AB 1705 STEM Calculus Pathway Placement and First Math Course Enrollment Analysis: Santa Barbara City College

April 6, 2024

Purpose: This analysis is provided by the state Chancellor's Office and The RP Group to support colleges in AB 1705 validation of placement policies and enrollment practices for the STEM Calculus pathway. The analysis presented here uses your college's data to replicate the statewide analysis presented in the report Preparatory Pathways and STEM Calculus Completion: Implications of the AB 1705 Standards. Please use this data to inform your AB 1705 planning and certification decisions. Colleges may choose to submit local data by July 1, 2024. Questions about your college's data or this analysis can be submitted to ab705@cccco.edu.

Summary of Santa Barbara City College 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 **MATH138** 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 MATH138 as an option for Lowest STEM Placement students.

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

Operationalizing AB 1705 STEM standards for local validation:

For this analysis, we define a Lowest STEM Placement group to identify students who may be highly unlikely to succeed if they take STEM Calculus 1 as their first math course and for whom additional

transfer-level preparation may improve the probability that they persist to and successfully complete STEM Calculus 1 and Calculus 2.

Lowest STEM Placement group: Students who have not passed high school trigonometry, precalculus or calculus with a C or better OR have a HS GPA <= 2.6.

A preparatory course in the STEM Calculus pathway is validated as compliant with AB 1705 standards when all of the following are true:

1. Lowest STEM Placement students are highly unlikely to succeed in STEM Calculus 1 if they start in STEM Calculus 1. (Calculus 1 throughput in two-years is less than 15%.)
2. Lowest STEM Placement students have a higher STEM Calculus 1 throughput in two-years when starting in the preparatory course compared to starting in Calculus 1.
3. Lowest STEM Placement students have a higher STEM Calculus 2 throughput in two-years when starting in the preparatory course compared to starting in Calculus 1.

A preparatory course in the STEM Calculus pathway has interim status when:

> The Lowest STEM Placement students who start in the preparatory course have a STEM Calculus 1 throughput in two years of 50% or greater.

Methodology

The analysis below is based on data your college reported to the California Community College's Chancellor's Office's Management Information System (COMIS) and CCCApply. The cohort (labeled All Students) includes non-dual enrolled students at your college with a Degree/Transfer or Undecided education goal whose first math course was a transfer-level course in the STEM Calculus pathway in the academic years 2019-2020, 2020-2021, or Fall 2021, excluding those starting in summer. STEM majors are a subset of the All Students cohort. See Additional Methodology notes at the end of this report for more information on the definition and identification of STEM majors.

Because AB 1705 connects STEM Calculus completion with transfer-level math placement and initial math enrollment, the analysis uses throughput as the outcome metric. Calculus throughput rate (TR %) is the percentage of students who successfully complete (C or better) STEM Calculus 1 or 2 within a given timeframe out of the count who started in a specified course in the calculus pathway. Students were tracked to determine whether they completed STEM Calculus 1 within two years and STEM Calculus 2 within three years, anywhere within the community college system.

STEM Calculus 1 is a course equivalent to C-ID Math 210, 211 or the first half of Math 900S. STEM Calculus 2 is a course equivalent to C-ID Math Math 220, 221 or the second half of Math 900S. The identification of STEM majors requiring STEM Calculus was based on C-ID Transfer Model Curricula (TMC).

Additional information about the methodology is provided at the end of this document.

Analysis

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	260	670
2020-2021	244	720
Fall 2021	185	524
Total	689	1,914

Table 2. Student Headcount by First CCC Math Course

First CCC Math	STEM Majors	All Students
College Algebra	397	1,370
Precalculus	38	82
STEM Calculus 1	254	462
Total	689	1,914

* 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

		STEM Majors		All Students	
	First CCC Math	Cohort	2-Yr TR %	Cohort	2-Yr TR %
Lowest STEM Placement Group	College Algebra	263	18%	919	8%
	Precalculus	12	58%	19	53%
	STEM Calculus 1	23	70%	35	71%
All Higher Placements	College Algebra	134	22%	451	8%
	Precalculus	26	38%	63	33%
	STEM Calculus 1	231	79%	427	76%

* Data is suppressed if n < 10.

