

Will AB 1705 Lead to Stronger and More Equitable Calculus Outcomes for the Business Major?

AccelerationProject.org

CAP
Webinar
March 2
2023



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AB 1705
Sec. 78213
(c)(1) & (e) & (i)
& (j)(9)

AB 1705 cliff notes

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 colleges verify benefit by showing:
 - (A) The student is highly unlikely to succeed in the gateway transfer-level math course
 - (B) The enrollment in the prerequisite to the gateway course will improve the student's probability of completing gateway transfer-level math course within a one-year timeframe.

AB 1705
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(e) & (i)

What if a prerequisite is not validated?

The answer is the same for pretransfer-level and transfer-level prerequisites:

- The college cannot require or recommend the prerequisite course.
- U.S. HS graduates must begin in the gateway transfer-level course.

AB 1705 and the Business AS-T

What does AB 1705 mean for the business major?

- Transfer Model Curricula for [AS-T Business 2.0](#) requires statistics and a choice of business calculus or finite math; these are gateway courses.
- Precalculus and college algebra do not satisfy a requirement for the AS-T in Business; therefore, if these courses are prerequisites to gateway courses, the college must validate benefit to students per AB 1705 standards.
- Validation deadline for non-STEM programs, e.g., business: July 1, 2023. Changes to curricula if required by July 1, 2024.

Purpose of CAP Report

[Report: Will AB 1705 Lead to Stronger and More Equitable Calculus Completion for the Business Major?](#)

In light of AB 1705 mandates, this report examines how prerequisite requirements, corequisite options, and the discontinuation of remedial math are currently impacting equitable access to and completion of calculus for the business major.

Findings

- Access to business calculus is inconsistent across colleges.
- Corequisites are better than prerequisites at improving business calculus completion for students deemed “not calculus ready.”
- Colleges serving a large share of the state’s Black and/or Hispanic students are more likely to restrict access to business calculus and less likely to offer a corequisite.
- Access to business calculus varies widely within and across regions.

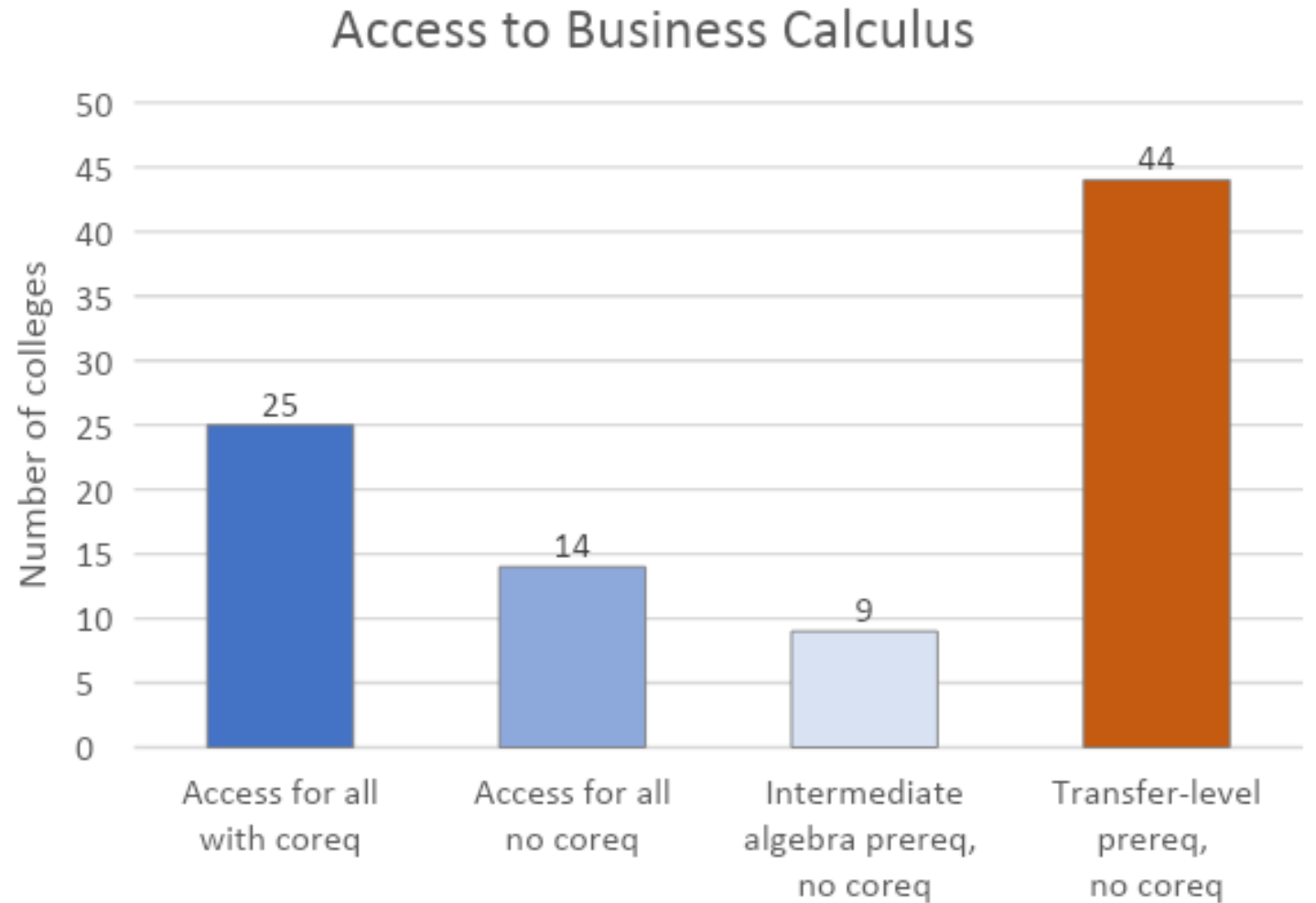
Content and learning goals for business calculus consistent across colleges

