2024-2025 Comprehensive Instructional Program Review - Mathematics

Latest Version

Self-study template for Instructional Program Review process. Visitation Year: 2024-2025. Review period: 2018-2019, 2019-2020, 2020-2021, 2021-2022, 2022-2023, and 2023-2024.

Section 1. Program Overview

A. Mission Alignment : Version by **Lopez, Manuel** on **11/22/2024 01:08**

1. *Explain how your program supports the College's Mission and Students First Framework* (https://www.cerritos.edu/students-first-framework/default.htm).
The Mathematics Department helps prepare our diverse student population to be productive members of their local and global communities by providing learning opportunities to develop the students' problem-solving and critical thinking skills, and by teaching them the mathematical concepts necessary to succeed in their chosen educational pathways.

The Mathematics Department is actively involved in supporting Cerritos College's Student First Framework:

Equitable Access

As Cerritos College strives to expand opportunities for our community to participate in higher education by ensuring equitable access for every learner to enter an educational pathway, the Mathematics Department supports these efforts by providing a wide range of courses designed to meet the needs of our diverse student population.

- Gateway courses with support - aka "S" courses: California's AB705 and AB 1705 radically changed the learning environment for all our students starting in 2017. These changes included the sequential elimination of all pre-transfer-level math courses. By fall 2024, we were not allowed to offer any such courses. This means that now, the first math course available at Cerritos College to any student is a transfer-level math course. To meet the needs of our students in this new environment, the Mathematics Department has developed and is developing new transfer-level courses with built-in support for students who need assistance with prerequisite content. The Mathematics Department has been offering Math 112S - Enhanced Elementary Statistics since fall 2022. Math 155S - Enhanced Precalculus has just been approved for UC elective credit and will be offered to our students in fall 2025. Math 114S - Enhanced College Algebra has been approved by the Curriculum Committee and will be submitted for CSU and UC approval in summer 2025. Math 116S - Enhanced Calculus for Managerial, Biological, and Social Sciences and 170S - Enhanced Analytic Geometry and Calculus I are currently being developed.
- Learning & Career Pathways (LCPs): The Mathematics Department supports Cerritos College's LCPs initiative. We are part of the Contextualized Courses project coordinated by the Office of Academic Affairs.
- Adult Education: The Mathematics Department has an ongoing collaborative relationship with Adult Education to develop non-credit courses of developmental mathematics and support courses for some transfer-level mathematics courses to be offered to Cerritos College students through Adult Education to meet the goals of AB705 and AB1705.

Completion

The Mathematics Department fully supports Cerritos College's commitment to increasing timely completion rates to ensure that all our students achieve their educational goals.

- Math 104: New language in Title V requires that all students seeking an AA degree must take a college level math course. This new requirement could potentially work against Cerritos College's efforts to increase completion rates. To address this challenge, the Mathematics Department developed a new transfer-level math course for non-STEM majors and Plan A students: Math 104 - Survey of Mathematics. This course was specifically designed to meet the general education requirements of non-STEM majors, offering a viable choice to students in Humanities and Arts and specifically well-suited for Plan A students.
- The Office of Educational Partnerships and Programs (EPP): The Mathematics Department supports the efforts of the Office of EPP in its implementation of several key programs at Cerritos College: Cerritos Complete Promise Program, Dual Enrollment, Learning Communities and First Year Experience (FYE), and our national award-winning teacher preparation program, Teacher TRAC.
- MESA (Mathematics, Engineering, Science Achievement): MESA is an academic support and professional development program for students pursuing a calculus-based science, technology, engineering, mathematics (STEM) degrees. Since spring 2024, one of our full-time faculty members has been the Faculty Sponsor of MESA. A Faculty Sponsor serves as a liaison with the Science Engineering and Math (SEM) division to advance the main goals set for the program. In her capacity as the MESA Faculty Sponsor, she has:

1. Established Academic Excellence Workshops.
2. Provided administrative support by recruiting student facilitators and tutors.
3. Mentored student facilitators.
4. Developed and fostered working relationships with faculty in the SEM division.
5. Conducted student outreach and recruitment and.
6. Provided support trhrough attending field trips and events for MESA students.

- UMOJA Mentorship – In Swahili, umoja means unity. To support this unity, full-time math faculty serve as mentors in the UMOJA Success Program. The Cerritos College Umoja Success Program is committed to enriching, fostering, and nurturing the educational experience of all students, especially African American and first-generation college students, ultimately preparing them for academic, personal, and professional success beyond Cerritos College.
- Math Success Center (MSC): The Mathematics Department provides in-person and remote support to our math students in the MSC, and it is involved in the training of MSC tutors.

Career and Transfer Success

Math courses at Cerritos College play a crucial role in supporting innovative career pathways and transfer pathways for all our students. By offering a wide range of math courses tailored to diverse fields, such as survey of mathematics for liberal arts, statistics for social sciences, and calculus for engineering, we support our students in meeting the needs of the economy.

The flexibility we offer allows students to pursue career pathways that require varying levels of mathematical proficiency, thereby increasing employability while also meeting the needs of transfer students aiming for four-year institutions. By integrating relevant applications, innovative teaching methods, collaborative projects and real-world problem-solving, our courses enhance students' critical thinking and analytical skills, which are highly valued in today's job market. Ultimately, our math courses are vital in fostering a skilled workforce and facilitating a smooth transition to universities.

In addition to being hired as mathematics instructors and professors, mathematicians are hired as auditors, financial analysts, operations analysts, civil engineers, computer scientists, database administrators, researchers, economists, epidemiologists, and actuaries. While some of these careers may require
additional degrees, mathematics is an especially important component of the application to these careers. A strong mathematics background is essential in many of the natural and social sciences.

The Cerritos College Mathematics Department actively encourages students to seek career development and internships in STEM areas by announcing career and internship opportunities to students, exposing students to professionals currently working in the STEM fi eld, and by enthusiastically writing letters of recommendation for students.

The Mathematics Department is eager to serve the transfer population as well as the local community. To serve students seeking a terminal AA, students can now take Math 104, a course designed for non-STEM and non-business majors. All other courses currently offerned are CSU approved, and all, but Math 110A, 110B, and 140, are UC approved. We are working with the Curriculum Committee to ensure that our courses meet the new CalGETC transfer requirements.

Institutional Health

Cerritos College's aim for agile, caring practices that foster excellence throughout our operations is supported by the Mathematics Department's commitment to professional growth.

- Culturally Responsive Pedagogy Practices (CRPP) Grant: The Mathematics Department is actively involved with the CRPP training program that supports faculty to reflect, learn, and implement culturally responsive and sustaining practices in their curriculum, assignments, and classroom activities.
- SEM Faculty Inquiry Group (FIG): Math faculty participated in an SEM FIG led by Earth Science Professor Crystal LoVetere. This FIG was a shared learning experience with a focus on the importance of professor-student relationships.
- Association of College and University Educators (ACUE) Certificates in Effective College Instruction. Members of the math department were involved a year-long collaboration with other departments (English and Adult Ed) to establish Effective Practice Framework, which included the following micro credentials:

1. Designing an Effective Course and Class
2. Establishing a Productive Learning Environment
3. Using Active Learning Techniques
4. Promoting Higher Order Thinking.

- American Mathematical Association of Two-Year Colleges (AMATYC) National Conference: Our two new full-time math faculty members attended the AMATYC National Conference in 2023. They participated in workshops focusing on statistics, strategies and mindset for student success, and equity and inclusivity. However, more faculty should be attending these meetings so that the newer faculty are not left in isolation with new ideas that may not be embraced or understood by established faculty. That would require ongoing institutional financial support.
- California Mathematics Council (CMC) - South Conference: Several full-time faculty members attend the CMC - South Conference each year. The theme in 2023 was "Teaching and Learning Big Mathematical Ideas." This conference is one of the most popular mathematics conferences in the United States, with one of the lowest registration costs. It should be a regularly funded professional development activity.

