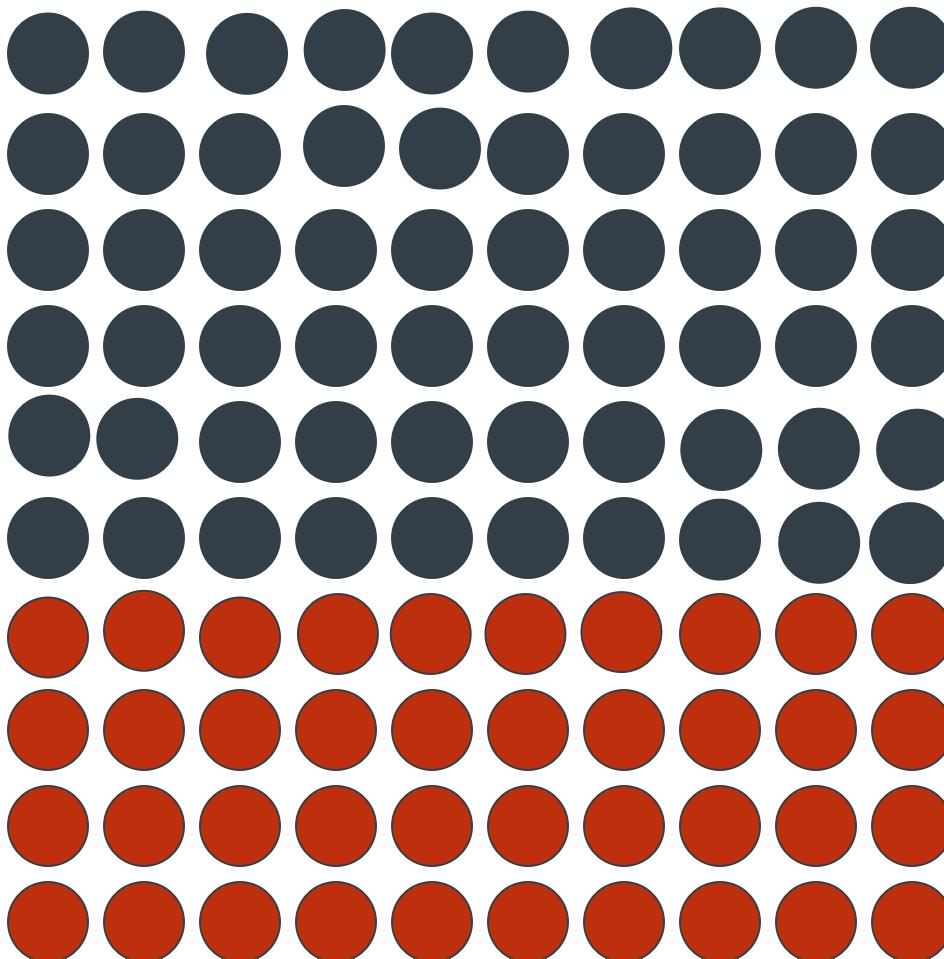
Statistics

Calculus

## Emerging Texas Math Pathways



# Mathematics College Readiness



- Percentage of Texas community college students that are required to take developmental mathematics courses.

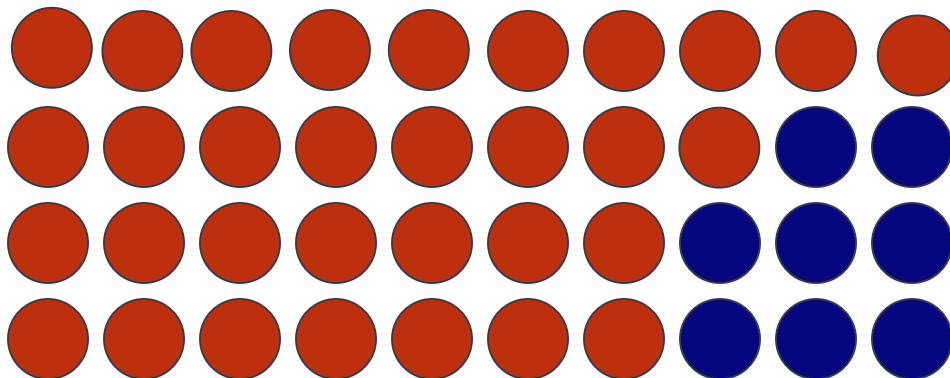
**40%**

*Texas Higher Education Coordinating Board Developmental Education Accountability Measures Data, 2017*