2022-2023 catalogs
Fall 2022 class schedules

- Ninety-two colleges offer business calculus as an option for meeting the math requirements of an associate degree for transfer in business ([AS-T Business 2.0](#)).
- At all 92 colleges, the course has the same learning goals and content and is certified as equivalent to [Math 140](#) under the Course Identification Numbering System (C-ID).
- This certification requires an intermediate algebra prerequisite but also lists a college algebra course as an advisory.

Access to
business calculus
inconsistent
across colleges

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Why bar access to
business calculus?

What beliefs are behind algebra prerequisites?

- Students are not ready for calculus
- Prerequisites keep the door to math intensive careers open for students who are deemed underprepared
- If you don't know A , you can't learn B
- Prerequisites protect students who are deemed “not calculus ready” from failing calculus by diverting them into a course in which they can be successful as they build their skills.

Are these views supported by data?

Does data support
common views of
preparedness?

**Large statewide study of students transitioning
from California high schools into California
community colleges post AB 705 ([RPGroup 2023](#))**

Let's examine students who did not take,
or did not pass, a course above Algebra 2 (or
the equivalent) in high school.

These students started in various levels and
types of math at the community college and tend
to have lower pass rates compared to students
who take higher levels of HS math ([RPGroup 2021](#))

In which college course did these students have the
highest pass rate: precalculus, calculus or statistics?

Does data support
common views of
preparedness?

**First college math course pass rates for students
who did not take, or did not pass, a course above
Algebra 2 (or equivalent) in high school**

Statistics (n=22,276): 42% passed

Some form or precalculus, includes college
algebra (n=4842): 38% passed

Some form of calculus (n=476): 41% passed

Students with similar levels of preparation pass all
three courses at roughly the same rates. Traditional
views of readiness do not explain these results and
call into question the efficacy of precalculus
prerequisites to calculus.

Corequisites better than prerequisites at improving business calculus completion for students deemed “not calculus ready”

In fall 2019 the first 8 colleges offered a corequisite with applied calculus (open access)

- **57%** of students starting in applied calculus with corequisite support completed the calculus course in a year.
- Compared to **16%** of students starting in an intermediate algebra prerequisite at those colleges, pre-reform (fall 2015-spring 2016)

A statewide study found that only **15%** of business and STEM students who began in college algebra completed some form of calculus after three semesters, compared to **64%** of students starting in applied calculus ([PPIC 2021](#)).

