

Monday, March 4, 2024

# **AB 1705 Equitable Placement, Support and Completion STEM Validation of Practices**

# Presenters

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# Overview

- AB 1705 Policy and Guidance
- Data Validation Overview
- Interpreting College-specific Reports
- Certification Process
- Data Submission Template
- Q & A



# Data Deep Dive



## Multiple Measures Assessment Project

TheRPGroup

**Spotlight on STEM Calculus 1: Impact of Preparatory Pathways on Completion**

**Thursday, March 7, 2024**  
**3:00pm**

This webinar will share new findings on the impact transfer-level preparatory courses in Science, Technology, Engineering, and Math (STEM) pathways have on students' chances of completing the first calculus course required for their major. In addition, a deep dive into the methodology and methods used for this study will be shared to support local replication of this study.

Please click the Zoom registration link below to register in advance for the webinar:  
[https://us06web.zoom.us/webinar/register/WN/Wf6z-KmWQS-d51WmZ\\_n5mA#/registration](https://us06web.zoom.us/webinar/register/WN/Wf6z-KmWQS-d51WmZ_n5mA#/registration)

# You're Amazing!

AB 1705  
Planning

AB 1705  
Implementation  
Certifications

AB 1705  
Validation of  
Non-STEM  
Preparatory  
Courses

**And we know  
this is difficult  
and  
complicated  
work.**



**You've got  
this!**

AB 1705  
Planning

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Preparatory  
Courses

AB 1705  
Validation of  
STEM  
Preparatory  
Courses

**there!**

**We're almost**

**Thank  
you!**

# AB 1705 Requirements

AB 1705 specifies that colleges must demonstrate the benefit of transfer-level math preparatory courses for STEM Calculus 1 based on the following conditions:

- The student is highly unlikely to succeed in the first STEM calculus course without the additional transfer-level preparation.
- The enrollment will improve the student's probability of completing the first STEM calculus course.
- The enrollment will improve the student's persistence to and completion of the second calculus course in the STEM program, if a second calculus course is required.

# Statewide Analysis

To support colleges in their validation efforts, an extensive [statewide analysis](#) and a local analysis for each college was conducted, to assess:

1. Which students are highly unlikely to succeed when enrolled directly in the first STEM calculus course?
2. Which students are more likely to complete STEM Calculus 1 when they start in a transfer-level preparatory course?
3. Which students are more likely to persist to and complete STEM Calculus 2 when they start in a transfer-level preparatory course before STEM Calculus 1?



# Methodology

- The questions were investigated by examining the progress of community college STEM students whose first math enrollment was a transfer-level math course in the calculus pathway (e.g., College Algebra, Trigonometry, Precalculus or STEM Calculus 1).
- The analysis calculated successful completion rates (also known as throughput) which include all STEM students who began in the calculus pathway, not just those who eventually enrolled in calculus.
- Students were followed for two years to allow a full examination of multi-course preparatory sequences leading to STEM Calculus 1.

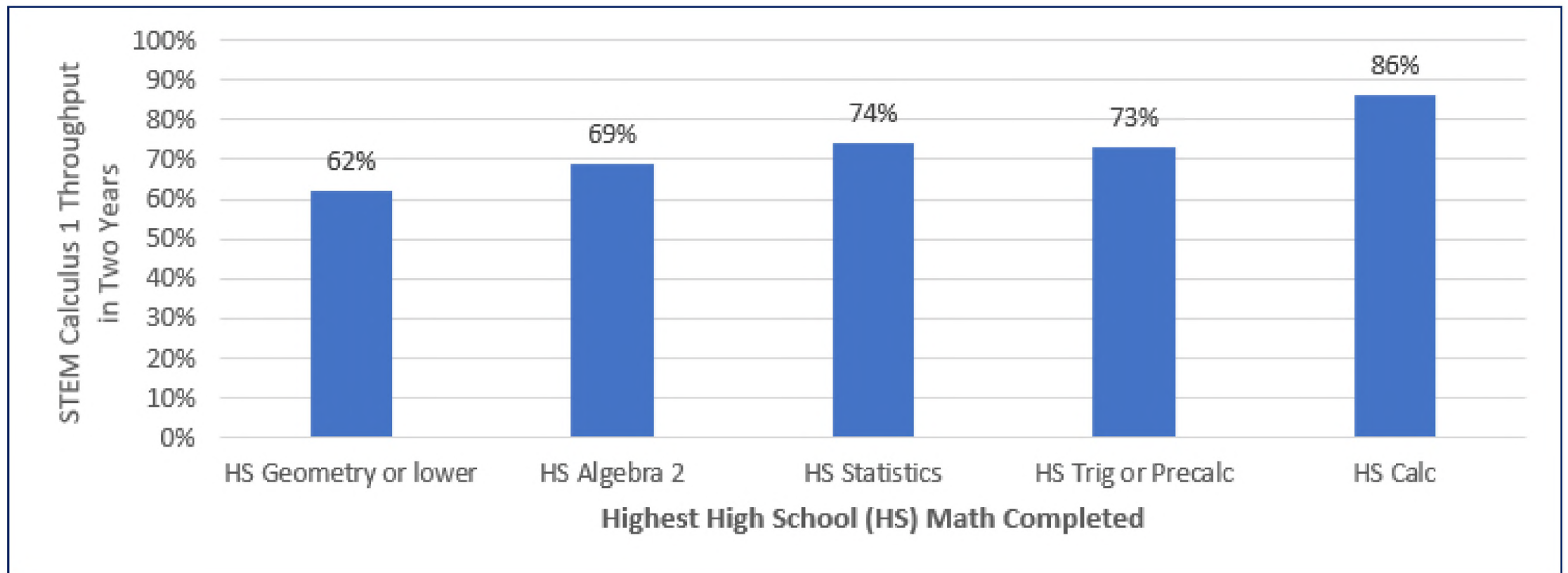
# Disaggregating by high school preparation