# Mathematics College Completion

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Percentage of students referred to developmental education who earned a credit in a college mathematics course in two years.

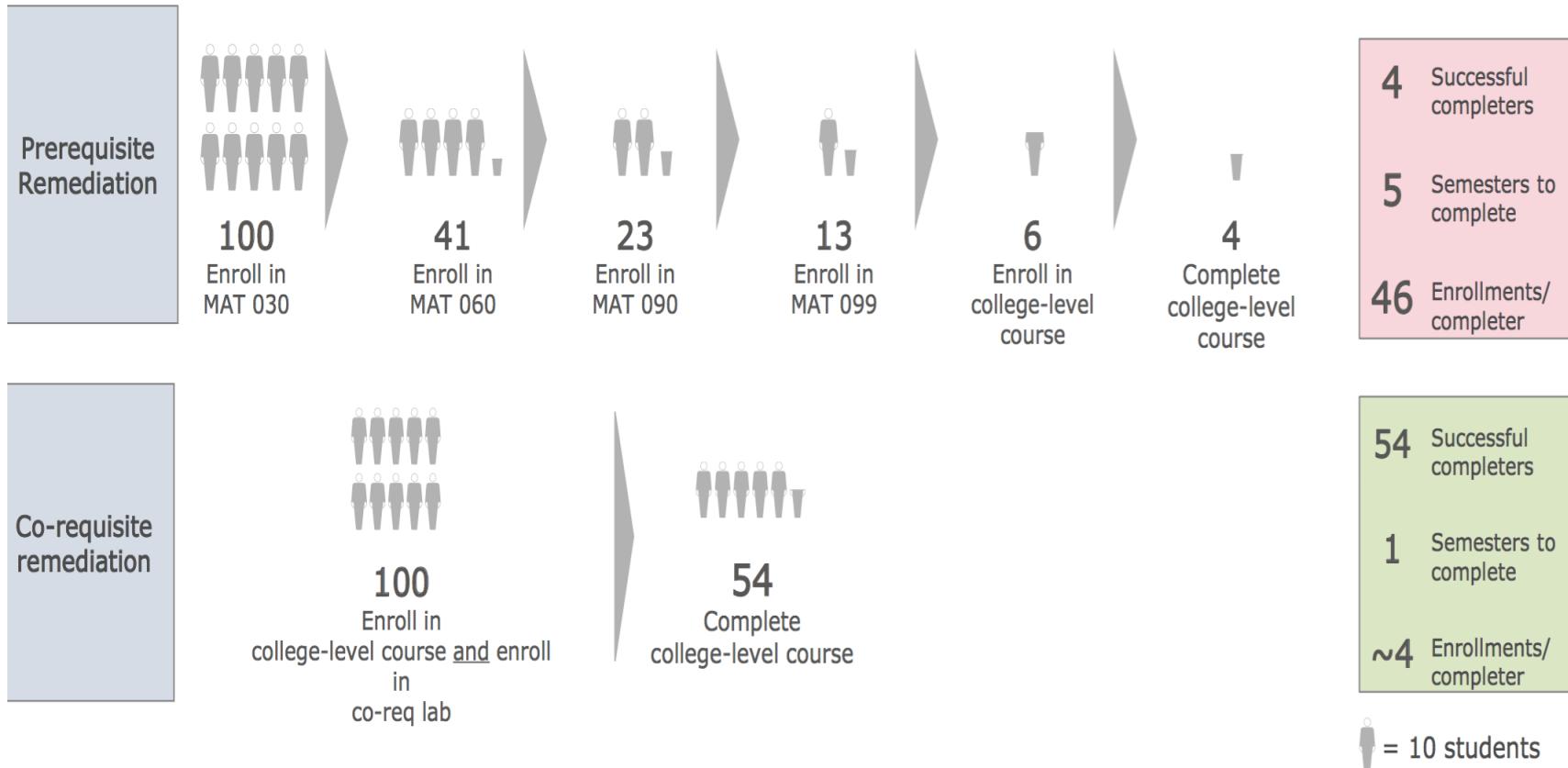


**19%**

*Texas Higher Education Coordinating Board Developmental Education Accountability Measures Data, 2017*

# Why does developmental education reform matter? Co-requisite remediation increases completion and improves efficiency

Illustrative



# What we know: Dev Ed Reform Matters

- Pilots do not work
- Work at scale rather than scaling up
- Acceleration improves student outcomes
- Structure matters--pathways
- Pedagogy matters—active learning and growth mindset

# Dana Center Principles for Mathematics Pathways

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## Post-Secondary

### Quick structural change

- *All students, regardless of college readiness, enter directly into mathematics pathways aligned with programs of study*
- *First college-level math requirement completed in the first year of college*

