AB 1705 Non-STEM Validation: Business Administration and Template Assistance

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June 2023

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Objectives

- Review validation requirements for AB 1705
- Review findings from analysis of largest non-STEM program with a transfer-level prerequisite: Business Administration Associate Degree
- Explore how to replicate the statewide analysis locally
- Review data submission template for colleges choosing to submit local validation
- Questions and Answers (potentially)

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AB 1705 Reporting Requirements

- Requirements were detailed in the **AB 1705 guidance memo** (December 2022) and in the **AB 1705 Implementation Guide** (March 2023) and an **AB 1705 FAQ**.

- Per Education Code §78213, validation of non-STEM transfer-level prerequisites is **due July 1, 2023**. However, given the time of the academic year, the Chancellor's Office will collect this certification from colleges on a rolling basis from **July 1, 2023, to September 1, 2023**.

- **All colleges must complete a certification form** for AB 1705 Validation of Equitable Placement, Support, and Completion Practices for General Education and Non-STEM Programs to report to the Chancellor's Office the college's compliance status.

Required Action One

U.S. high school graduates (or equivalent) shall **begin in transfer-level** English and math/quantitative reasoning coursework.

- Applies to programs with English or math/quantitative reasoning requirements. To ensure compliance, **colleges may choose from two options:**

A. **Continue or implement default transfer-level placement** into English and math/quantitative reasoning courses with **no pretransfer-level enrollment.**

B.Continue to implement default transfer-level placement and enrollment into English and math/quantitative reasoning courses **with limited pretransfer-level or non-credit enrollments restricted to programs serving students exempted under the law** (see guidance memo). Colleges must **clearly define and implement a mechanism for restricting access for any students other than those exempted from the law.**

Required Action Two

Students **shall begin in the transfer-level** English and math/quantitative reasoning coursework that satisfies a course requirement for the student's intended certificate or associate degree or a requirement for transfer **within the intended major**.

- Validation is required for transfer-level prerequisites preceding gateway transfer-level English or math courses for degree or transfer in the major by July 2023 (the timeline for STEM programs is extended to July 2024)

- Largely **applies to students in transfer-level math courses** associated **with lower division requirements** for the major.
- **Colleges should conduct an audit of their degrees and transfer pathways** to identify transfer-level prerequisites that do not satisfy required gateway coursework.

Ensuring Compliance

To ensure compliance, **colleges may choose from two options**:

A. **Ensure access, enrollment and support in gateway transfer-level English and math/quantitative reasoning coursework for every program**.

B. **Validate** that **the prerequisite** meets the standards of the law by acting in accordance with the statewide validation finding or through completion of a validation template.

Ensuring Compliance, Continued

If the transfer-level prerequisite to the **gateway course is not validated:**

1. The college **shall not require or recommend the prerequisite** to students, and
2. the U.S. high school graduate (or equivalent) **shall begin in the gateway course** when they begin coursework in English or math/quantitative reasoning.

Business Administration Associate Degree

Serving as a statewide validation of Required Action #2

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Business Administration Associate Degree

- Many Business Administration students begin their math coursework in College Algebra or Precalculus

- At some colleges College Algebra and Precalculus are prerequisites to a gateway Business Calculus or applied calculus course and do not satisfy course requirements for the Business Administration Associate Degree.

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Research Question #1

1) **Are students with lower levels of high school math preparation highly unlikely to succeed in Business Calculus if directly enrolled in that course?**

Business Calculus throughput was calculated in a one-year timeframe for students in the cohort who directly enroll in Business Calculus as their first community college math course, disaggregated by the highest math successfully completed while in high school. The one-year timeframe tracks the cohort for an academic year (up to four academic terms) from initial transfer-level math enrollment in a calculus-based pathway. The one-year timeframe is specified in AB 1705.

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Research Question #2

2. **Does starting in a transfer-level prerequisite to calculus improve the probability that students will complete calculus within a one-year timeframe when compared to students with similar high school math preparation that directly enroll in calculus?**

Since Business Administration students may complete various forms of calculus, throughput calculations included all possible calculus completions (e.g., Business Calculus or STEM Calculus I). Given that various types of entry-level calculus courses can share the same prerequisites, this approach allowed for the most comprehensive throughput calculation for the completion of Business Calculus or the equivalent for Business Administration students.

Additional Analysis: Extended Timeframe

- Throughput was also analyzed in an extended timeframe of up to 10 years to determine if the transfer-level prerequisite validation results changed when the one-year restriction was removed.