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

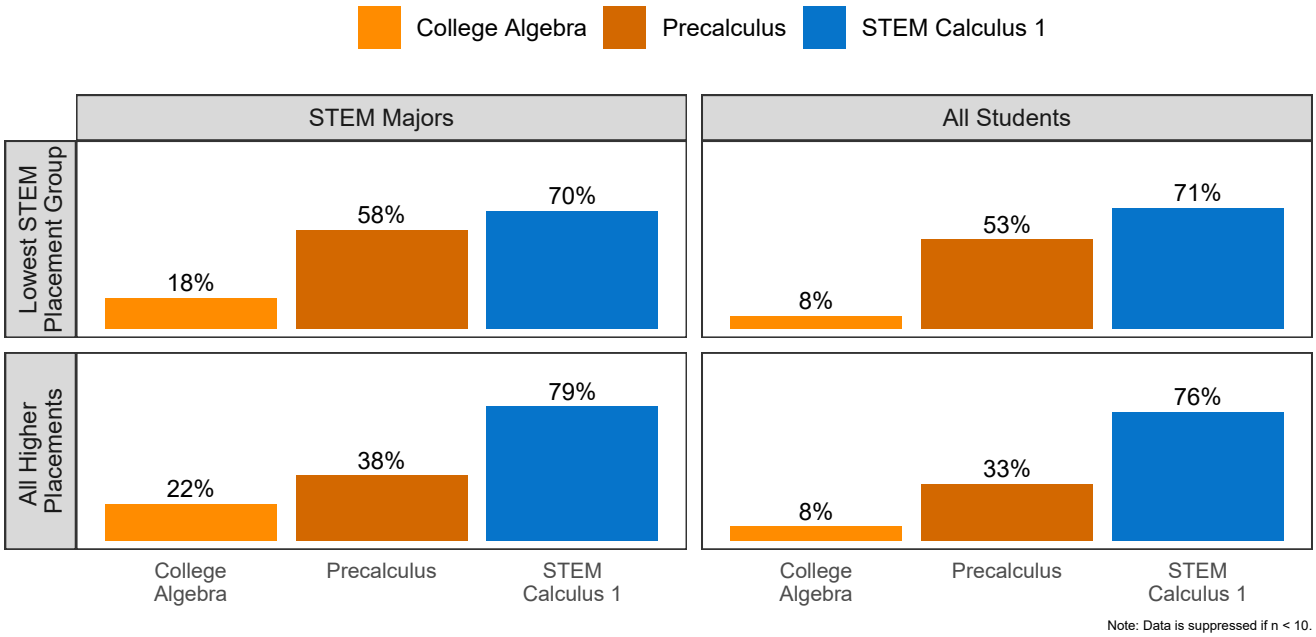

Table 4. Three-Year STEM Calculus 2 Throughput by First CCC Calculus Pathway Course

Only 2019-2020 and Fall 2020 cohorts were included for the Calculus 2 throughput analysis to allow for a full three-year observation window. Because it is not possible to identify students in the All Students group who are in programs that require Calculus 2, we include only STEM majors in this analysis and exclude Biology majors since the Biology Transfer Model Curriculum (TMC) only requires one semester of calculus.

		STEM Majors	
	First CCC Math	Cohort	3-Yr TR %
Lowest STEM Placement Group	College Algebra	62	24%
	Precalculus	*	*
	STEM Calculus 1	12	50%
All Higher Placements	College Algebra	43	26%
	Precalculus	14	36%
	STEM Calculus 1	115	67%

* Data is suppressed if n < 10.