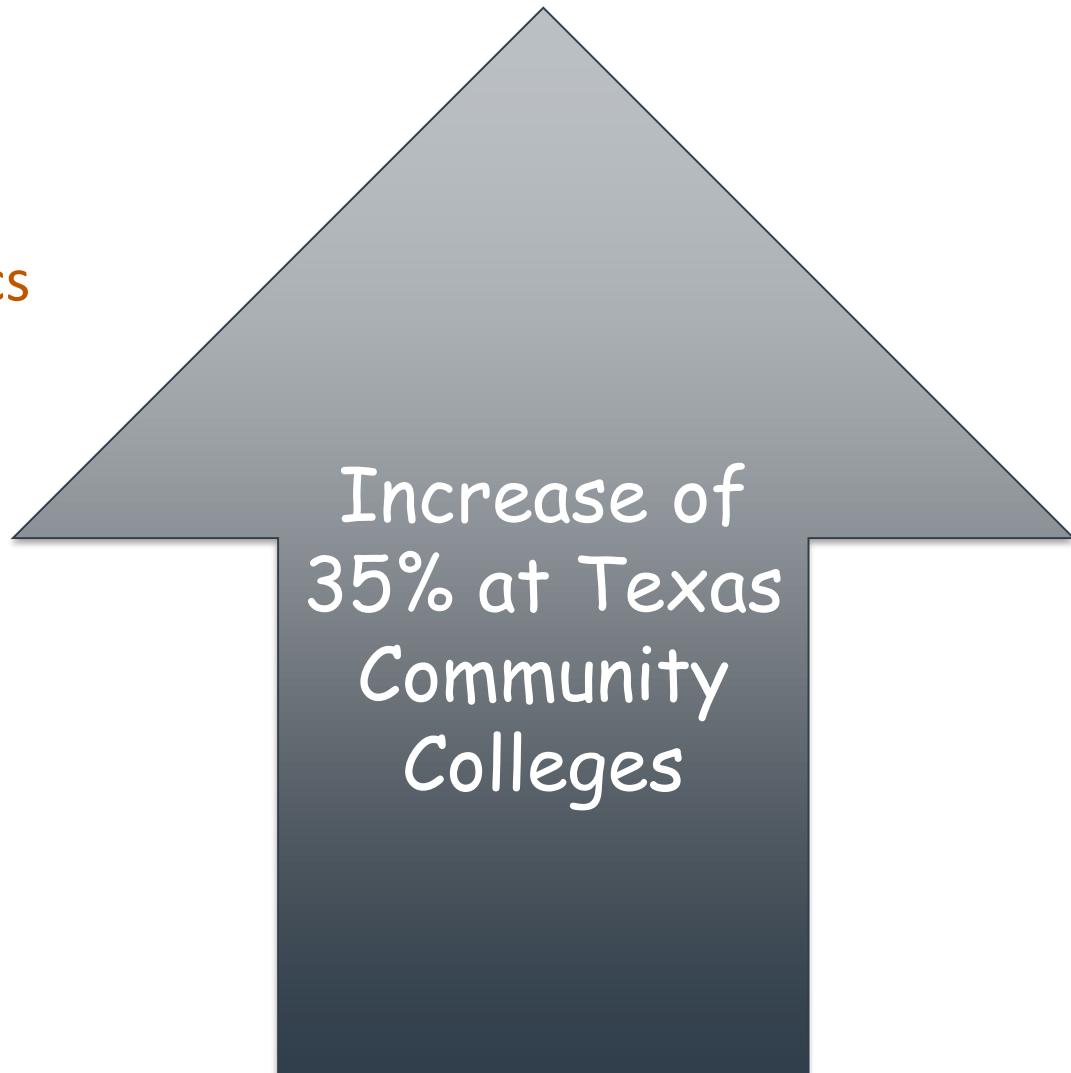
### Continuous improvement

- *Strategies to support students as learners are integrated directly into courses and aligned across the institution*
- *Evidence-based curriculum and pedagogy*

# Completion of College Level Math Course in Their