Corequisites better than prerequisites at improving business calculus completion for students deemed “not calculus ready”

- Attrition is inevitable in a prerequisite model because there are 3 exit points.
 - Example: 40% pass college algebra statewide. If 60% persist to calculus and 65% pass calculus, only 16% complete calculus ($0.40 \times 0.60 \times 0.65 = 0.16$)
- 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.

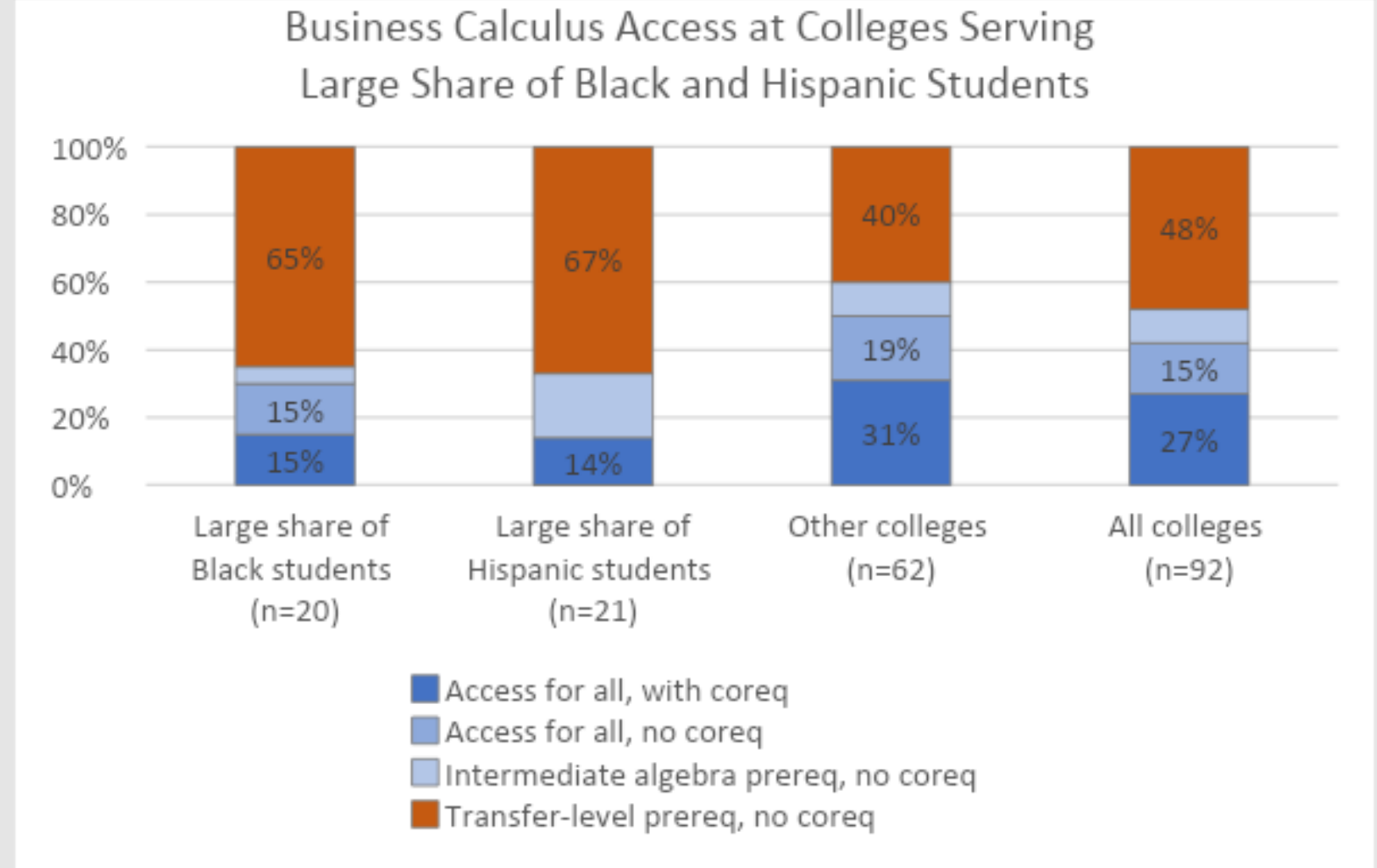
Corequisites better than prerequisites at improving business calculus completion for students deemed “not calculus ready”