- By removing the time constraint, this additional analysis afforded the prerequisite pathway the greatest possible opportunity to demonstrate its impact on throughput.

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Additional Analysis: Conditional Throughput

- The report also separately examines successful calculus completion rates for **only those students who eventually enroll in calculus**, defined as **conditional throughput**.
- Conditional throughput used an extended timeframe, which gives students one to ten years to complete calculus depending on the year they enrolled in calculus, with disaggregation by highest math course completed in high school and the first course taken in the calculus-based pathway at the community college.
- This analysis is included to highlight the way in which conditional throughput is often used to raise concerns about the potential for lower success rates in a gateway course when students bypass prerequisites.

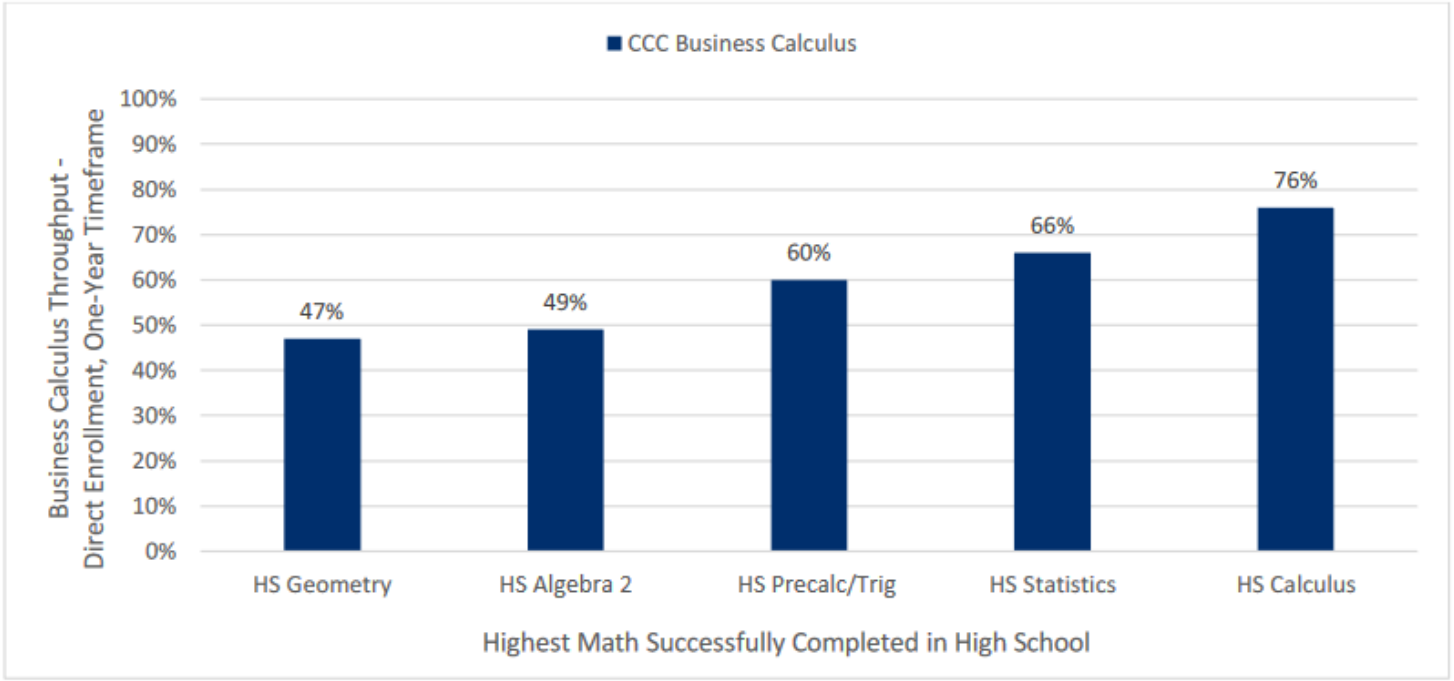
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Finding #1

For students pursuing Business Administration, across all levels of high school math preparation, there are no groups of students who are highly unlikely to succeed when directly enrolled in Business Calculus. Students with lower levels of math preparation are good candidates for and should be provided corequisite support linked to Business Calculus.