First Year at Texas Community Colleges

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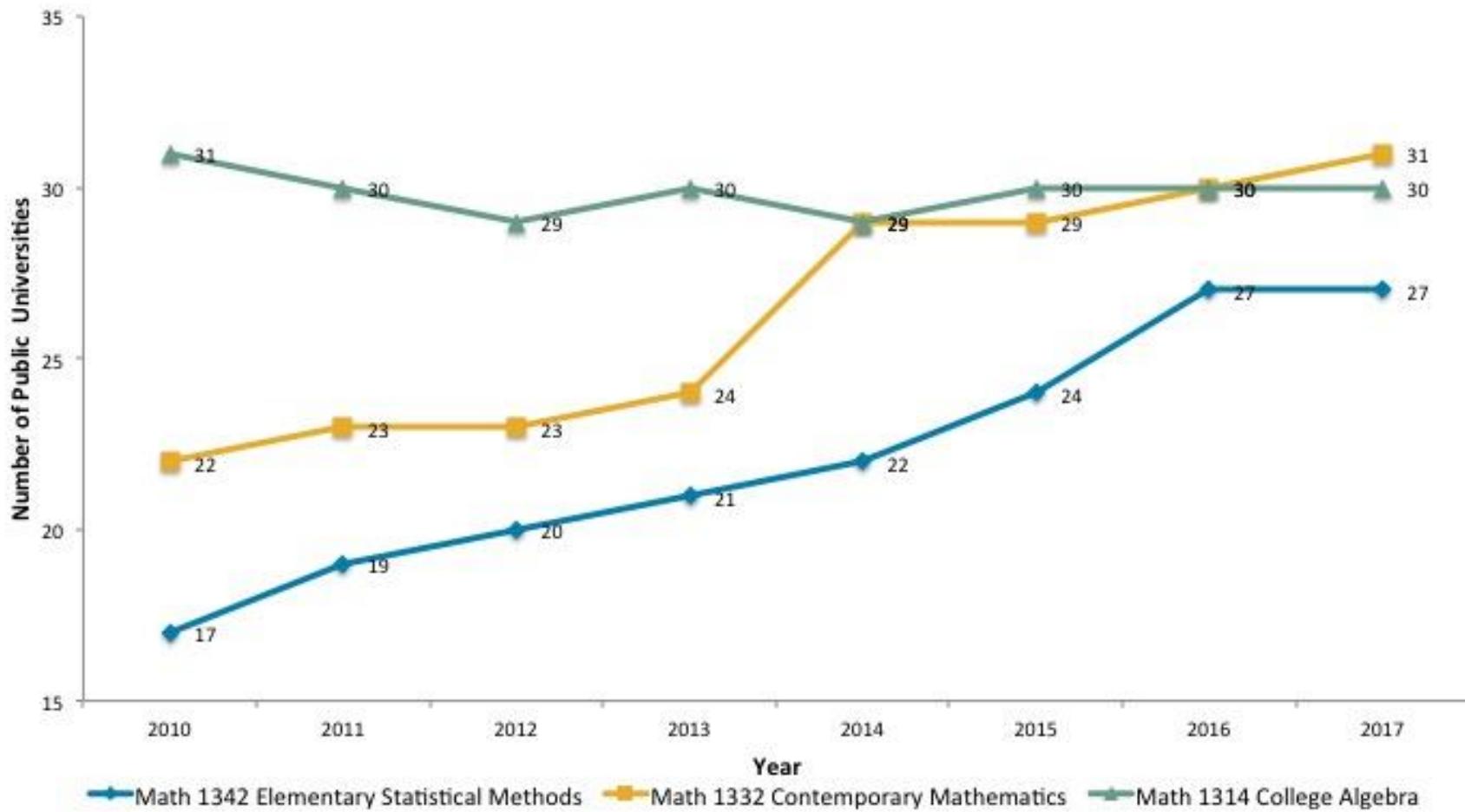
- **7000 more** FTIC students completed a college level mathematics course in their first year while overall community college enrollment decreased