To identify students who might benefit from college coursework prior to enrolling in STEM Calculus 1, STEM students were disaggregated by:

- highest high school math course successfully completed
- default STEM placement rules (developed in 2018 for placement into precalculus)

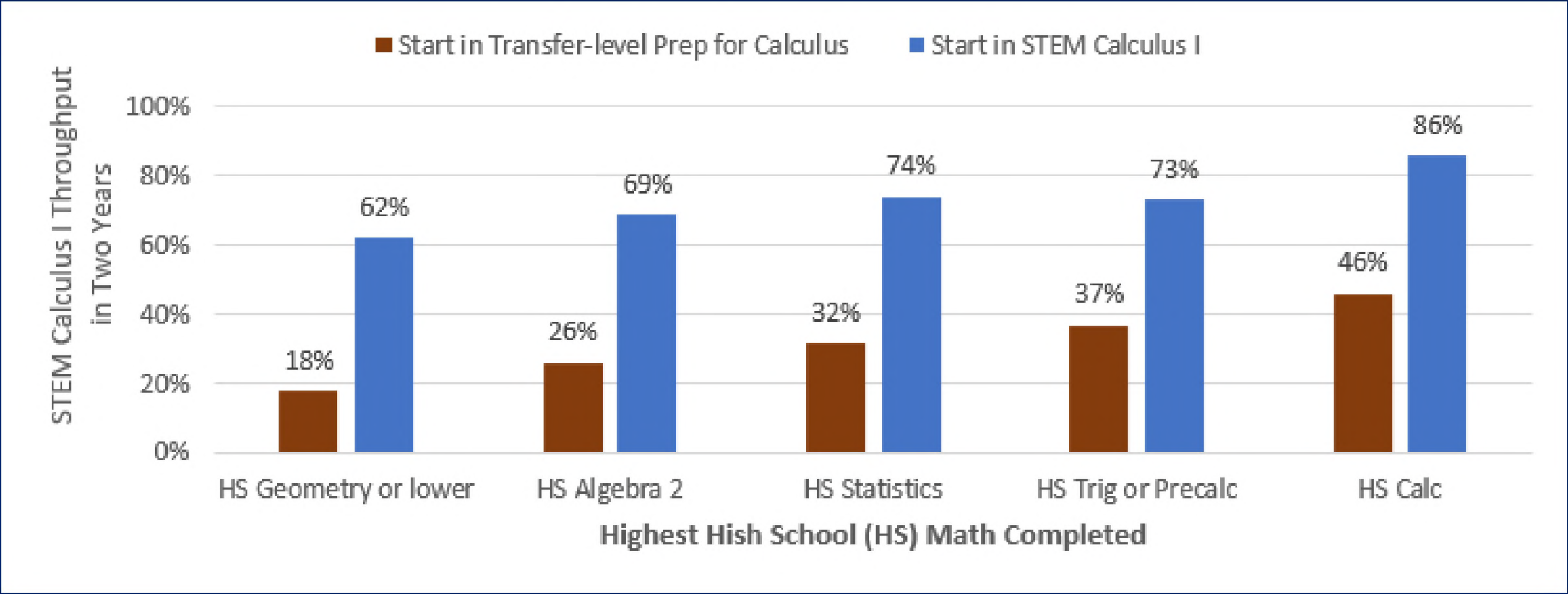
Based on high school math preparation, no group was highly unlikely to succeed in STEM Calculus 1 when directly enrolled and given two years.