Figure 2. Three-Year STEM Calculus 2 Throughput by First CCC Calculus Pathway Course

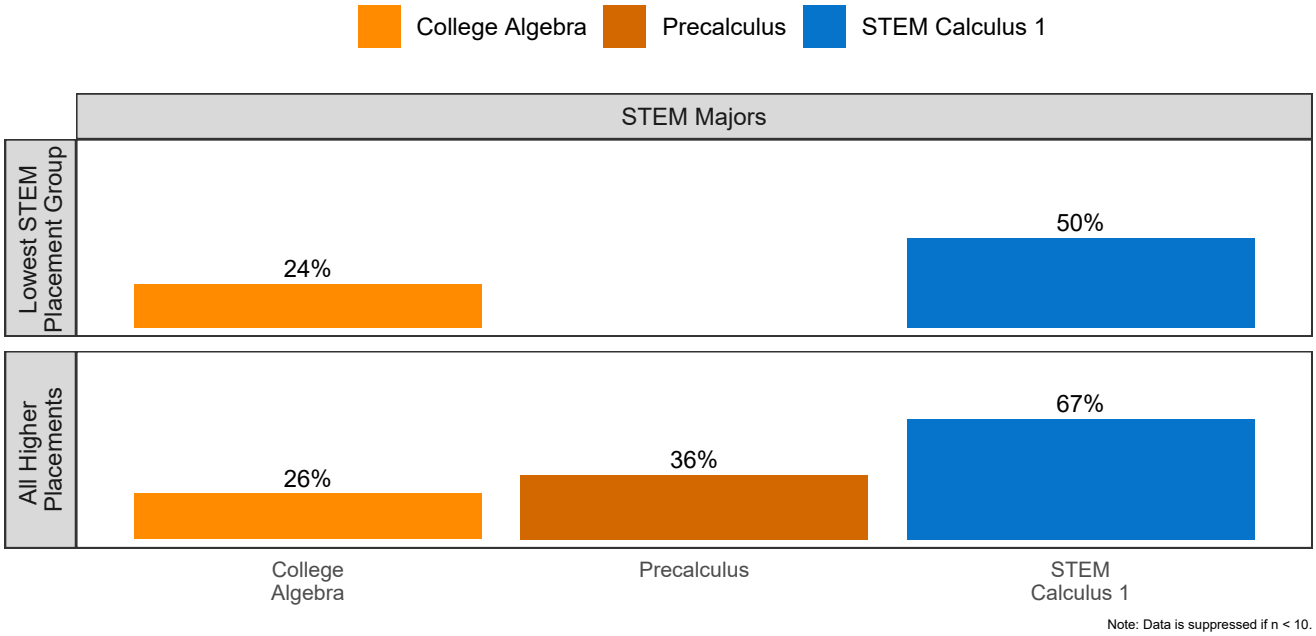

Table 5. Courses Included Analysis by Math Typology Category

The table below contains all Santa Barbara City College courses with enrollments during the time frame considered in this college-specific analysis.

CB00	Local Course ID	Course Title	Math Typology Category
CCC000392226	MATH137	Precalc I:coll Algebra&Funct	College Algebra
CCC000412318	MATH138	Precalc Ii-Coll Algebra/Trig	Precalculus
CCC000637403	MATH149	Precalculus For Stem Majors	Precalculus with Trig
CCC000406218	MATH150	Calculus W/ Analytc Geometry I	STEM Calculus 1

Additional Methodology Notes

The identification of STEM majors requiring STEM Calculus was based on C-ID Transfer Model Curricula (TMC). Biology is excluded from the STEM Calculus 2 pathway analysis because the TMC for biology does not include Calculus 2. The following TOP Codes were used to identify STEM majors: 1905.00, 0706.00, 0707.00, 0707.10, 0901.00, 1914.00, 1701.00, 1902.00, 0401.00, 4902.00.

Data for high school preparation was obtained from CCCApply self-reported high school information. Students with no high school data from CCCApply (missing both GPA and highest high school course passed or attempted) are excluded from the analysis since they could not be assigned to a placement group.

STEM Calculus 1 is defined as the first calculus course required for STEM majors and excludes business calculus and other forms of applied calculus.