B. Degrees and Certificates : Version by **Lopez, Manuel** on **09/19/2024 14:38**

Degree	Type (Cert., AA, AA-T, AS, AS-T)	Units or Courses Required
MATHEMATICS ASSOCIATE IN SCIENCE DEGREE FOR TRANSFER	AS-T	REQUIRED CORE (18 units)
		MATH 170 - Analytic Geometry and Calculus I (4 units)
		MATH 190 - Analytic Geometry and Calculus II (4 units)
		MATH 225 - Calculus III (5 units)
		MATH 250 - Linear Algebra and Differential Equations (5 units)
		SELECT ONE (3 – 4.5 units)
		PHYS 201 - Engineering Physics (4 units)
		CIS 180 - Programming in C/C++ (3 units)
		MATH 112 - Elementary Statistics (4 units)
		MATH 112S -Enhanced Statistics (4.5 units)
		Total Units for the Major: 21 - 22.5
		ADDITIONAL DEGREE COMPLETION REQUIREMENTS:
		1. Completion of 60 semester-units or 90 quarter-units that are eligible for transfer to the California State University, including both of the following:
		The Intersegmental General Education Transfer Curriculum (IGETC) or the California State University General Education – Breadth Requirements.
		A minimum of 18 semester-units or 27 quarter-units in a major or area of emphasis, as determined by the community college district.
		2. Obtainment of a minimum grade point average of 2.0.
		3. Also required is that students must earn a "C" or better in all courses required for the major.

Section 2. Program Trends

A. Program Data : Version by **Lopez, Manuel** on **12/09/2024 23:27**

1. Describe your student demographics (race/ethnicity, gender, age, and others that might be relevant). Consider the following questions when writing your response:

- ***How do the demographics of your program and its related courses compare with the college as a whole?***

- ***Have they changed over time?***

The demographics of the Mathematics Department are consistent with the demographics of the college as a whole.

Consider the unduplicated headcounts from 2018-2019 through 2023-2024 disaggregated by gender. For the college at large, the proportion of female students over the past six years has fluctuated between 53% and 56% while the proportion of male students has fluctuated between 42% and 45%. In the Mathematics Department, the proportion of female students over the past six years has fluctuated between 49% and 55% while the proportion of male students has fluctuated between 45% and 50%.

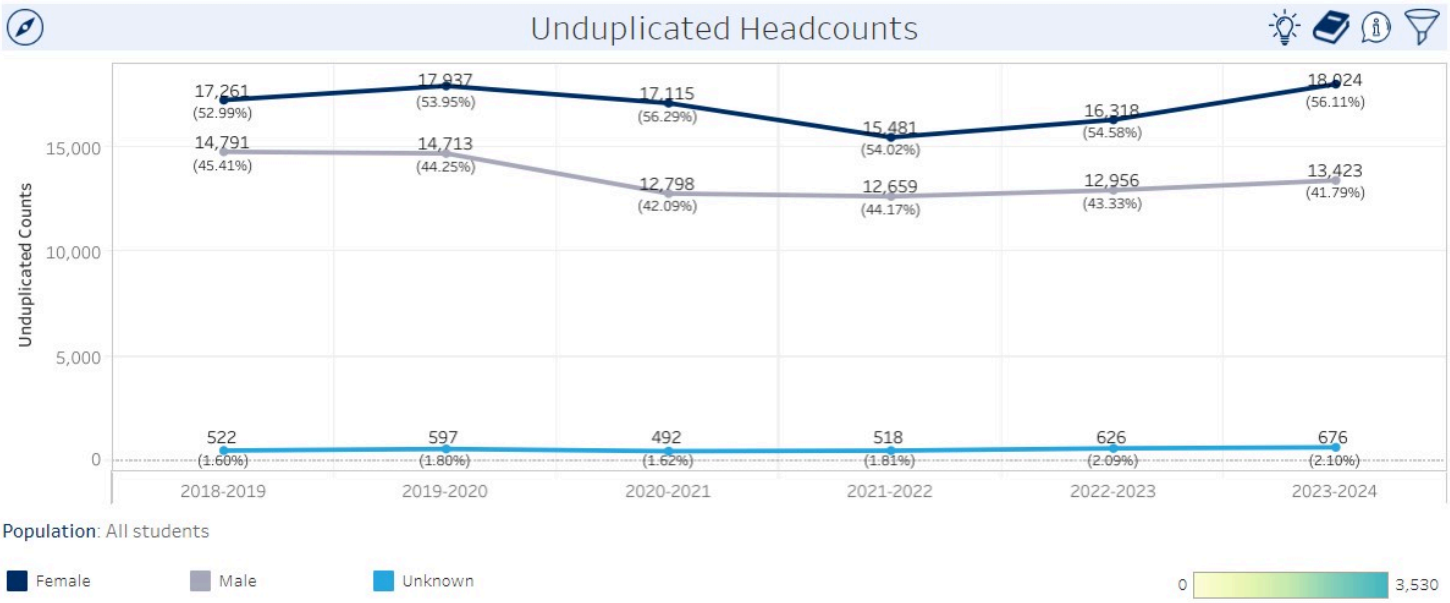

Fig. 1: Cerritos College - Unduplicated Counts by Gender

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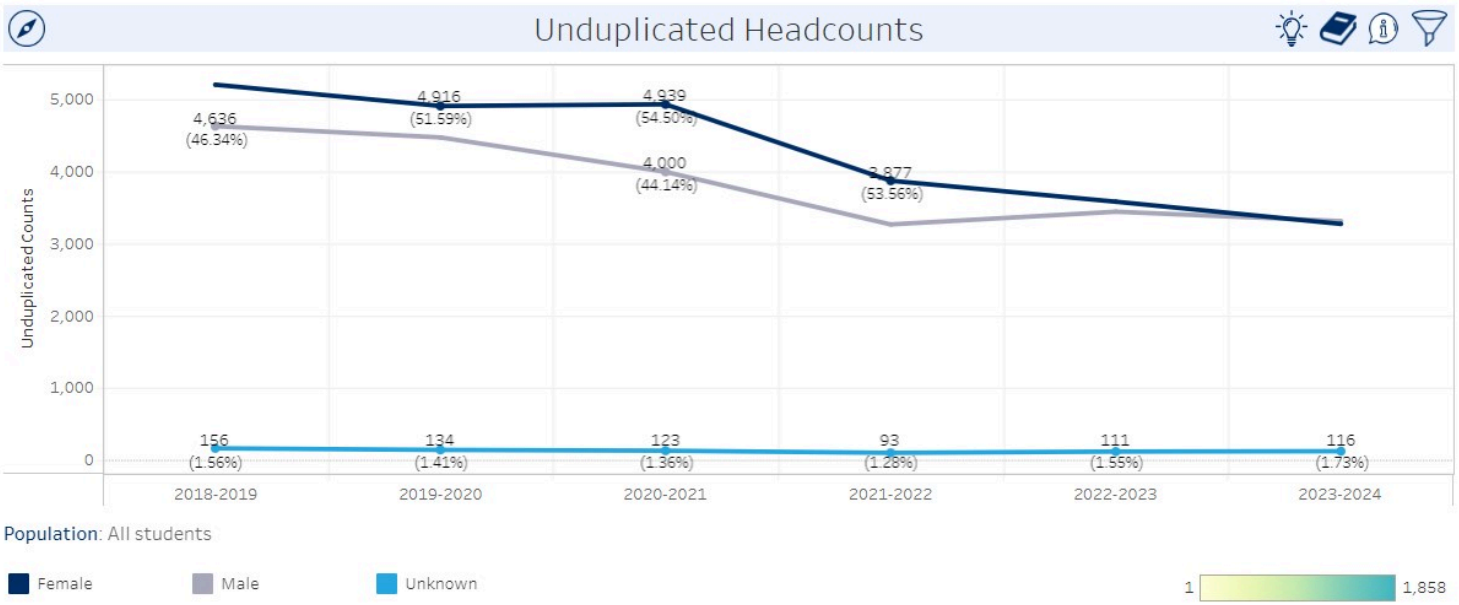

Fig. 2: Math Department - Unduplicated Headcouts by Gender

Notice that the number of males and females in math classes has declined over time. We do not know with certainty why this is different from the enrollment over time for all students at Cerritos College. However, we speculate that this decline may be in part caused by the fact that the number and variety of math courses we offer has declined sharply over the past few years as a direct consequence of AB 705 and AB 1705.