**STEM Calculus 1 Two-Year Throughput with Direct Enrollment, STEM Students Disaggregated by Highest High School Math Completed**



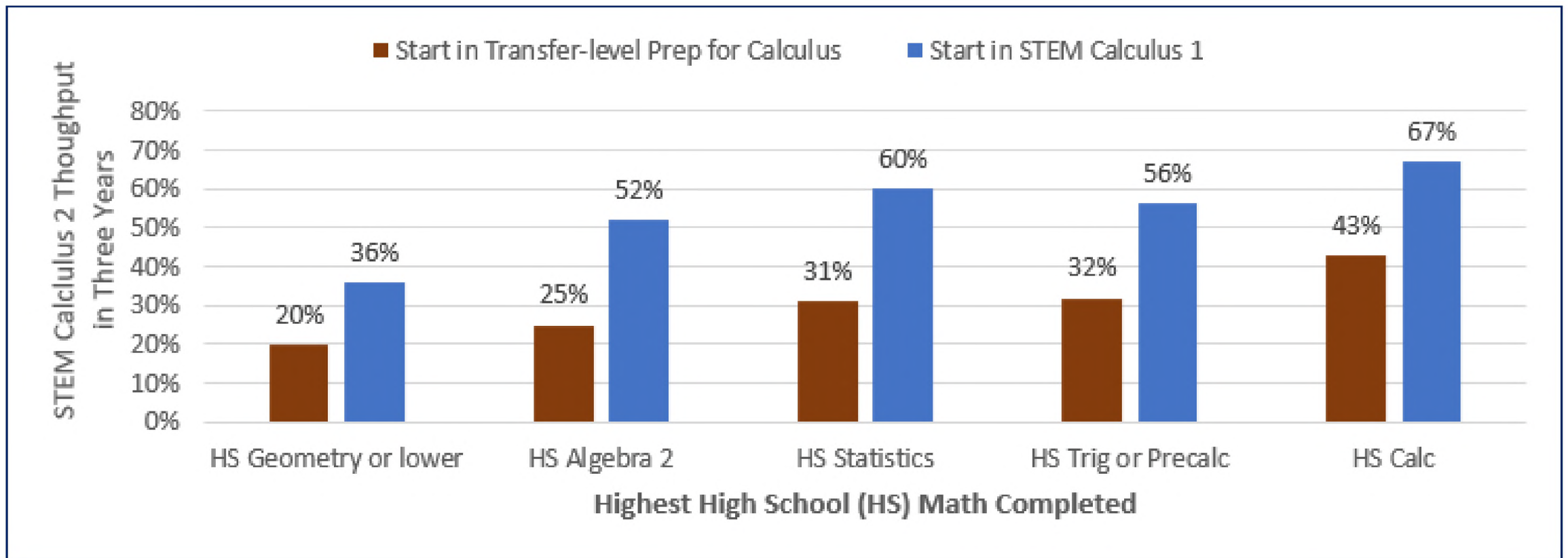
Students who began in a STEM pathway preparatory course were much less likely to complete STEM Calculus 1 compared to students with similar high school math preparation who began directly in Calculus.

**STEM Calculus 1 Two-Year Throughput, STEM Students Disaggregated by Starting Level and Highest High School Math Completed**