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Figure 1. Business Calculus Throughput in One-Year (y-axis) by Highest High School Math (x-axis) for Business Administration Students Who Directly Enroll in Business Calculus



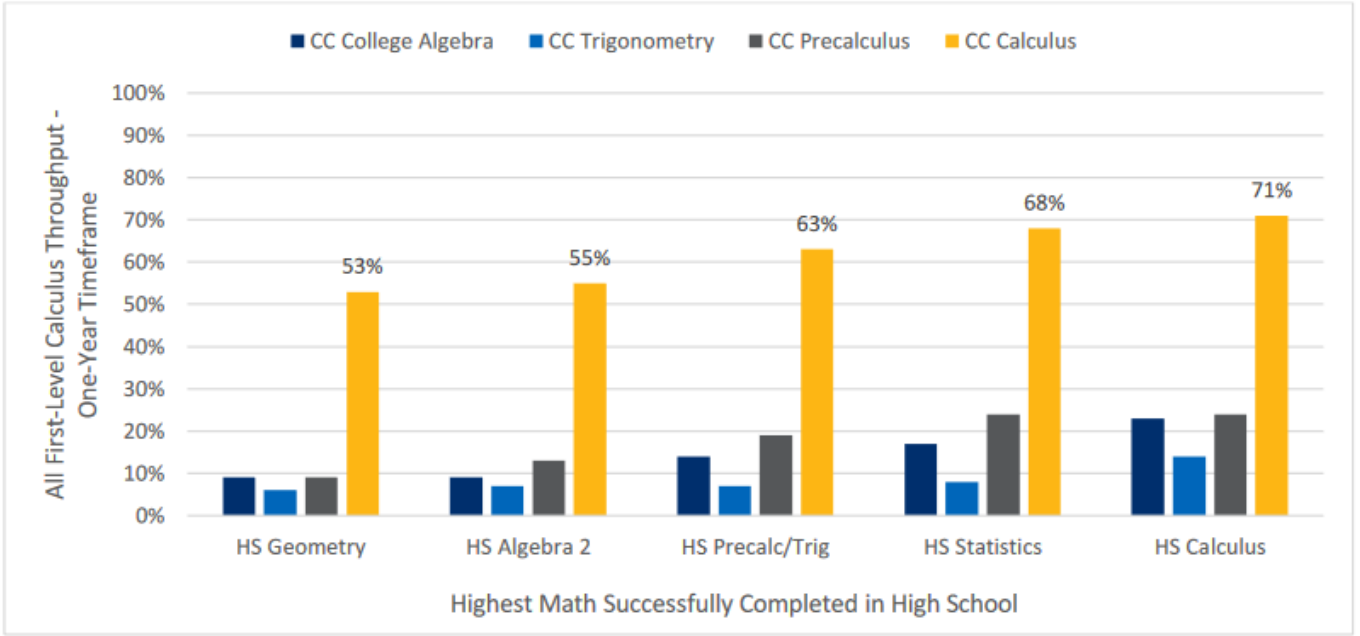
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Finding #2

For Business Administration students who need calculus to meet program requirements, direct enrollment into calculus (across all types) resulted in far higher rates of completion of calculus within one year relative to students beginning in any transfer-level prerequisites, across all levels of high school preparation.

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Figure 2. All First-Level Calculus Throughput in One-Year (y-axis) by Highest High School Math (x-axis) and First Community College Course (legend) for Business Administration Students



Note: Legend represents the first community college math course for Business Administration students.