Now, consider the same data disaggreagated by race. Note: To make the data easier to read, there are 2 graphs for the college and 2 graphs for the Mathematics Department, focusing on the 4 largest groups disaggregated by race.

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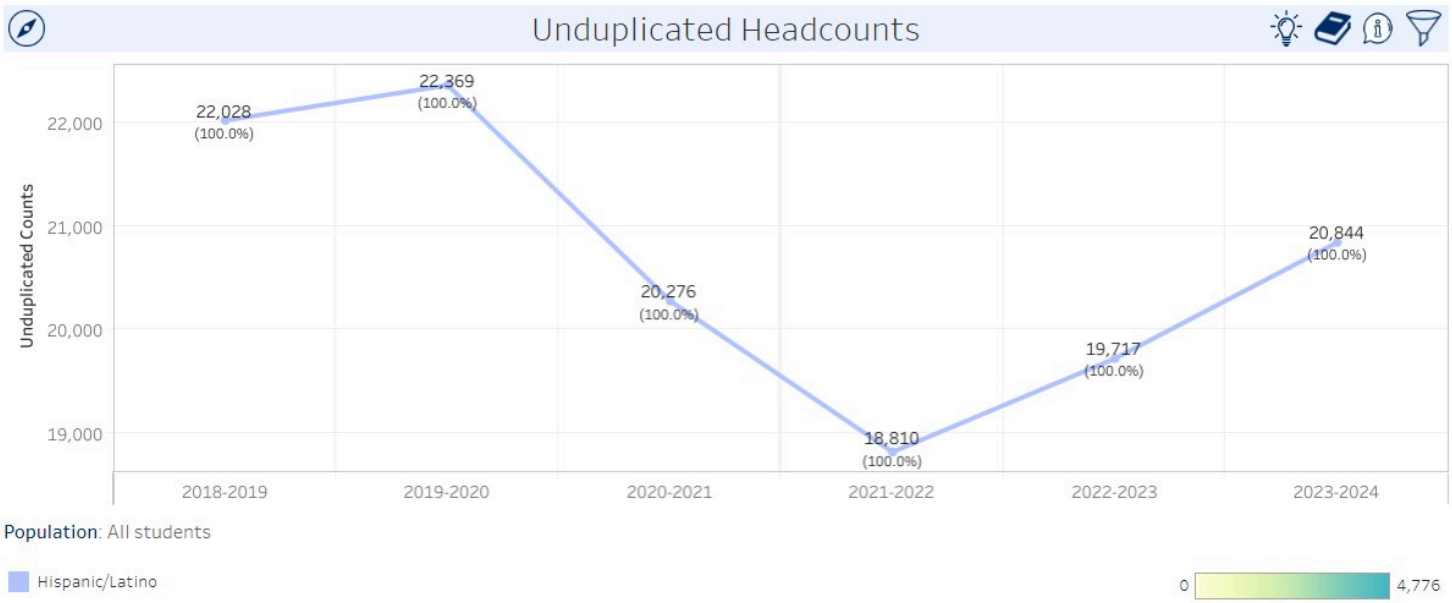

Fig. 3: Cerritos College - Unduplicated Counts by Race A - Latino

Fig. 4: Math Department - Unduplicated Headcounts by Race A - Latino

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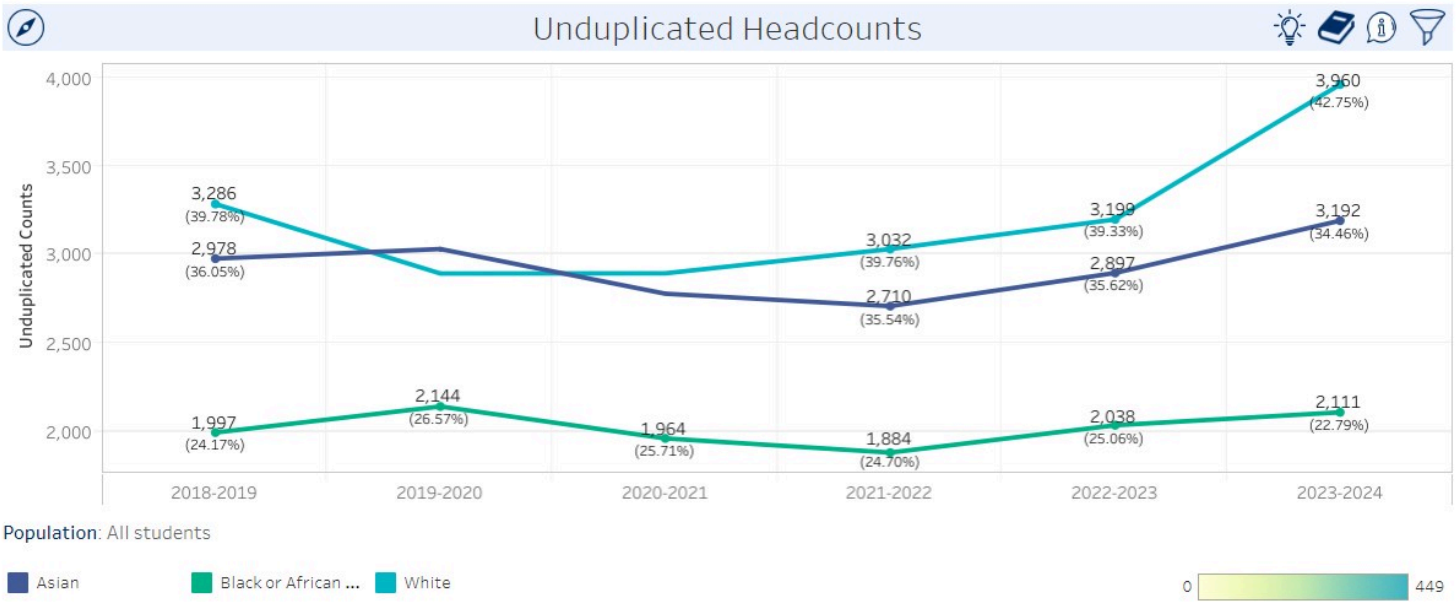

Fig. 5: Cerritos College - Unduplicated Counts by Race B - Asian, Black, and White

Fig. 6: Math Department - Unduplicated Counts by Race B - Asian, Black, and White

The following table summarizes unduplicated headcounts for the college and the Mathematics Department for the past 6 years, and it presents the percent of each subgroup of students that were enrolled in math classes in each of those years. For example, in 2018-2019, 34% of the 22028 Latino students at Cerritos College were enrolled in math courses.

Table 1

Over the past 6 years, the proportion of Cerritos College students enrolled in math classes has decreased across all racial groups. For Latino students there was about a 10% decrease, for White students the decrease was about 8%, for Asian students it was about 5%, and for Black students it was about 8%. Much of this decline is due to the loss of pre-transfer level courses mandated by California's AB 705 and AB 1705. Our collective experience suggests that many students come to Cerritos College with various degrees of math anxiety, and it is not unreasonable to conclude that students that were intimidated by taking pre-transfer-level math courses, such as Math 60 or Math 80, would be much more intimidated by, and therefore less likely to enroll in, transfer-level math courses such as Math 104 or Math 112. We anticipate that with time and with the addition of more courses with built-in support to the schedule, this practice will be normalized, and students will be more comfortable enrolling in transfer-level math courses.