- From 2013 to 2017
  - THECB, 2018

# Texas Public Universities, Mathematics in the Core Curriculum

Core Curriculum Entry-Level Math Course at Texas Universities, 2010-2017



# National Policy, Higher Education, and Content Organizations Support Mathematics Pathways



EDUCATION  
COMMISSION  
OF THE STATES



NATIONAL COUNCIL OF  
TEACHERS OF MATHEMATICS



AMS  
AMERICAN MATHEMATICAL SOCIETY



Achieving the Dream™

Community Colleges Count



COMPLETE  
COLLEGE  
AMERICA



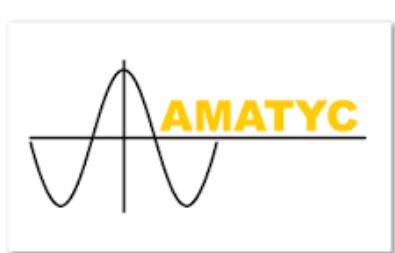
JOB S FOR THE FUTURE

NASH  
National Association  
of System Heads



ASSOCIATION OF  
PUBLIC &  
LAND-GRANT  
UNIVERSITIES

SIAM  
Society for Industrial and Applied Mathematics



# Texas Transfer Context

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78

...the percent of bachelor's completers that had community college credit on their transcripts.  
Almost 40% had 30+ SCH.

138

...the average number of credits accumulated by a bachelor's degree completers

National Student Clearinghouse Research Center. (2012). Transfer and mobility: A national view of pre-degree & student movement in postsecondary institutions. Retrieved from <http://nscresearchcenter.org/signaturereport2/#more-1580>

THECB. (2017). 2017 Higher Education Almanac. Institutional Comparison Sheets. *Author calculation.*

# Texas Transfer Context

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78

...the  
com-  
Almost  
Highest in U.S. according to  
National Student  
Clearinghouse