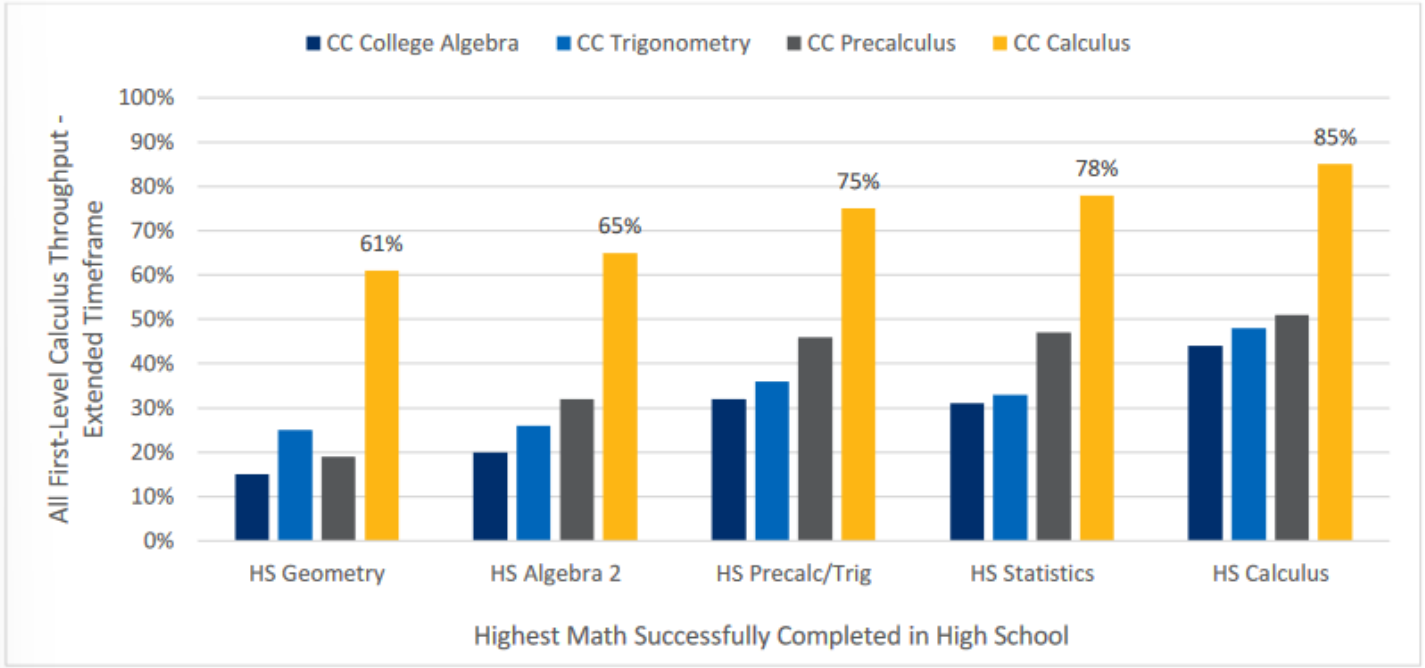
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Finding #3

Even when the timeframe was extended, Business Administration students starting in a transfer-level prerequisite were still far less likely to successfully complete calculus than students who began directly in calculus, across all levels of high school math preparation.

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Figure 3. All First-Level Calculus Throughput (y-axis) Extended Timeframe by Highest High School Math (x-axis) and First Community College Course (legend) for Business Administration Students



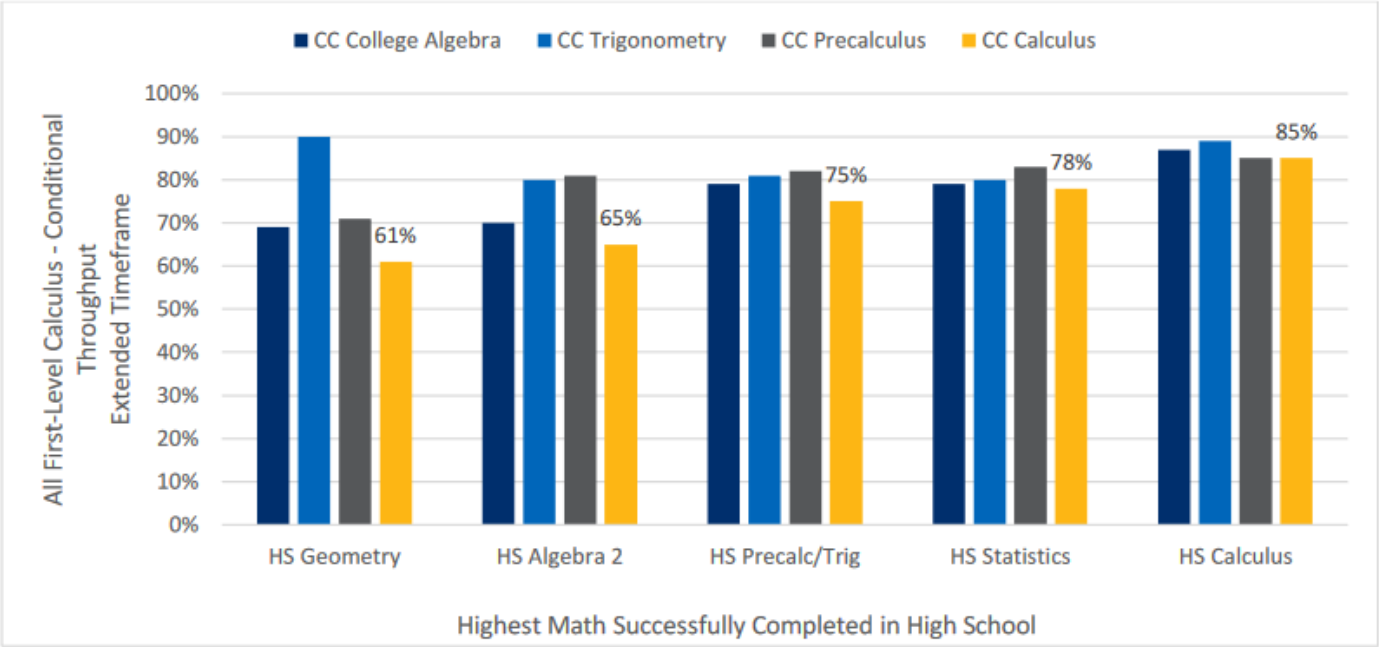
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Finding #4