While the elimination of pre-transfer level math courses seems to have affected all racial groups similarly, one fact stands out from table 1. For the past 6 years, the proportion of White students at Cerritos College enrolling in math classes has been significantly lower than the proportion of any other racial group, and the rate is decreasing. On average, only 14% of White students at Cerritos College take math classes each year. The average for Latino students is 29%, for Asian students, it is 26%, and for Black students, the average is 25%. To investigate this further, we looked at unduplicated headcounts and at the proportion of students belonging to each of these four racial groups for the college at large and for the mathematics department. We then looked at these demographics in four different categories of math courses: Pre-transfer level, non-STEM and non-Business transfer-level, Business transfer-level, and STEM transfer-level.

Tables 2 and 3 show that the number of Latinos, Asians and Blacks in the Mathematics Department are proportional to their numbers in the college at large. This is not the case for White students. Over the past 6 years, about 11% of the student population at Cerritos Colles has been White, but only 5% of the students taking math classes have been White, and this rate is declining. When we separate the courses into the groups described above, we see a similar pattern emerge for White students.

Unduplicated Headcount - Pre-Transfer Level Math Courses

	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	2023-2024
Latino	4955 - 78%	2840 - 77%	2504 - 75%	1620 - 75%	1249 - 75%	153 - 75%
White	340 - 5%	163 - 4%	192 - 6%	109 - 5%	85 - 5%	14 - 7%
Asian	367 - 6%	199 - 5%	164 - 5%	107 - 5%	86 - 5%	18 - 9%
Black	354 - 6%	236 - 6%	260 - 8%	160 - 7%	133 - 8%	11 - 5%

Table 4

Unduplicated Headcount - Transfer-Level
Non-Business Non-STEM

	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	2023-2024
Latino	1483 - 73%	2500 - 74%	2358 - 74%	1940 - 74%	2074 - 75%	2436 - 75%
White	121 - 6%	154 - 5%	157 - 5%	128 - 5%	114 - 4%	173 - 5%
Asian	169 - 8%	292 - 9%	228 - 7%	230 - 9%	199 - 7%	211 - 7%
Black	134 - 7%	231 - 7%	230 - 7%	172 - 7%	211 - 8%	235 - 7%

Table 5

The proportion of White students taking math classes in each of the four categories is fairly consistent, between 5% and 6% across the board. We do not understand the causes of this underrepresentation of White students in math classes. This trend predates the pandemic and the enactment of AB 705, and it does not seem to have been affected by either event. When we look at the consistency of the proportion of White students in math classes over the years, we can rule out demographic changes in our service area as the root cause of this problem because regardless of the number of White students at Cerritos College, the proportion of them taking math classes is about 5%.
Tables 4 through 7 show that Latino, Asian, and Black students are proportionally represented in pre-transfer level math courses, transfer-level non-Business and non-STEM courses, and in transfer-level business courses. In transfer-level STEM courses, Black students are disproportionally underrepresented. While they make up between 6% and 7% of the student population, Black students make up, on average, about 3% of the students taking STEM courses each year.
The Mathematics Department and the Cerritos College community at large must look carefully at these discrepancies. The underrepresentation of White students across all math courses and of Black students in STEM courses may be the result of a lack of interest or shifts in academic interests and career paths, but it may also indicate the existence of systemic barriers, implicit bias, and of external socioeconomic conditions affecting participation. We must strive together to ensure that we provide access and opportunity along with the necessary resources and support to all our students.

2. Headcount (unduplicated) and enrollment (duplicated) in the program. Consider the following questions when writing your response:

- ***Identify enrollment trends.***
- ***Have there been an increase or decrease in enrollment in the last year?***
- ***Are there differences in trends when you disaggregate the data (e.g., online versus face-to-face, demographics, special populations, etc.)?***
- ***How will enrollment trends affect staffing decisions?***

Unduplicated Headcount for Cerritos College and the Math Department

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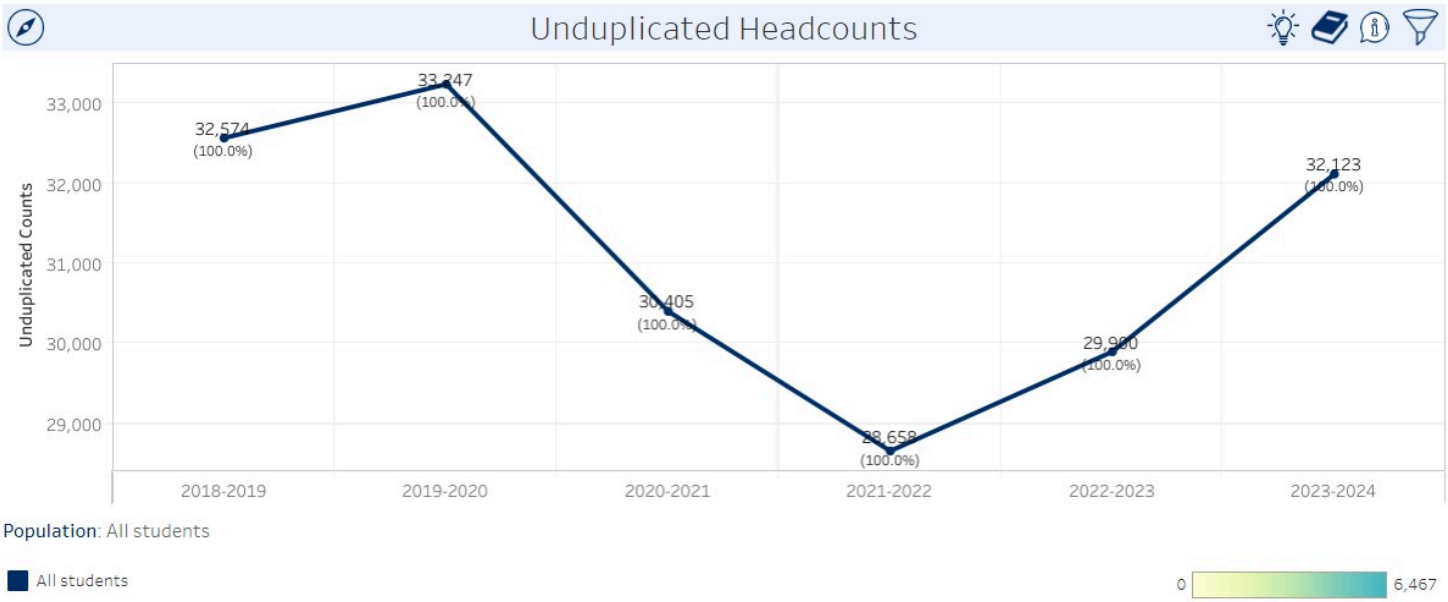

Fig. 7: Cerritos College - Unduplicated Counts

From this data, we can see that from 2018-2019 to 2021-2022, the unduplicated headcounts for the college declined by 12%. This can be attributed, to a large degree, to the Covid pandemic, and the associated personal, social and economic woes suffered by Cerritos College students. Headcounts after Spring 2022 have been increasing and have nearly recovered to pre-pandemic numbers.