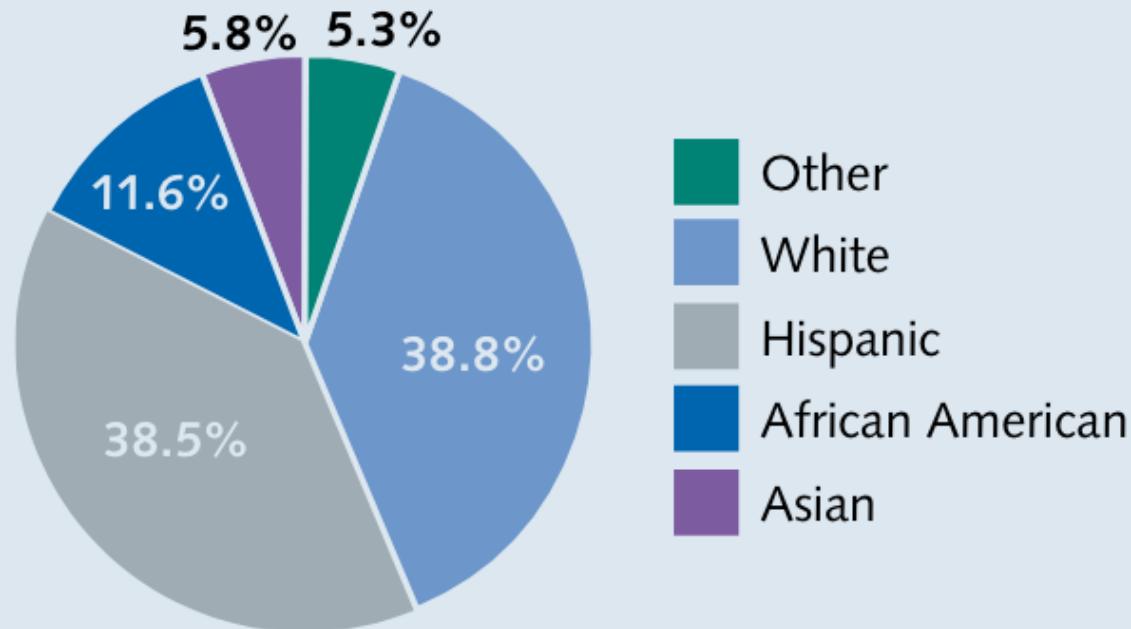
138

...the  
a  
Highest in 36-state sample  
according to Complete College  
America

National Student Clearinghouse Research Center. (2012). Transfer and mobility: A national view of pre-degree & student movement in postsecondary institutions. Retrieved from  
<http://nscresearchcenter.org/signaturereport2/#more-1580>

THECB. (2017). 2017 Higher Education Almanac. Institutional Comparison Sheets.

# Total Two-Year College Transfers to University by Ethnicity



THECB, 2018 Texas Public Higher Education almanac

# Why approach 60x30TX regionally?

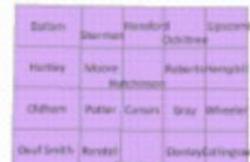
- Regions and institutions differ in many ways
- However, institutional actions and outcomes are embedded in regional context
  - High school feeder patterns
  - Transfer networks
  - Local labor market
- Institutional target-setting is improved by considering regional context
- Encourages tactical planning



# Regional Approach

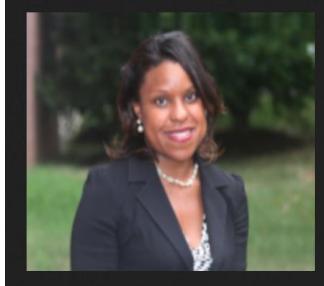


## Regions



## West Texas

6



## North Texas

2



East Texas

1



## → Central Texas

4



Southeast Texas

1



South Texas

5



# Dana Center Principles for Mathematics Pathways

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## Post-Secondary

### Quick structural change

- *Enter mathematics pathways aligned to programs of study*
- *First college-level math in the first year of college*

### Continuous improvement

- *Integrated student success strategies*
- *Evidence-based curriculum and pedagogy*

## K-12

### Quick structural change

- *Align high school course offerings to post-secondary gateways*
- *College-ready-trajectory math beginning no later than Grade 11 and continuing through graduation*