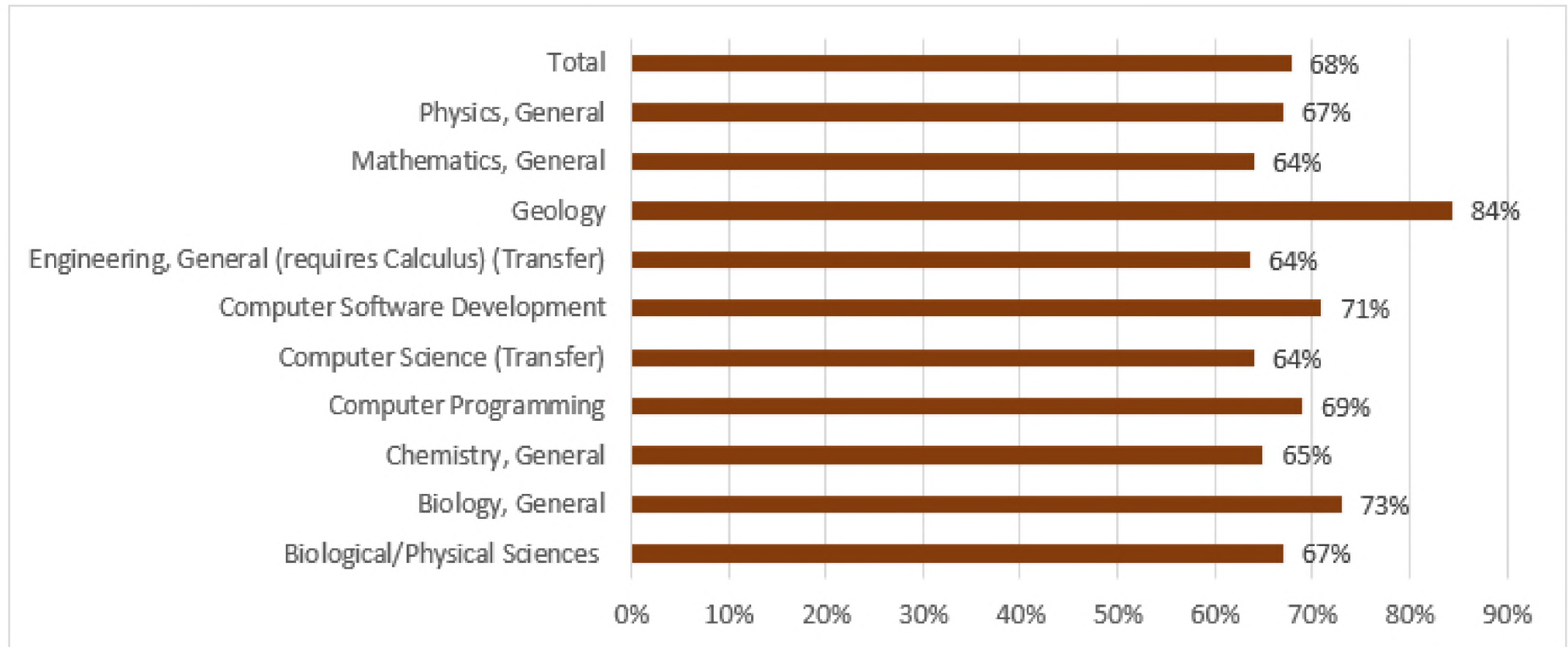
Across all levels of high school math preparation, students completed the second STEM Calculus course at higher rates within three years if they began in STEM Calculus 1 rather than a preparatory course prior to Calculus 1.

### STEM Calculus 2 Three-Year Throughput, STEM Students Disaggregated by Starting Level and Highest High School Math Completed



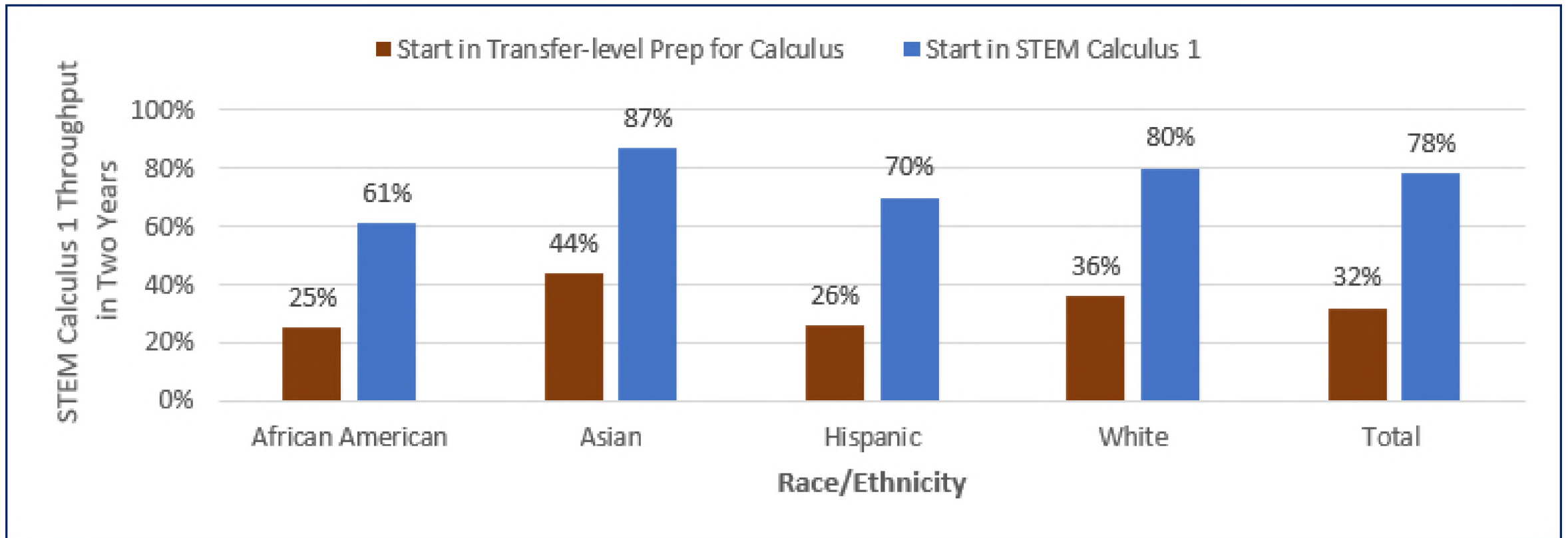
We lose **two-thirds** of our STEM majors who start in transfer-level preparatory courses prior to STEM Calculus 1.