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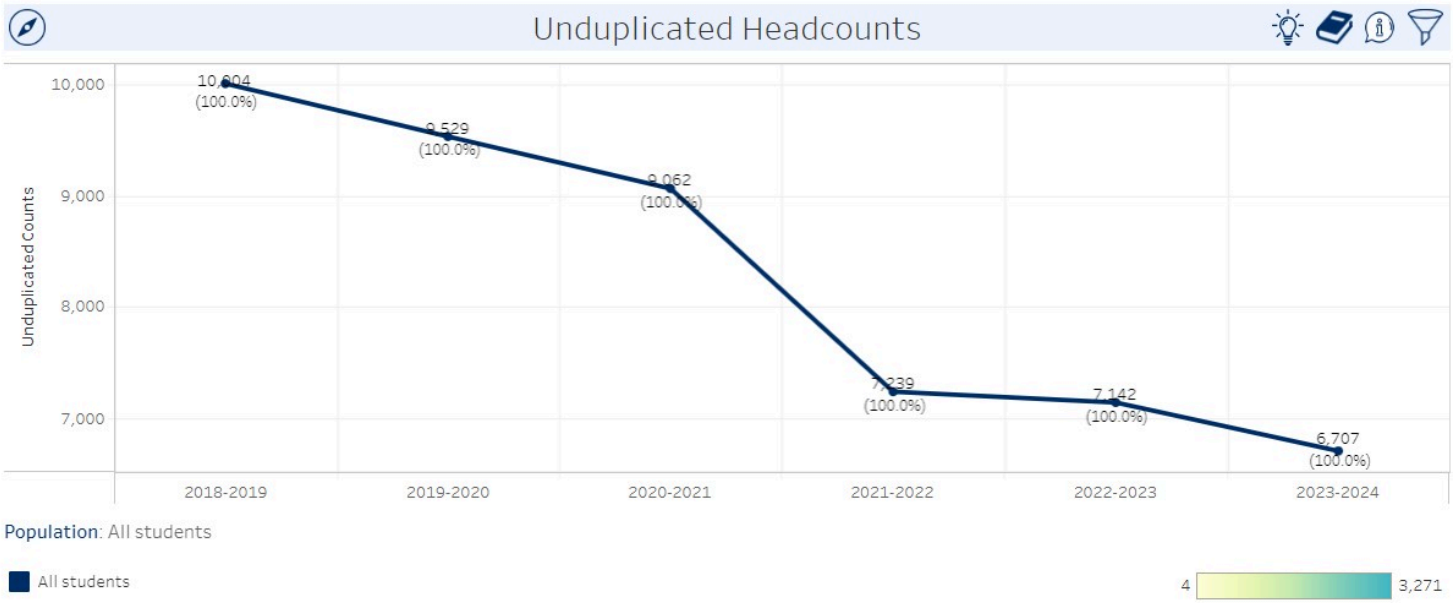

Fig. 8: Math Department - Unduplicated Counts - All Courses

In contrast to the headcounts for the college at large, between 2018-2019 and 2021-2022, the unduplicated headcounts for mathematics courses declined by 28%. Furthermore, unlike the headcounts for the college, the headcounts in mathematics courses did not bounce back after Spring 2022. By Spring 2024, the headcounts for mathematics courses had further declined by 7%. The initial decline may be associated with the pandemic, but the most recent decline may be attributed to the impact of the AB 705/1705 legislation, which mandated the cancellation of all pre-transfer-level math courses. To put things in perspective, consider, for instance, that in Fall 2018, the math department offered 203 sections; 129 (64%) of these sections were pre-transfer-level courses, while 74 (36%) of these sections were transfer-level courses. Starting in Fall 2019, the number of pre-transfer-level sections that we offered began to be significantly reduced. By Spring 2024, to be in compliance with AB 705/1705, we did not offer a single section of pre-transfer-level math, but we offered a total of 138 sections of transfer-level math, an increase of 86% from Fall 2018. Requiring that all students take a transfer-level math course as their first math course at Cerritos College is a significant factor contributing to the decline in headcounts we have seen in math courses after Spring 2022.

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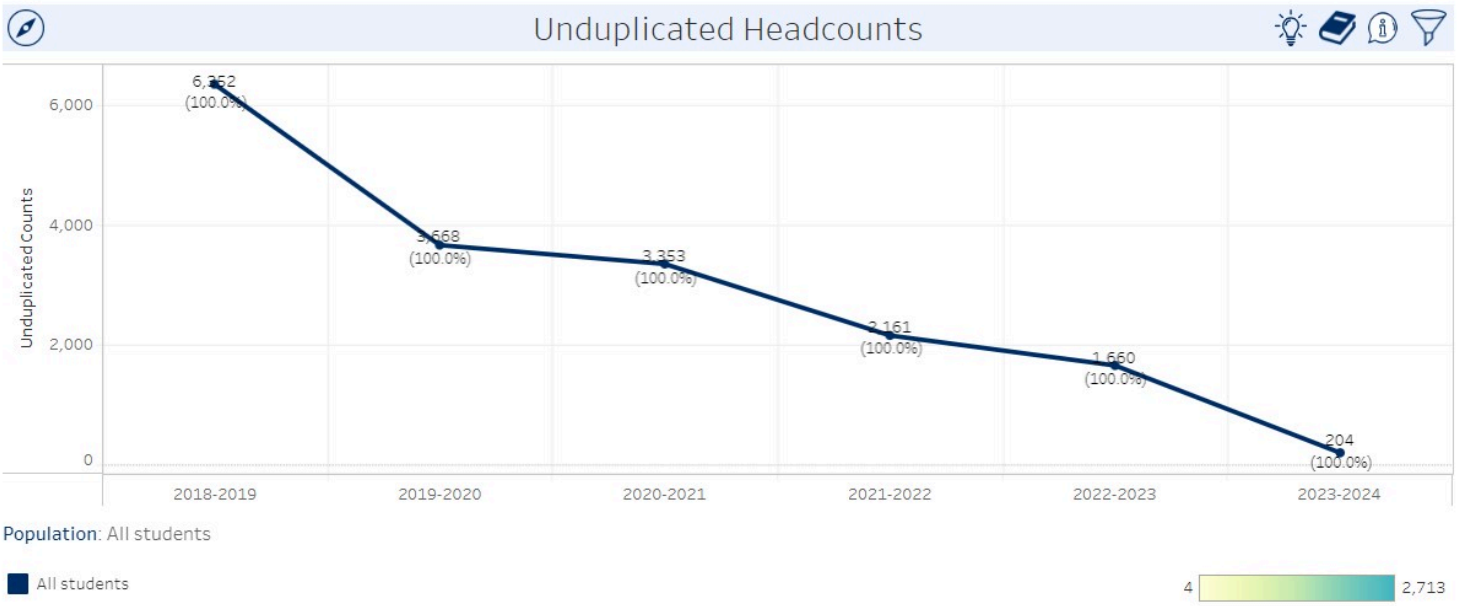

Fig. 9: Math Department - Unduplicated Counts - Pre-Transfer-Level Courses

In 2018-2019, of the 10,004 students enrolled in math courses, 6,352 students were enrolled in pre-transfer-level courses. This means that about 63% of the students enrolled in mathematics courses that year were enrolled in courses which we no longer offer.