Restricting Business Administration students' access to calculus resulted in higher conditional throughput rates but at a very high cost to program enrollment and gateway math course completion. Thousands of students who could have succeeded in a calculus course never made it to calculus because of the prerequisites and their progress and completion in Business Administration was powerfully, unnecessarily, and unfairly curtailed.

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Figure 4. All First-Level Calculus Conditional Throughput Extended Timeframe (y-axis) by Highest High School Math (x-axis) and First Community College Course (legend) for Business Administration Students



Note: Legend represents the first community college math course for Business Administration students.

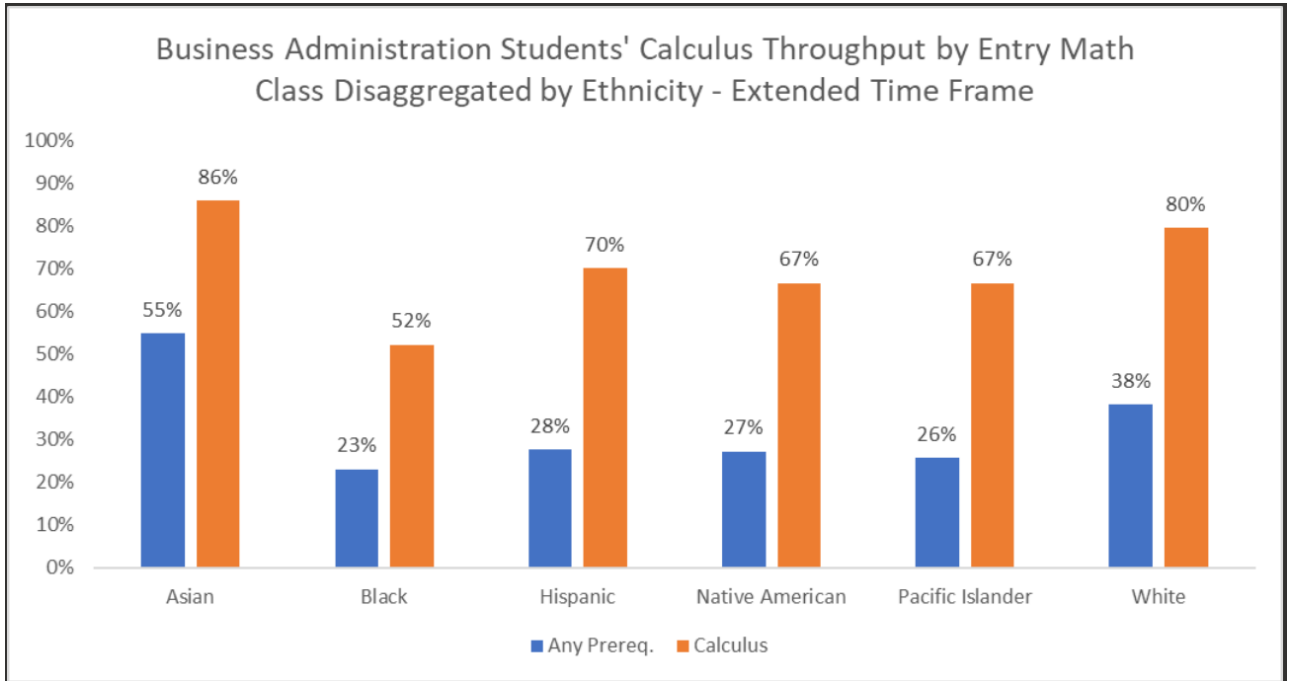
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Finding #5

For students pursuing Business Administration, across all levels of high school math preparation (aggregated together), direct access to calculus optimizes throughput for all ethnicity groups. Further, there are no groups of students, when disaggregated by race/ethnicity who are highly unlikely to succeed when directly enrolled in any Calculus course.