### Continuous improvement

- *Integrated student success strategies*
- *Evidence-based curriculum and pedagogy*

# HB 5 Endorsements

Arts and Humanities

Public Service

Business and Industry

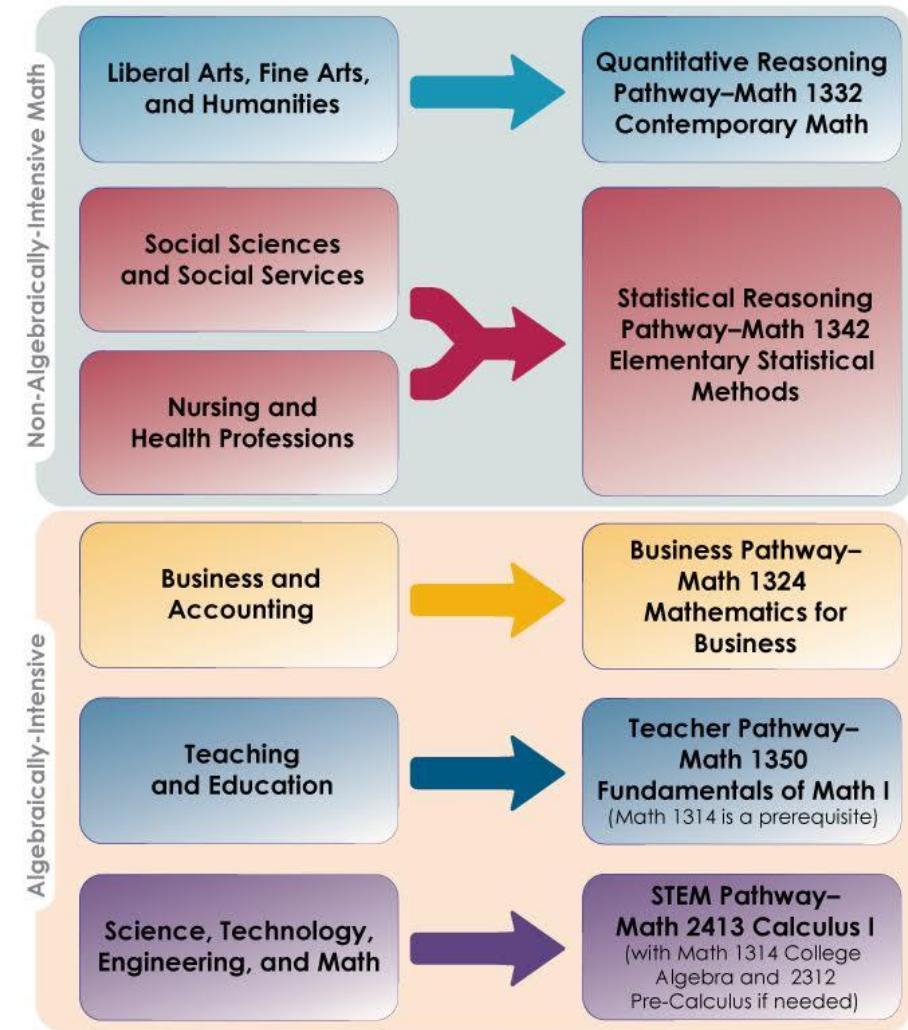
STEM

Multidisciplinary

## Emerging Texas Math Pathways

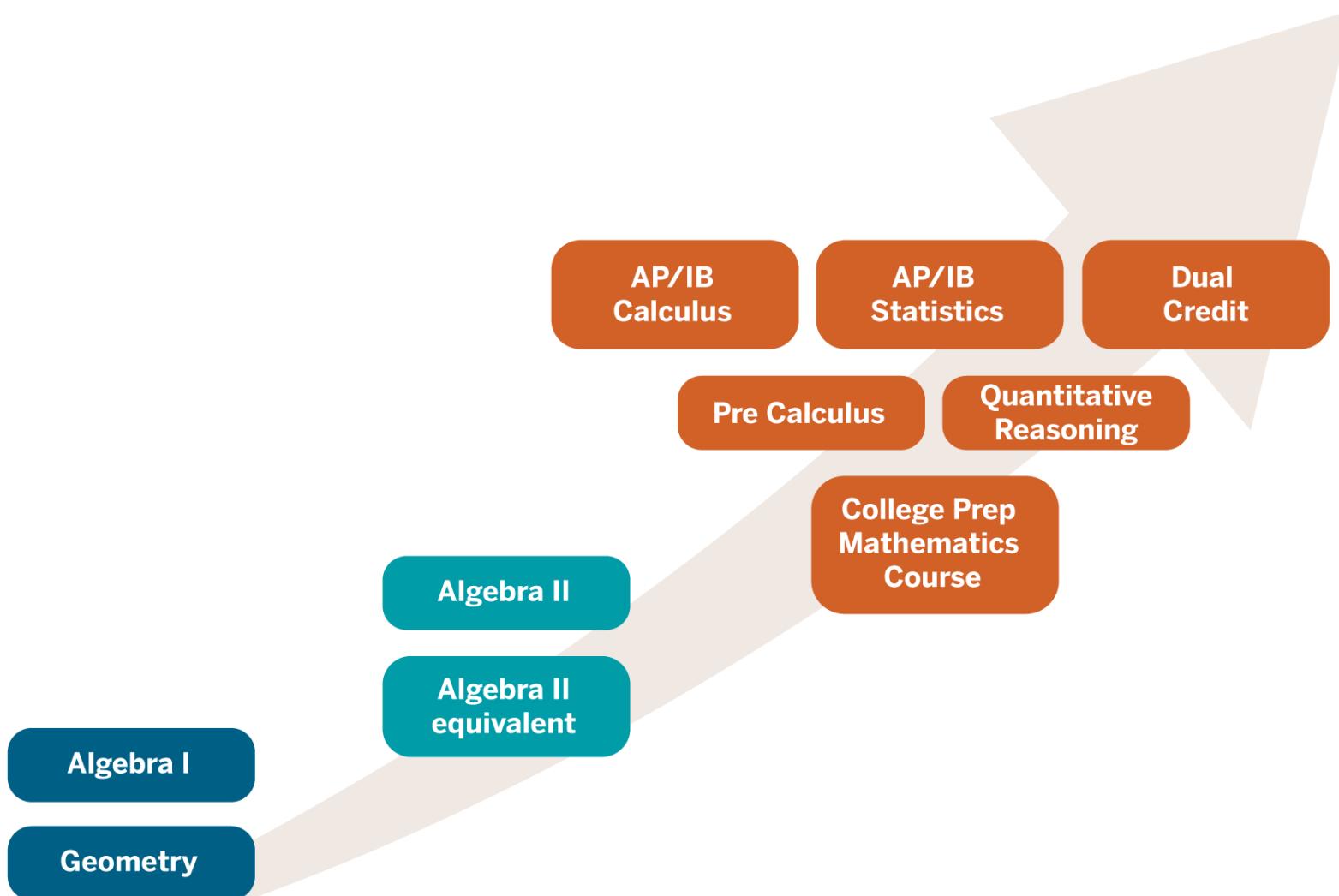
### Meta-Major

### Math Pathway



# Readiness for Mathematics Pathways

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*“ Building a strong network of practitioners and policymakers to collaborate, share resources, and create momentum for change is crucial to the implementation, scaling, and sustainability of multiple mathematics pathways. To this end, the Dana Center designed an intentional process that empowers faculty to lead at the state level, engages multiple stakeholders, and is coordinated and aligned across institutions and systems.*

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# Contact us

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For more information on the Dana Center, see  
[www.utdanacenter.org](http://www.utdanacenter.org)  
[www.dcmathpathways.org](http://www.dcmathpathways.org)

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