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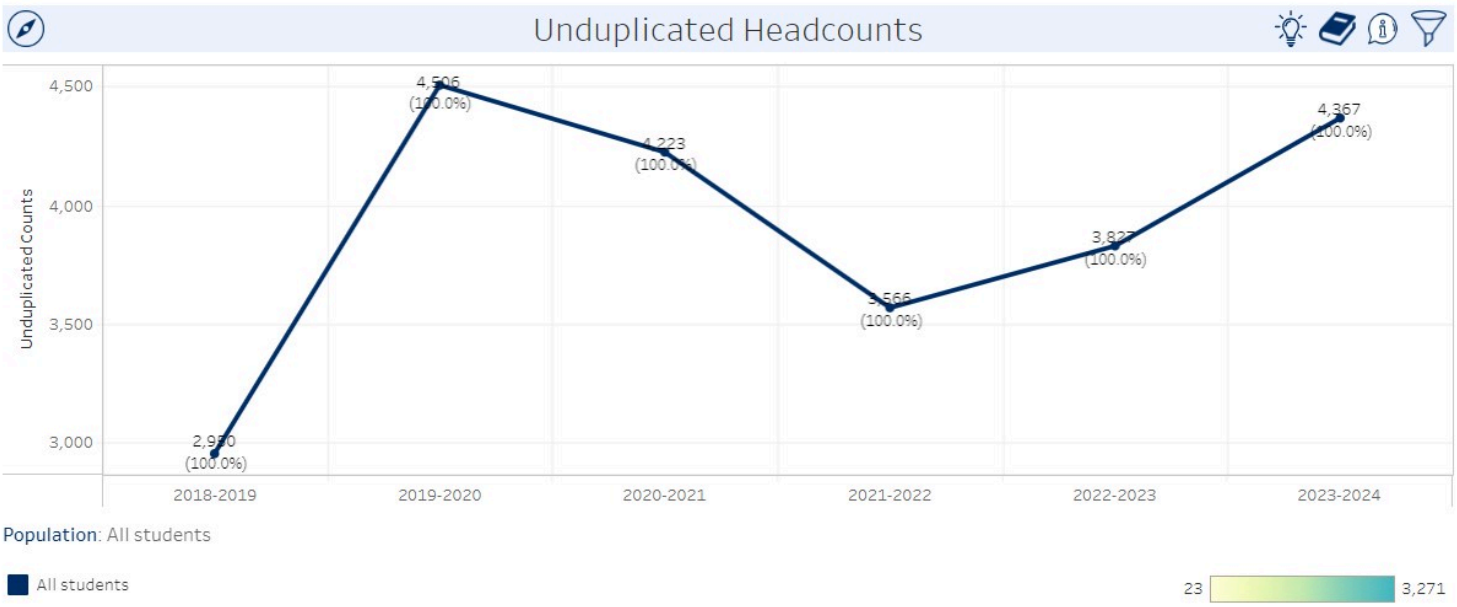

Fig. 10: Math Department - Unduplicated Counts - Non-STEM Transfer-Level Courses

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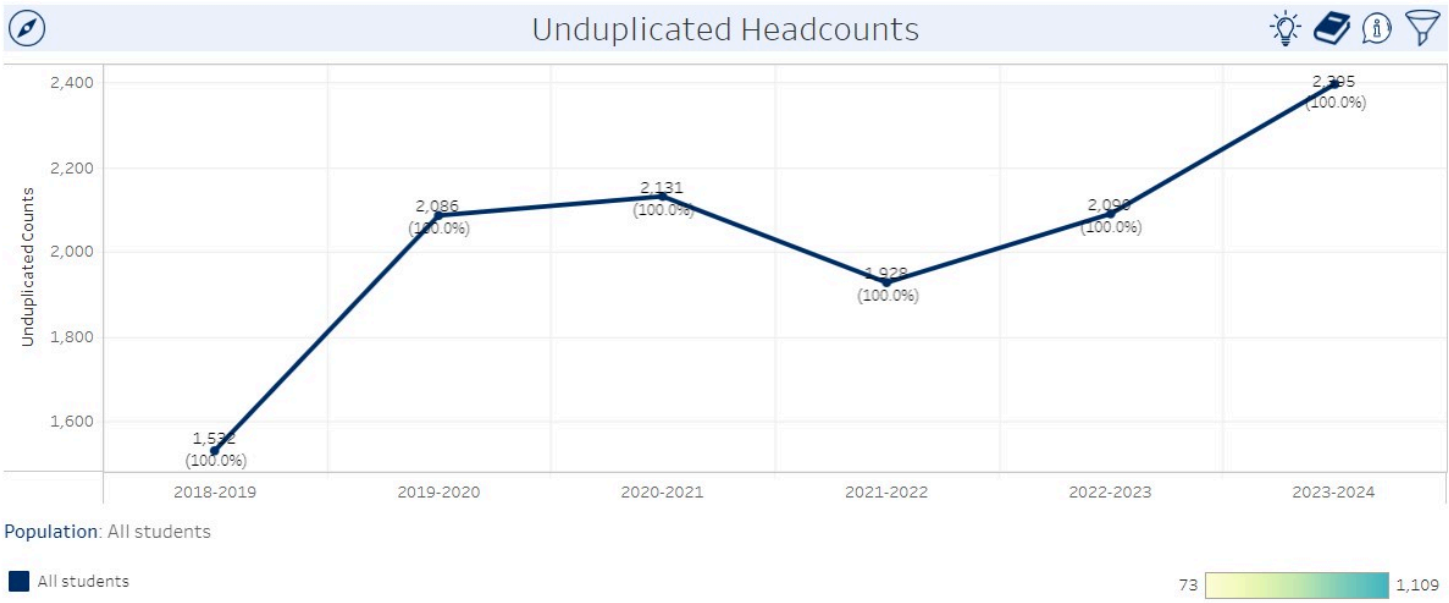

Fig. 11: Math Department - Unduplicated Counts - STEM Transfer-Level Courses

The trend in unduplicated headcouts for transfer-level courses, both for Non-STEM and STEM courses. shows an overall increase. The headcount for students in Non-STEM transfer-level courses increased from 2,950 in 2018-2019 to 4367 in 2023-2024, a 48% increase. In the same time period, the heaccount for students in STEM transfer-level courses increased from 1,532 to 2395, a 56% increase. These substancial gains are a direct result of the Math Department's restructuring of the schedule of classes over time to meet the mandates of AB705/1705. In particular, the creation of Math 104, presents a viable option for non-STEM and non-business students. In addition, our statistics class (Math 112) has become our most popular course, and it has replaced college algebra (Math 114) as the terminal course of choice for non-STEM transfer students.

3. Discuss the program's success and retention rates, addressing any performance gaps if success rates are lower for disproportionately impacted students. Consider the following questions when writing your response:

- ***How have the success and retention rates changed over time?***
- ***Are there particular courses that have particularly low rates and may prove a barrier to program completion?***

Retention and Success Rates for Cerritos College and the Math Department

Fig. 16: Cerritos College - Retention Rates

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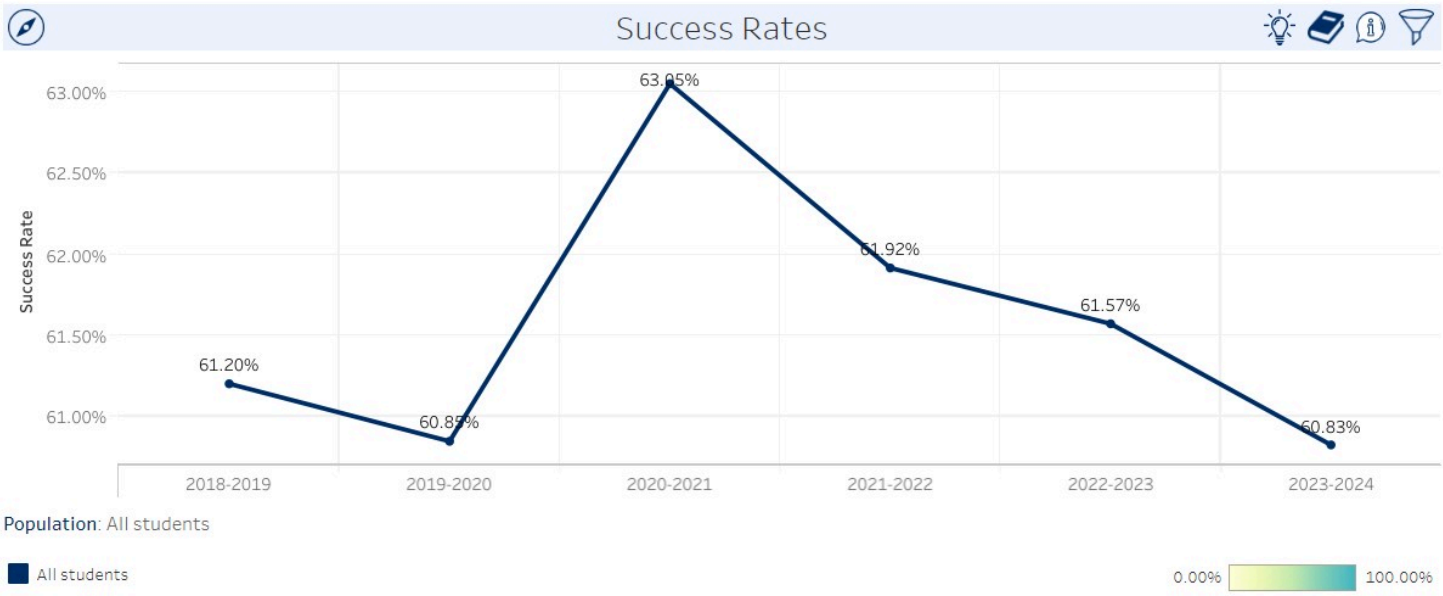

Fig. 17: Cerritos College - Success Rates

Between 2018-2019 and 2023-2024, the retention rates at Cerritos College fluctuated between 71% and 76%, while success rates did so between 61% and 64%.

