

Corequisite Support for STEM Calculus I at Mt. SAC

AccelerationProject.org

CAP
Webinar
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AB 1705

[AB 1705](#)

AB 1705 CCCCCO [Implementation Guidance](#) (Dec. 2022)

AB 1705 [webinar with CCCCCO](#) (Feb 7, 2023)

[FAQs from the CCCCCO](#) February webinar (March 13, 2023) –22 pages!

[CCCCCO Implementation Guide](#) (March 13, 2023)

Today we will not have much time to discuss or answer questions on AB 1705.

Please reserve the chat for questions for Lisa and Paula.

AB 1705

Sec. 78213

(c)(1) & (f) &
(i) & (j)(9)

AB 1705 cliff notes

- Students cannot be required to repeat [math] courses that they previously passed

Gateway math course = lowest level math course that satisfies a degree or transfer requirement within a program of study

- U.S. HS graduates shall be directly placed into and, when beginning math/quantitative reasoning, enrolled in a gateway transfer-level course.
- For all students, placement and first math enrollment must maximize the probability that a student will enter and complete a gateway transfer-level math/QR course within one-year of their initial attempt in the discipline.
- Exception: Students can start in a transfer-level prerequisite to the gateway course if the college verifies benefit to the student per standards stated in the law. CCCCO is referring to this as validating prerequisites.

AB 1705 Sec. 78213(f)

How is it possible to
validate prerequisites?
See CCCCO FAQs pages 9-
14.

AB 1705 cliff notes

By July 1, 2024, for calculus-based associate degrees or transfer majors in STEM

- Offer no more than two transfer-level prerequisites to the first STEM calculus course
- Validate prerequisites by showing all of the following:
 - (A) The student is highly unlikely to succeed in the first STEM calculus course without the additional transfer-level preparation.
 - (B) The enrollment will improve the student's probability of completing the first STEM calculus course.
 - (C) 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.

AB 1705
Sec. 78213 (f)
& (i)

What if a prerequisite is not validated?

By July 1, 2025

- The college cannot require or recommend the prerequisite course.
- U.S. HS graduates must begin in the gateway transfer-level course. **This can be with corequisite support!**

Shared values

Shared values:

- We want more students, and a more diverse body of students, to transfer in a STEM major and earn a STEM degree.
- Calculus is the gateway to STEM, so we want to help more students to complete calculus.
- We want our STEM math pathways to produce equitable calculus completion, and we want to remove barriers that contribute to inequity in calculus completion.
- We want our STEM math pathways to keep the door open to a STEM major for students deemed "not calculus ready" by producing the highest possible completion rates of calculus for the "underprepared."

What predicts STEM momentum?

[CCRC study](#) – data from community colleges in 3 states

What are the most reliable indicators of STEM transfer and bachelor's degree attainment in STEM?

- **First-year** completion of calculus or other STEM coursework that counts toward the lower division requirements in the major
- First-year completion of calculus is a reliable predictor of subsequent STEM transfer success across student demographic subgroups and institutional contexts.

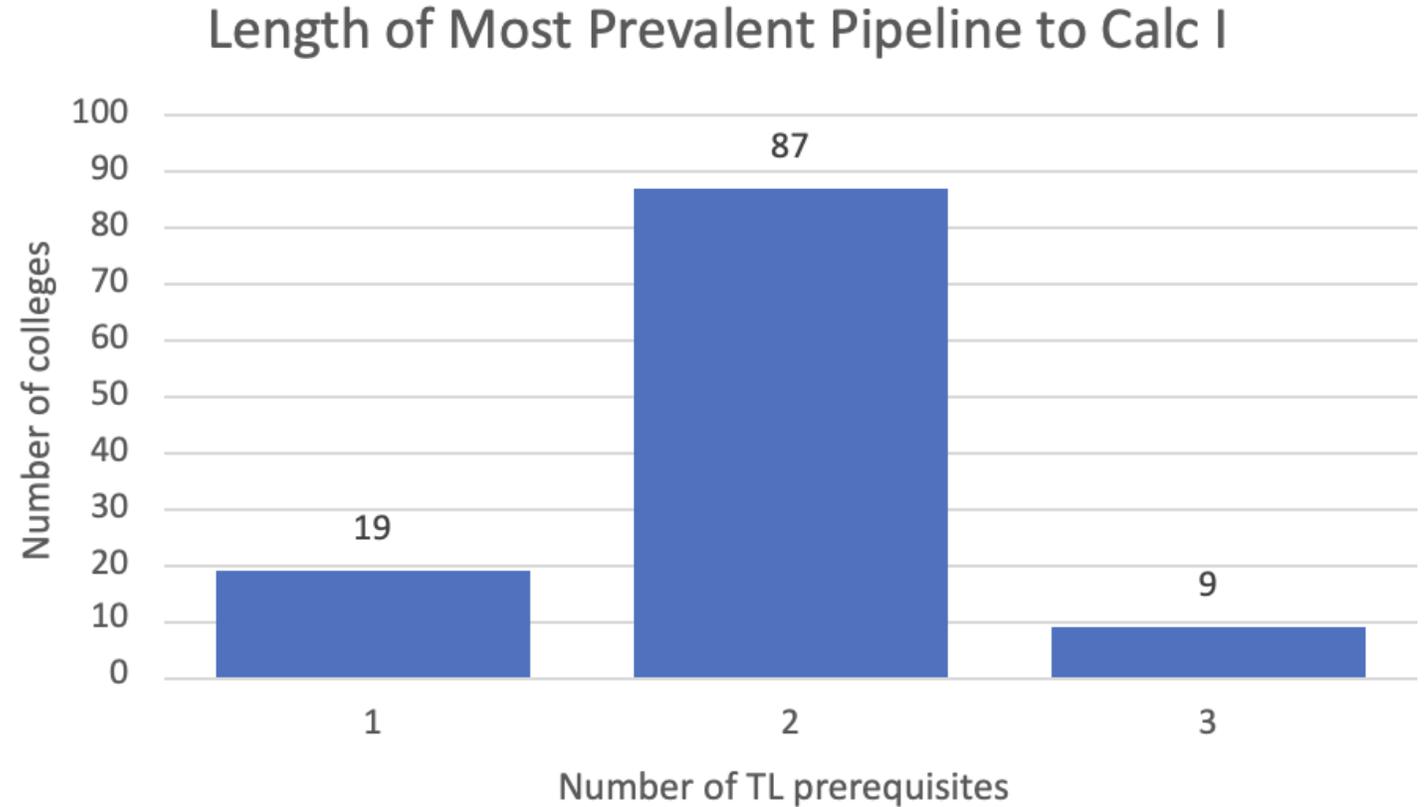
What
produces
STEM
momentum?