**Percent of Students Starting in the Path to Calculus Who Do Not Complete STEM Calculus 1 in Two Years**



Pathways to STEM Calculus and inequitable access to Calculus may contribute to inequity in calculus completion and ultimately to less diverse STEM programs.

### STEM Calculus 1 Two-Year Throughput, STEM Students Disaggregated by Starting Level and Race/Ethnicity



# College-Specific Reports





# College-Level Analyses Purpose

Each college received with the memorandum a report based on their local data that addresses the same three questions investigated in the statewide analysis.

- The local reports can be used to help colleges decide their next steps in the process to achieve compliance with AB 1705.
- Colleges may choose to follow the findings in their local report and forgo data submission (Options B2 and C2).

The college-level research is consistent with the state level analysis:

- transfer-level preparatory courses do not meet AB 1705 standards.
- high rates of attrition in pathways to calculus hinder efforts to improve STEM participation and STEM equity hinges on addressing this issue.

# College-Level Analyses Methodology

- For the local analyses, we defined a Lowest STEM Placement group to identify a set of students who might be highly unlikely to succeed if starting in STEM Calculus 1 and might have higher calculus completion rates if they begin in preparatory coursework prior to calculus.
- The Lowest Placement Group is students with a high school GPA equal to or less than 2.6 ( $HSGPA \leq 2.6$ ) or students who had not previously earned a C or better in high school trigonometry, precalculus, or calculus.
- The local reports use the most recent cohorts that allow for the two-year STEM Calculus 1 throughput calculation (2019-2020, 2020-2021, and Fall 2021).
- Each college is provided with a table of local courses included in the analysis.

# College-Level Analyses Methodology, Continued

The reported cohorts are disaggregated by:

- All Students: students who demonstrate STEM intent by starting in a transfer-level course in the college's path to STEM Calculus 1.
- STEM Majors: A subset of All Students who have a declared STEM major.

## **i** Summary of Analysis

For the cohorts of STEM Majors analyzed in this report, we offer the following observations. Observations based on an analysis of ALL students who start in preparatory courses in the STEM Calculus pathway, rather than the subset of STEM majors, may differ.

- Lowest STEM Placement students who started in STEM Calculus 1 at your college were not “highly unlikely to succeed.” (STEM Calculus 1 completion is greater than 15%.)
- Lowest STEM Placement students who started in any preparatory course in the STEM Calculus Pathway at your college had lower STEM Calculus 1 completion (throughput) in two years than those who started in STEM Calculus 1.
- More than 50% of Lowest STEM Placement students who started in **MATH43** or **MATH32** completed STEM Calculus 1 in two years.
- Students in the higher placement group who started in a preparatory course prior to STEM Calculus 1 were repeating coursework that they previously passed in high school, which is no longer permitted under AB 1705.
- The data provided in this report do not provide evidence that placement and enrollment practices for the STEM Calculus pathway at your college meet AB 1705 standards. However, the analysis does support interim course approval for MATH43 or MATH32 as an option for Lowest STEM Placement students.

Please refer to the guidance memo **ESLEI 24-15** for your options and next steps.

**Table 1. Student Headcount by Cohort Year**

To allow for two-year throughput calculations, 2019-2020, 2020-2021, and Fall 2021 cohorts were used. The cohort is All Students, which is students who demonstrated STEM intent by starting math in a transfer-level course in the college's path to STEM Calculus 1. STEM Majors are a subset of All Students.

Cohort	STEM Majors	All Students
2019-2020	948	2,571
2020-2021	1,142	2,812
Fall 2021	774	1,788
Total	2,864	7,171

**Table 2. Student Headcount by First CCC Math Course**

First CCC Math	STEM Majors	All Students
College Algebra	399	1,805
Trigonometry	185	367
Precalculus	861	2,275
Precalculus 2	81	195
STEM Calculus 1	1,338	2,529
Total	2,864	7,171