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Figure 5. Calculus Throughput in Extended Timeframe (y-axis) by Highest High School Math (Aggregated) (x-axis) for Business Administration Students Who Directly Enroll in Any Calculus



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Finding #4 - Implications

Consider this example of the impact of prerequisites on persistence and enrollment in the Business Administration program:

Example: Business Administration students with Geometry as highest HS math

- Of those who start in any introductory calculus, 53% complete it within a year and 61% complete within an extended timeframe.
- Of those who start in college algebra, 9% (57 of 641) complete calculus within a year, 15% complete within the extended timeframe.
- If those 641 students had started in calculus instead of college algebra, 53% of them would likely have completed calculus. This is 340 students. **Nearly six times as many Geometry completers could have passed** the gateway course for their program within one year and progressed in the program.

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Summary

- Business Administration students were **far more likely to complete a calculus requirement for their program when they started directly in a calculus course** than if they started in a transfer-level prerequisite. Importantly, these findings were consistent across every level of high school math preparation and across all transfer-level prerequisites.
- In the case of Business Administration majors, this analysis suggests that business programs are losing large numbers of capable students due to prerequisite structures that prevent students' direct enrollment into calculus.

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Replicating Business Administration Analysis

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Replication of Statewide Analysis – Step 1

1) **Select students in the desired program(s) whose first math class was within the time frame of study, e.g., Summer 2013 through summer 2022. This is your basic sample & data frame; it should be one student per row with no duplicates. Add the following variables to this basic data frame:**
   - ✓ Highest high school math completed from CCCApply and/or MMPS
     - ➢ Code high school math as follow:
       - ➢ 1 = Geometry/Integrated Math 2 or lower
       - ➢ 2 = Algebra 2/Integrated Math 3
       - ➢ 3 = Precalculus/Math Analysis/Trigonometry
       - ➢ 4 = Statistics
       - ➢ 5 = Calculus or higher
   - ✓ High School GPA
   - ✓ Ethnicity, gender, other variables of interest for later disaggregation & equity analysis
   - ✓ Latest program of study ← filter to include only relevant students (e.g., Business Administration and Economics ADT students)

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Replication of Statewide Analysis – Step 2

2) **Identify all students' math class enrollments at the college, one row per enrollment.**
   - ✓ Include term of enrollment
   - ✓ Include course variables: course ID, short course title, course control number (if available), course units (max)
   - ✓ Include student outcomes for the class section: final grade mark/outcome, grade points, success indicator (0/1), registration status (include only students with a valid census enrollment)

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Replication of Statewide Analysis – Step 3

3) Compute new columnar variables, one set for each relevant math course.

- ✓ Compute a set of enrollment variables for each course of interest, e.g.:
  - ✓ Precalculus
  - ✓ Trigonometry
  - ✓ College Algebra
  - ✓ Finite Math
  - ✓ Business Calculus
  - ✓ Calculus I
- ✓ Use prefix or suffix to identify the content and level of each set of math enrollment variables. See Step 1 for list of variables to include.

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Replication of Statewide Analysis – Step 3a

Sample code:

```
STR Calculus_College (A3) Calculus_CourseID (A12) Calculus_CourseTitle (A80)
Calculus_CourseMarkLetter (A4).

If (MathTransferType = 8) Calculus_College = CollegeCode.
If (MathTransferType = 8) Calculus_CourseID = CourseID.
If (MathTransferType = 8) Calculus_CourseTitle = CourseTitle.
If (MathTransferType = 8) Calculus_CourseMarkLetter = CourseMarkLetter.
If (MathTransferType = 8) Calculus_YearTermCode = YearTermCode.
If (MathTransferType = 8) Calculus_CourseUnitsTry = CourseUnitsTry.
If (MathTransferType = 8) Calculus_Success = success_in_math_class.

fre Calculus_College Calculus_CourseID Calculus_CourseTitle Calculus_CourseMarkLetter
Calculus_YearTermCode Calculus_CourseUnitsTry Calculus_Success.
```

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Replication of Statewide Analysis – Step 4