CCRC study continued

- “Relatively few community college students complete this type of STEM coursework in their first year; students are instead more likely to concentrate on completing prerequisite “foundational” STEM courses or other STEM courses that may transfer to a four-year college without fulfilling STEM bachelor’s degree requirements.”
- "Despite the potential of community college STEM transfer pathways to broaden access to STEM careers for underrepresented groups such as Black and Hispanic students and women, we find low and inequitable rates of early STEM transfer momentum.”

Is our system designed to produce STEM momentum?

Fall 2022 class schedules
2022-2023 catalogs



Only 18% of California community college BSTEM majors started in some form of calculus as their first math course in fall 2019 – [PPIC](#)

Is our system
designed to
produce STEM
momentum?

What is the impact of prerequisites on
calculus completion?

[PPIC report](#) on California community colleges

Completion of any form of calculus in three terms by
starting point for BSTEM majors (fall 2019, n=9,544)

- College Algebra: 15%
- Trigonometry: 20%
- Precalculus with embedded trigonometry: 38%

Is our system
designed to
produce STEM
momentum?

- Attrition is inevitable in a prerequisite model because there are 3 exit points.
Example: 46% pass precalculus statewide. If 70% persist to calculus and 75% pass calculus, only 24% complete calculus ($0.46 \times 0.70 \times 0.75 = 0.24$)
- Students who pass the prerequisite often choose not to persist into calculus.
 - At Texas Tech university, 33% of students who earned a B or better in precalculus did not enroll in calculus.
 - At Arizona State University, 65% of declared life science majors who earned a C or better in precalculus did not persist into the calculus; this was also true for 55% of declared physical science majors and 38% of declared engineering majors.

Is our system
designed to
produce STEM
momentum?

What about students who are deemed "not calculus ready"?

Quasi-experimental study of over 10,000 student records, stratified sample included 2- and 4-year institutions. [Sonnert and Sadler](#)

- Taking precalculus in college did not produce statistically significant improvements in students' performance in calculus.
- This was true for students with weaker math preparation and for those who had previously passed precalculus in high school.

Is our system
designed to
produce
equitable
STEM
momentum?

What about students who are deemed "not calculus ready"?

Mathematical Association of America (MAA)
[Insights and Recommendations](#) from the MAA
National Study of College Calculus (pages 59-60)

"Restricting student enrollment in Calculus I may result in students never passing Calculus I who otherwise might have. Furthermore, there is a disproportionately frequent placement of underrepresented minorities into remedial and Precalculus courses. ... The meager gains from Precalculus do not appear to offset the considerable risk that students directed to Precalculus will not persist to Calculus."

Is our system designed to produce equitable STEM momentum?

Data from one California community college

Disproportionate impact in placement into calculus for Hispanic students.

	Total STEM majors (FA19)	Number placed into calculus	Percent placed into calculus	Percent of other students placed into calculus	PPG-1 (Inequity when PPG-1<0 and outside MoE)	Margin of error (MoE)
Asian	209	68	32.5%	$(345-68)/(1670-209)$ =19.0%	32.5%-19% =13.5%	6%
Black	32	8	25.0%	20.6%	4.4%	15%
Hispanic	1067	186	17.4%	26.4%	-9.0%	2%
White	267	62	23.2%	20.2%	3.0%	5%
Other	95	21	22.1%	20.6%	1.5%	8%
Total	1670	345	20.7%			

At this college, students deemed "not calculus ready" start in precalculus. Only 28% completed calculus within a year.

Structural racism = disproportionately placing students of color into a course sequence that produces consistently low calculus completion rates.

Is our system
designed to
produce STEM
momentum?

Our current system is not designed to
produce STEM momentum.

Will AB 1705 mandates move us closer?