Fig. 18: Math Department - Retention Rates

Fig. 19: Math Department - Success Rates

For the Math Department as a whole, retention rates between 2018-2019 and 2023-2024 fluctuated between 63% and 68%, while success rates fluctuated between 43% and 50%.

The retention and success rates for the Math Department are distinctly lower that those for the college at large. The Cerritos College Mathematics Department is committed to improving our success and retention rates. We believe this can be accomplished by emphasizing accessibility, engagement and student-centered teaching practices. Here are some of the ways this may be accomplished:

- **Support Courses** – Creating support courses to serve as introduction or review of prerequisite topics. We have developed support courses for statistics, college algebra, and precalculus, and we are in the process of developing support courses for business calculus and for calculus 1. We would like to point out that the time it takes to add a new course to the schedule of classes from the time the course is turned into the Curriculum Committee can be almost two years. The length of this process prohibits us from meeting our student needs in a timely manner.
- **Class Size** – Reducing class sizes can enhance student success. Smaller classes allow instructors to provide more individualized instruction, identifying students who may be struggling early in the term and providing them with the support they may need to succeed in the class. This is particularly critical in mathematics, where personalized feedback and the ability to address diverse learning paces are essential.
- **Classroom Organization** – The physical and functional organization of the classroom should facilitate active learning and collaboration. Arranging desks in clusters can encourage group work and peer-to-peer learning. Providing spaces for interactive problem-solving activities and incorporating the use whiteboards at multiple locations can make the classroom more dynamic and engaging.
- **Use of Multiple Modalities** – To address diverse learning styles, we should incorporate multiple teaching modalities. This can include:
    - **Visual learning** through diagrams, graphs, and videos.
    - **Auditory learning** via lectures and group discussions.
    - **Kinesthetic learning** with hands-on activities such as manipulatives or real-world math applications.
    - **Digital learning** through the use of educational software, online tutorials, and virtual simulations.

Combining these methods ensures that students engage with the material in ways that best suit their individual needs.

- **Advocating for No-Cost or Low-Cost Textbooks and Technology** – This removes financial barriers, allowing students to focus on their studies without worrying about affordability. Similarly, advocating for free or subsidized access to essential technologies, such as graphing calculators or online platforms, ensures that all students have the tools needed for success.
- **Support Systems and Professional Development**
    - **Tutoring and Mentorship**: Expand access to math tutoring services, including peer-led sessions and one-on-one tutoring, to provide additional support outside of class hours. Two programs that are currently in place to serve in this capacity are MESA and UMOJA.
    - **Faculty Training**: Offer professional development opportunities for instructors to learn about inclusive teaching practices, effective use of technology, and innovative pedagogical strategies.
    - **Early Alert Systems**: Implement early intervention programs to identify and support at-risk students before they fall behind.

By addressing class size, improving classroom organization, employing multiple teaching modalities, and by advocating for affordable resources, support systems and professional development, the math department can create a more inclusive and effective learning environment. These changes can empower students, reduce dropout rates, and ultimately improve academic outcomes.

Disaggregated Retention and Success Rates by Gender

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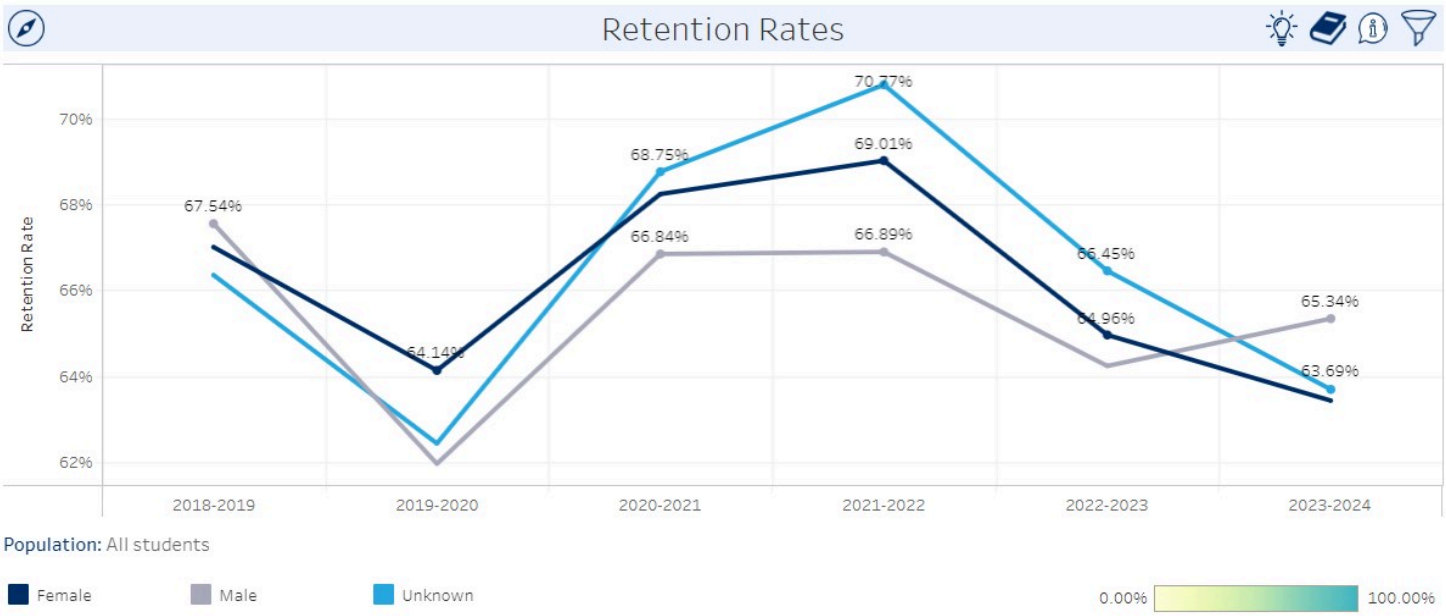

Fig. 20: Math Department - Retention Rates by Gender

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Fig. 21: Math Department - Success Rates by Gender

Retention rates and success rates for female and male students in math classes have remain relatively close over the past six years, with the difference never reaching 3%.

Disaggregated Retention and Success Rates by Race

Fig. 22: Math Department - Retention Rates by Race A

Fig. 23: Math Department - Success Rates by Race A

Retention rates and success rates have remain consistent over the past 6 years for the 4 largest groups disaggregated by race and, consequently, the gaps accross the different groups have not changed much over this time period. We address the disproportionate impact in retention and success rates of Latino and Black students in question 4 of this section.