4) **Aggregate across rows to produce an analytic file with one row per student. Sort by Term (i.e., year and term).**
   - ❑ For each Course ID/type of transfer-level math class:
     - ✓ Max course success indicator, YearTermCode
     - ✓ Last course title, course ID, Course Mark Letter
     - ✓ Sum of units attempted, completed
       - ✓ DATASET DECLARE Example_Aggregated_Analytical_File.
       - ✓ AGGREGATE
       - ✓ /OUTFILE='Example_Aggregated_Analytical_File'
       - ✓ /BREAK=InterSegmentKey
       - ✓ /CCGender_min=MIN(CCGender)
       - ✓ /CCEthnicities_min=MIN(CCEthnicities)
       - ✓ /CCEthnicity_min=MIN(CCEthnicity)
       - ✓ /Calculus_success_max=MAX(Calculus_success)
       - ✓ /Calculus_UnitsAttempted_sum=SUM(Calculus_UnitsAttempted)
       - ✓ /Calculus_GradePoints_max=MAX(Calculus_GradePoints)
       - ✓ /Calculus_College_last=LAST(Calculus_College)
       - ✓ /Calculus_CourseID_last=LAST(Calculus_CourseID)
       - ✓ /Calculus_CourseTitle_last=LAST(Calculus_CourseTitle)
       - ✓ /Calculus_CourseMarkLetter_last=LAST(Calculus_CourseMarkLetter)
       - ✓ /Calculus_YearTermCode_max=MAX(Calculus_YearTermCode)
       - ✓ /N_BREAK=N.

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Replication of Statewide Analysis – Step 5

Produce calculus throughput tables with crosstabulations

```
CROSSTABS
  /TABLES=MathTransferType BY Calculus_Success_max BY
Highest_HS_Math
  /FORMAT=AVALUE TABLES
  /CELLS=COUNT
  /COUNT ROUND CELL.
```

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Replication of Statewide Analysis – Step 6

Analyze throughput tables

Does the one-year throughput of prerequisite placement exceed that of those with direct placement into Calculus?

MathTransferType * Bus_Calc_1yr_throughput * HighestHSmathSimplified Crosstabulation

Count					
HighestHSmathSimplified			Bus_Calc_1yr_throughput		
			No	Yes	Total
Geometry and below	MathTransferType	Statistics	1	0	1
		College Algebra	98	0	98
		Trigonometry	15	0	15
		Precalculus	23	0	23
		Calculus	56	49	105
	Total		193	49	242
Algebra 2	MathTransferType	Statistics	8	1	9
		College Algebra	293	3	296
		Trigonometry	77	0	77
		Precalculus	119	0	119
		Calculus	256	250	506
	Total		753	254	1007
Precalc/Trig	MathTransferType	Statistics	24	0	24
		College Algebra	624	5	629
		Trigonometry	231	0	231
		Precalculus	403	0	403
		Calculus	503	767	1270
	Total		1785	772	2557

MathTransferType * Bus_Calc_1yr_throughput * HighestHSmathSimplified Crosstabulation

% within MathTransferType				
HighestHSmathSimplified			Bus_Calc_1yr_throughput	
			No	Yes
Geometry and below	MathTransferType	Statistics	100.00%	
		College Algebra	100.00%	
		Trigonometry	100.00%	
		Precalculus	100.00%	
		Calculus	53.30%	**46.70%**
	Total		79.80%	20.20%
Algebra 2	MathTransferType	Statistics	88.90%	11.10%
		College Algebra	99.00%	1.00%
		Trigonometry	100.00%	
		Precalculus	100.00%	
		Calculus	50.60%	**49.40%**
	Total		74.80%	25.20%
Precalc/Trig	MathTransferType	Statistics	100.00%	
		College Algebra	99.20%	0.80%
		Trigonometry	100.00%	
		Precalculus	100.00%	
		Calculus	39.60%	**60.40%**
	Total		69.80%	30.20%

Data Template Submission

For colleges choosing not to accept results of statewide analysis who are submitting local data for validation

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Required Action #1

Required Action #1: By July 1, 2023, placement policies, enrollment practices, and academic support structures shall ensure that students begin in transfer-level English and math/quantitative reasoning courses, when they take their first English or math/quantitative reasoning course. *

Check one option (A or B) for how the college is compiling with this requirement:

- ◯ Option A: Our college will have no pretransfer-level course enrollments, except corequisites to transfer-level courses, after July 1, 2023.
- ◯ Option B: Our college will continue enrollments into pretransfer-level courses, that are not corequisites to transfer-level courses, for some student groups identified in Ed. Code 78213(j). The college will clearly define and implement a mechanism for restricting enrollments to the intended student groups and will document that only the intended student groups are enrolled.

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Required Action #2

Required Action #2: By July 1, 2024, placement and prerequisite policies, enrollment practices, and academic support structures shall ensure that students in non-STEM programs begin in gateway transfer-level English and math courses for their intended program, when they take their first English or math/quantitative reasoning course. *

Check one option (A or B or C) for how the college is compiling with this requirement *

- ◯ Option A: Our college is compliant. We do not have placement policies, prerequisite requirements, or advising patterns for non-STEM programs that result in students enrolling in transfer-level coursework below the gateway English or math course for their program
- ◯ Option B: Our college plans to make changes to placement, prerequisites, and advising for non-STEM programs to achieve compliance as described in Required Action #2 by July 1, 2024.
- ◯ Option C: Our college will submit data for at least one non-STEM program in an effort to verify that transfer-level prerequisites to gateway math or English coursework improve student's likelihood of completing program requirements.