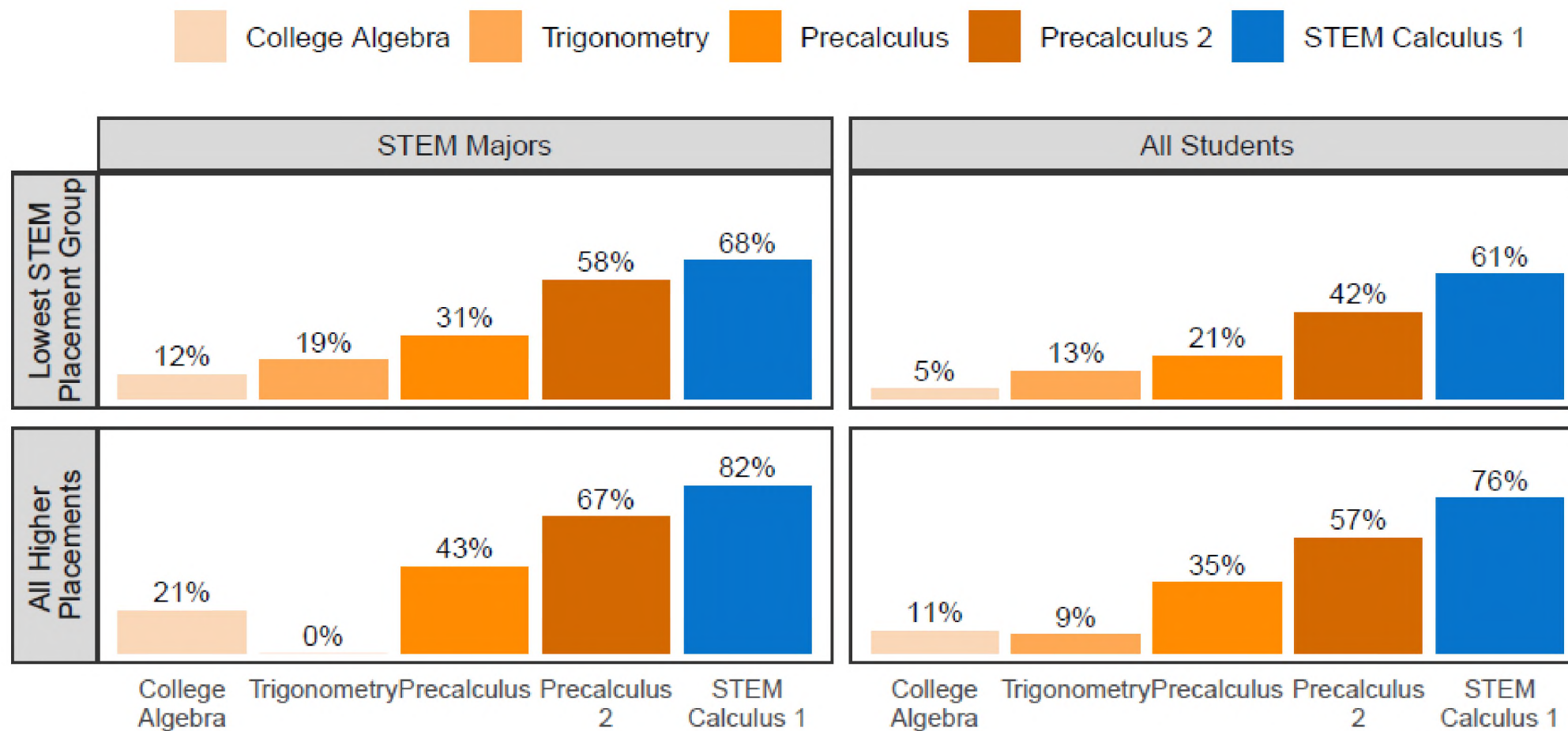
\* Data is suppressed in throughput tables below if  $n < 10$ . Table 5 provides details on the courses included and their categorization in the RP Group Math Typology.

**Table 3. Two-Year STEM Calculus 1 Throughput by First CCC Calculus Pathway Course**

	First CCC Math	STEM Majors		All Students	
		Cohort	2-Yr TR %	Cohort	2-Yr TR %
Lowest STEM Placement Group	College Algebra	375	12%	1,742	5%
	Trigonometry	175	19%	345	13%
	Precalculus	807	31%	2,133	21%
	Precalculus 2	69	58%	172	42%
	STEM Calculus 1	675	68%	1,348	61%
	College Algebra	24	21%	63	11%
All Higher Placements	Trigonometry	10	0%	22	9%
	Precalculus	54	43%	142	35%
	Precalculus 2	12	67%	23	57%
	STEM Calculus 1	663	82%	1,181	76%

\* Data is suppressed if  $n < 10$ .

Figure 1. Two-Year STEM Calculus 1 Throughput by First CCC Calculus Pathway Course



Note: Data is suppressed if n < 10.



# Implications and Guidance

- Direct placement into STEM Calculus 1 yields positive benefits for students.
- Widen access, provide support, allow innovation.
- Continue to assess the needs and outcomes of students.

# STEM Calculus Pathway Placement Rules

The STEM Calculus Pathway Placement Rules:

- Operationalize the research and provide guidance on placement and enrollment according to AB 1705 standards.
- Allows colleges flexibility in transitioning to new curricular models of learning support for STEM calculus.
- The placement rules pertain only to students who require STEM Calculus 1 for their program or major.
- STEM students who need applied calculus for their major should begin in that course.