- A calculus corequisite model welcomes business students into the major
 - with a course taught in the context of business applications
 - a course that counts toward their business degree
 - no stigma in needing help with algebra because algebra remediation is intentionally integrated
 - more instructional time for individualized help
- By contrast, a college algebra or precalculus prerequisite
 - sidelines students into a decontextualized math course
 - application to business is unclear
 - course does not count toward requirements for the business degree

This may result in students disengaging in the course and not passing. But this also may lead to capable students disengaging from the major altogether.

Colleges serving a large share of the state's Black and/or Hispanic students are more likely to restrict access to business calculus and less likely to offer corequisite support.

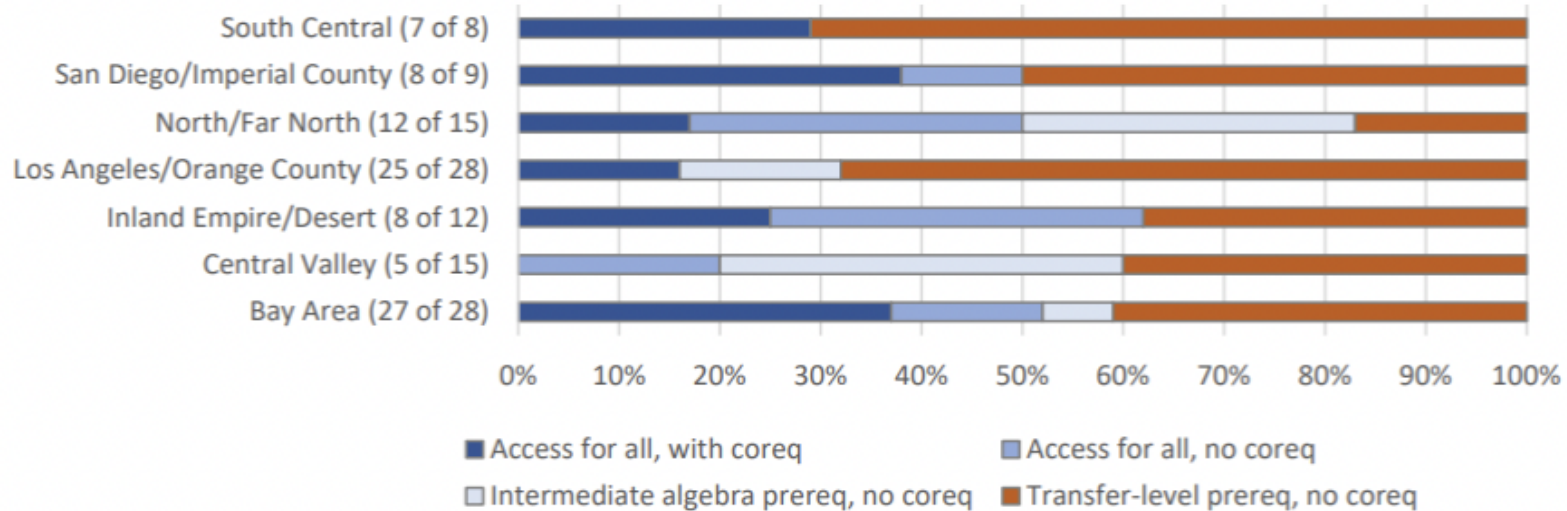
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Access to business calculus varies widely within and across regions.

2022-2023 catalogs

Business Calculus Access by Region



Recommendations
for strong and
equitable
completion of
calculus for the
business major

- ❖ Replace prerequisites with corequisite support that is tailored to the gateway course for the business degree, e.g., business calculus or finite math, and follow the principles of [good corequisite design](#).
- ❖ Integrate instructional strategies into gateway courses that create welcoming, intellectually engaging, interactive and supportive learning environments.
- ❖ Start business students in college-level statistics; statistics is required for the business major and may be an easier transition to college math.