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Option C: Data Submission

- Use the **template to submit data for each gateway course** for which a transfer-level prerequisite needs to be validated.

- A gateway course is defined as the **lowest transfer-level course that satisfies** the English or mathematics course **requirements** of the intended certificate or associate degree, or a course requirement for transfer **within the intended major**.

- For example, if an associate degree for Economics includes an applied calculus requirement, and the college requires some students to take college algebra before having access to applied calculus, then the college will need to validate the college algebra prerequisite.

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Option C: Data Submission

- Complete the template **for each gateway course** for which the college is attempting to **validate a transfer-level prerequisite**.

- If **several programs have the same gateway course with the same transfer-level prerequisite**, complete the template for the gateway course **only once** and report the program **cohorts in aggregate**.

- If a gateway course for a program has **more than one transfer-level prerequisite** option, **complete the template twice**, once for each prerequisite. In this case, data will be submitted for the cohort for each prerequisite separately.

- For each gateway course within a program that has a transfer-level prerequisite, the **template provides instructions** for defining the cohort, cohort timeframe, cohort count, gateway completion count, and gateway course throughput for the cohort.

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Program Name

- Enter the **program or degree name**, e.g., Business Administration AS-T.
- If **more than one program shares the same gateway** English or math course with a transfer-level **prerequisite**, **enter all program names**.
- For example, if the Business Administration AS-T and the Economics AA-T both have Business Calculus as a gateway course, and the Business Calculus has transfer-level prerequisite, such as college algebra, enter both degree names.

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Gateway Course ID and Title

- Enter the **course ID and course title** for the **gateway transfer-level** English or math/quantitative reasoning for the program(s)

- If the transfer-level gateway requirement can be satisfied with more than one course and you plan to report completions across multiple courses, **include the course ID and course title for all courses that meet the gateway requirement**.

- For example, if the gateway requirement for the program is an applied calculus course, but students can satisfy this requirement by taking STEM Calculus I, enter information about both calculus courses IF you plan to report completions across both calculus courses for students in the program.

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Transfer-Level Prerequisite Course ID and Title

- Enter the **course ID and title of the transfer-level** English or math **prerequisite** to the gateway course (e.g., Math 3 College Algebra)
- If a gateway course has more than one transfer-level prerequisite option, **complete a separate template for each prerequisite**.

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Cohort starting and ending timeframe

- Indicate the **time frame for the cohort**, e.g., summer 2019 through spring 2022, or any other time frame, but specify.

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Number of unduplicated students in the cohort

- Enter the **number of students** with the declared program of study whose **first enrollment in the discipline** is in the **transfer-level prerequisite** within the time frame specified above.

- If multiple programs have the **same transfer-level prerequisite** for the same gateway course, **combine the cohorts**.

- For example, if applied calculus has a prerequisite of college algebra, and applied calculus is required for an associate degree in Economics and an associate degree in Business Administration, enter the number of students in both degree programs whose first math enrollment is college algebra.

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Number of students successfully completing the gateway course within one year

- Enter the **number of students who successfully completed**, with a C or better, the gateway course within one academic year (up to four academic terms) when **starting in the transfer-level prerequisite**. Completions for **cohorts spanning multiple years** can be **combined** as long as each cohort is **tracked for a one-year** time frame.

- (Optional) If desired, **include successful completions of other coursework** that satisfies the gateway requirement.

- For example, if applied calculus is a gateway requirement for the program, but students can satisfy the requirement by taking STEM Calculus I or other forms of calculus, enter all calculus completions for students in the program who started in the transfer-level prerequisite. In this case, make sure that course identifying information is provided for all courses listed as gateway course options.

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Completion rate of the gateway transfer-level course

- Enter the **throughput rate**: the number of students successfully completing the gateway course divided by the number of students in the starting cohort.

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Additional resources:

- All Equitable Placement, Support and Completion (AB 705/1705) materials are available here: https://assessment.cccco.edu/ab-705-implementation

- Maximizing Calculus Completion for Students Seeking the Business Administration Degree report can be accessed here: https://bit.ly/3WYCkxY

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Questions

Questions we cannot answer can be directed to: ab705@cccco.edu.

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