# STEM Calculus Pathway Placement Rules

## All Students

STEM Calculus Pathway Placement	Placement and Enrollment in the STEM Calculus Pathway for STEM Students in Majors that Require STEM Calculus 1
<b>For All Students</b>	<ul style="list-style-type: none"><li>· By July 1, 2025, all students pursuing STEM programs must be given access to STEM calculus (with or without concurrent support). Students cannot be denied access to STEM Calculus 1 after July 1, 2025, unless the college has full validation status, as defined below.</li><li>· As of July 1, 2025, concurrent support in the form of a corequisite or an enhanced STEM Calculus 1 course, of no more than two additional units, must be available as an option but can only be required for Lowest Placement students (defined below).</li></ul>

# STEM Calculus Pathway Placement Rules

## Higher STEM Placement

<b>STEM Calculus Pathway Placement</b>	<b>Placement and Enrollment in the STEM Calculus Pathway for STEM Students in Majors that Require STEM Calculus 1</b>
<b>Higher STEM Placement</b> <b>HS GPA &gt; 2.6</b> <b>AND</b> <b>Passed high school Trigonometry, Precalculus, or Calculus with a C or better</b>	<p>At all colleges, the placement and initial enrollment for STEM students in the higher STEM placement band is STEM Calculus 1.</p> <p>Low unit (2 or fewer units) corequisite course or enhancement to STEM Calculus 1 may be recommended to students but not required.</p>

# STEM Calculus Pathway Placement Rules

## Lowest STEM Placement

<b>STEM Calculus Pathway Placement</b>	<b>Placement and Enrollment in the STEM Calculus Pathway for STEM Students in Majors that Require STEM Calculus 1</b>
<b>Lowest STEM Placement</b> <b>HS GPA <math>\leq</math> 2.6</b> <b>OR</b> <b>Did not pass high school Trigonometry, Precalculus, or Calculus with a C or better</b>	<p>At all colleges, except those with full validation status, students in the Lowest STEM placement band must be given the option to begin in one of the following:</p> <ul style="list-style-type: none"><li>• STEM Calculus 1</li><li>• STEM Calculus 1 with 2 or fewer units of attached support</li><li>• An optional preparatory course with interim approval (Option C below) or an innovative preparatory course (see Option D below), but not both.</li></ul> <p>At colleges with full validation status, students in the Lowest STEM placement band can be placed and enrolled into the validated preparatory course(s).</p>

## Implementation Options for Colleges

### **Option A (STEM Calculus 1 Implementation):** By July 1, 2025

- Replace stand-alone preparatory courses with support-enhanced STEM Calculus 1 or linked corequisite support
- Restrict all other enrollments into prep courses
- Submit certification form; no data submission required

### **Option B (Apply for Validation Approval):**

Validate course(s) meet all three AB 1705 standards

- Confirmed by CO analysis (submit certification form; no data submission required)  
OR
- Submit local data (submit certification form & data template)
- Continue to implement validated course(s)

### **Option C (Apply for Interim Approval):** Two-year STEM Calculus 1 throughput is 50% or greater for Lowest Placement Students

- Confirmed by CO analysis (submit certification form; no data submission required)  
OR
- Submit local data (submit certification form & data template)
- Submit 2025-2027 validation data July 2027

### **Option D (Implement an Innovative Course):**

Establish an innovative preparatory course for Lowest STEM Placement students

- Submit certification form; no data submission required
- Implement course 2025-2027
- Submit 2025-2027 validation data July 2027

# Certification Process



# Certification Process

- All colleges must submit an AB 1705 STEM Calculus Pathway Certification Form by July 1, 2024 (unique submission link sent to college CEO, CIO, CSSO, Senate President)
- Colleges will report their compliance status and plans by choosing one of six options.
- Colleges have an opportunity to submit local data, through the AB 1705 STEM Calculus Pathway Data Validation Template if they do not agree with their local analysis provided.
- Direct inquiries regarding the certification form to [AB705@cccco.edu](mailto:AB705@cccco.edu)



# Data Submission Template



# Data Submission Template – When to Submit Data

Colleges have an opportunity to submit local data to apply for:

1. Validation Approval with Data Submission (Option B1)
  2. Interim Approval with Data Submission (Option C1)
- Colleges who agree with the findings in their local analysis do not need to submit data (Options B2 and C2).
    - Colleges selecting option A also do not need to submit data.
  - If colleges choose to forgo data submission, they may still certify for an innovative preparatory course option for Lowest Placement students (Option D).

# Data Submission Template – Defining the Cohort

Colleges choosing to submit local data (Options B1 and C1) must:

- Follow the directions to create a cohort of Lowest STEM Placement students whose first math course was either in a STEM preparatory course or STEM Calculus 1.
- Determine if students will be tracked by STEM TOP code or include All Students regardless of major, but who started in a STEM preparatory course.
- Determine the timeframe for the cohort (e.g., Fall 2019, Fall 2020, Fall 2021 or 2019-20, 2020-21, 2021-22) and combine the cohorts into one.

# Data Submission Template – Submitting Multiple Courses

- If submitting data for more than one course, submit each course on a separate tab. You can submit data for any courses within a multi-course sequence if Lowest STEM Placement students enrolled in the course as their first math course.
  - For example, if Lowest STEM Placement students may start in a sequence at different levels (e.g., some students start in Precalculus 1 while others may start in Precalculus 2) report each course in which a student can start on a separate tab.
- Provide the information or data in each cell that is highlighted yellow.
- Report data for only one college, do not combine multiple colleges in a district

# Data Submission Template – Table 1. STEM Calculus 1 - Cohort and Course Details

Provide the following details about the cohort filters:

- 6-digit STEM TOP Codes (SM02 or SS02) or indicate All Students
- Cohort timeframe

Provide the following details about the course:

- Course Control Number (CB00)
- Local Course ID
- Course Title (CB02)

Table 1. Calculus 1 Throughput in Two Years for the Lowest STEM Placement Group by CCC Starting Level		
<b>Cohort Details</b>		
STEM TOP Codes (SMO2 or SS02): List 6-digit STEM TOP Codes or indicate All Students	1905.00, 0706.00, 0707.00, 0707.10, 0901.00, 1914.00, 1701.00, 1902.00, 0401.00, 4902.00	
Give the cohort timeframe (e.g., 2019-20 and 2020-21 or Fall 2019 and Fall 2020)	Fall 2020, Fall 2021, Fall 2022	
<b>Course Details</b>		<b>STEM Calculus 1 Start</b>
Give the Course Control Number (CB00)	CCC000187803	CCC000562587
Give the Local Course ID	MATH105	MATH1A
Give the Course Title (CB02)	College Algebra	Calculus

# Data Submission Template – Table 1. STEM Calculus 1 Throughput by Starting Level

Provide the following details about the cohort of students in the Lowest Placement Group:

- Students starting in a transfer-level preparatory course or STEM Calculus 1 (Starting Cohort)
- Students successfully completing STEM Calculus 1 within two years (# Complete STEM Calculus 1 in Two Years)
- The throughput rate is calculated for you (STEM Calculus 1 Throughput Rate (%))

Data for Lowest Placement Group	Transfer-Level Preparatory Course Start	STEM Calculus 1 Start
Starting Cohort	146	76
# Complete STEM Calculus 1 in Two Years	56	43
STEM Calculus 1 Throughput Rate (%)	38.4%	56.6%

# Data Submission Template – When to submit the data template

Submit the data template if:

- Students with a Transfer-Level Preparatory Course Start have a STEM Calculus 1 throughput rate above 50% (Option C – Interim Approval).

Or

- (1) Students starting in STEM Calculus 1 exhibit a throughput rate less than 15% and (2) students starting in a transfer-level preparatory course have higher throughput than those starting in STEM Calculus 1 and (3) these students complete Calculus 2 at higher rates than students starting in Calculus 1 (Option B – Full Approval)

**Table 1. Calculus 1 Throughput in Two Years for the Lowest STEM Placement Group by CCC Starting Level**

Data for Lowest Placement Group		
	Transfer-Level Preparatory Course Start	STEM Calculus 1 Start
Starting Cohort	146	76
# Complete STEM Calculus 1 in Two Years	78	43
STEM Calculus 1 Throughput Rate (%)	53.4%	56.6%

**Table 1. Calculus 1 Throughput in Two Years for the Lowest STEM Placement Group by CCC Starting Level**

Data for Lowest Placement Group		
	Transfer-Level Preparatory Course Start	STEM Calculus 1 Start
Starting Cohort	146	76
# Complete STEM Calculus 1 in Two Years	78	10
STEM Calculus 1 Throughput Rate (%)	53.4%	13.2%

**Table 2. Calculus 2 Throughput in Three Years for the Lowest STEM Placement Group by CCC Starting Level**

Data for Lowest Placement Group		
	Transfer-Level Preparatory Course Start	STEM Calculus 1 Start
Starting Cohort	113	67
# Complete STEM Calculus 2 in Three Years	78	15
STEM Calculus 2 Throughput Rate (%)	69.0%	22.4%

# Q & A





# Thank you for attending

The webinar and materials will be posted in the Equitable Placement and Completion community in the Vision Resource Center, and the Chancellor's Office Equitable Placement, Support and Completion webpage

Email: [AB705@cccco.edu](mailto:AB705@cccco.edu)