4. With regards to success and retention rates, what is the program doing or planning to do to close performance gaps and address student equity? Consider the following question when writing your response:

- ***Are there differences in success rates across delivery method (e.g., face-to-face compared to online)?***

We can describe the gaps in retention and success rates by comparing each group's six-year average to the overall six-year average:

Cerritos College

Math Department

Retention Rates

	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	2023-2024	Mean
Asian Students	78.77%	75.18%	80.63%	77.32%	77.34%	76.35%	**77.60%**
White Students	71.50%	69.40%	68.93%	72.68%	73.36%	68.96%	**70.81%**
Latino Students	66.39%	62.01%	67.00%	67.09%	63.30%	62.79%	**64.76%**
Black Students	57.58%	53.86%	62.29%	60.57%	56.59%	57.61%	**58.08%**
Mean	**68.56%**	**65.11%**	**69.71%**	**69.42%**	**67.65%**	**66.43%**	**67.81%**

Success Rates

	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	2023-2024	Mean
Asian Students	64.92%	64.34%	70.28%	64.13%	63.19%	63.30%	**65.03%**
White Students	53.13%	59.30%	53.87%	57.38%	56.97%	53.54%	**55.70%**
Latino Students	44.48%	45.90%	48.73%	44.61%	40.30%	42.38%	**44.40%**
Black Students	32.92%	37.19%	39.95%	32.75%	31.16%	33.54%	**34.59%**
Mean	**48.86%**	**51.68%**	**53.21%**	**49.72%**	**47.91%**	**48.19%**	**49.93%**

Cerritos College

	Average Gap in Retention Rates as Compared to the 6-year Average 72.28%	**Average Gap in Success Rates as Compared to the 6-year Average 60.78%**
Asian Students	+ 0.26 percentage points	+ 5.03 percentage points
White Students	- 2.43 percentage points	- 0.42 percentage points
Latino Students	+ 3.12 percentage points	+ 1.74 percentage points
Black Students	- 0.95 percentage points	- 6.35 percentage points

Math Department

	Average Gap in Retention Rates as Compared to the 6-year Average 67.81%	**Average Gap in Success Rates as Compared to the 6-year Average 49.93%**
Asian Students	+ 9.79 percentage points	+ 15.10 percentage points
White Students	+ 2.99 percentage points	+ 5.77 percentage points
Latino Students	- 3.05 percentage points	- 5.53 percentage points
Black Students	- 9.73 percentage points	- 15.34 percentage points

Clearly, Cerritos College has done a good job in closing the gaps in retention rates across racial groups. In fact, Latino students had the highest average retention rate over the past 6 years, with an average retention rate of 75.41%. The college gaps in success rates are a little wider. Asian students had an average success rate about 5 percentage points above the average while Black students had an average success rate about 6 percentage points below the average.

Retention and success rates for Asian students in the Mathematics Department are the highest and are close to the retention and success rates for the college as a whole. Retention and success rates for White students, Latino students, and Black students are significantly lower.

The performance gaps between Asian, White, Latino, and Black students are shaped by a combination of socioeconomic factors, cultural influences, institutional practices, and historical inequalities. Addressing these gaps requires systemic change, including improved financial support, culturally relevant teaching practices, better access to resources, mentorship programs, and a focus on combating racism and discrimination in educational settings. Efforts to close these gaps must take a holistic approach that recognizes the diverse needs and challenges faced by students from different racial and ethnic backgrounds. Math faculty acknowledge these complexities, and we have been taking steps to address some of them. Several math instructors participated in the first Culturally Responsive Pedagogy and Practices Program offered at Cerritos College last year. The instructors that participated in this program recognize the difficulty of engaging in conversations about systemic racism and institutional barriers to student success, especially in the context of mathematics, which is traditionally considered a neutral, non-controversial subject. Discussions about implicit bias, affective domain, equitable grading, student centered instruction, and cultural relevant pedagogy are new and often

challenging to many math faculty, but we are making strides in this area. Many faculty have began to experiment with more interactive teaching practices and more equitable grading policies. It is too early to assess the effect of these changes in student success and in closing performance gaps, but we feel that we are moving in the right direction.

5. Discuss conclusions drawn from the program data, assessments (SLOs), and/or other data. Indicate any specific responses or programmatic changes based on the data.
Our program has been significantly impacted by two main factors over the past 6 years. One is the pandemic and the other is the enactment of AB 705 and AB 1705.

While opening access to transfer-level math courses has resulted in an increase in the number of students completing their math requirements to transfer, this has also resulted in decreasing success rates in our transfer-level math courses. This means that more students are failing these courses. We understand the argument that many (perhaps most) of the students who are currently failing our transfer-level math classes are students that prior to the implementation of AB 705 and AB 1705 would never have had a real opportunity to even attempt these courses. The fact remains that far too many students are still falling through the cracks, and the data is clear that Latino students and Black have been disproportionately impacted by these changes. We are addressing these challenges by developing new courses with built-in support and participating in professional development opportunities to develop skills to better support our students in the current environment.

Changes in state laws precipitated the sudden restructuring of our class offerings. Unable to offer pre-transfer level math courses, we are faced with the challenge of teaching a growing number of students in our transfer-level classes in need of additional support. To be able to do this effectively, utilizing student-centered teaching modalities, we need to teach classes with fewer students. We plan to revise our courses to be able to request lower class sizes for all our classes with a current cap of 40 students. We think that a class-size reduction of about 30% is reasonable and viable. Classes with 28 students would enable us to provide more individualized attention and to hold more interactive classes. All our student will benefit from this change.

Two years ago, AB 1705 required all California Community Colleges to accept high school Algebra 2 and Integrated Math 3 to meet math proficiency for an AA degree. Cerritos College adopted new language for our college catalog to be in compliance with this law. Last year, new language in Title V required that, to earn an AA degree, all students must take a college math class, making our newly adopted catalog language obsolete. This new change will require the Math Department to offer many more sections of Math 104, which was designed to meet the needs of Plan A students. Such students would certainly benefit from math classes with fewer students to receive more personal attention and to engage in more interactive classes.

B. Career Technical Education (CTE) Supplemental Questions : Version by **Lopez, Manuel** on **09/19/2024 14:39**

1. How strong is the labor market demand for the program? Utilizing labor market data, describe changes in demand over the last six years and discuss the occupational outlook for the next six years.
N/A
2. How does the program address needs that are not met by similar programs in the college's region/service area? Identify and describe any distinctive component of the program and/or unique contributions.
N/A
3. What is the success, completion, and employment rates for students in the program? Identify the standards set by the program for each metric and discuss any factors that may impact the metrics for students in the program. Based on the program's benchmarks, describe the status of any action plans for maintaining/improving the metrics.
N/A
4. List any licensure/certification exam(s) required for entry into the workforce in the field of study and report the most recent pass rate(s) among program graduates. Identify performance benchmarks set by regulatory agencies and based on the program's benchmarks, describe the status of any action plans for maintaining/improving the pass rates.
N/A

Section 3. Learning Outcomes Assessment

A. SLO Assessment Report : Version by **Lopez, Manuel** on **09/19/2024 14:42**

Course By SLO	Expected Performance	Performance
MATH104 - Survey of Mathematics		
Compare and contrast linear/exponential growth and decay (Active from 2022 FA)	100.00%	37.82%
Recognize and apply proportional reasoning techniques (Active from 2022 FA)	100.00%	39.62%
Conduct probability experiments and compare empirical results with theoretical probabilities (Active from 2022 FA)	100.00%	31.54%
Identify and interpret valid statistical analysis (Active from 2022 FA)	100.00%	32.52%
Apply financial models to real world situations by making inferences and drawing conclusions (Active from 2022 FA)	100.00%	32.29%
MATH155 - Precalculus		
Demonstrate an understanding and use the properties of trigonometric identities and linear, nonlinear, and transcendental functions to evaluate expressions, solve equations, and solve applications (Active from 2017 SP)	100.00%	41.37%
Explore and analyze conic sections (Active from 2017 SP)	100.00%	41.92%
Identify geometric and arithmetic progressions (Active from 2017 SP)	100.00%	45.71%
Demonstrate an understanding and use the principle of mathematical induction (Active from 2017 SP)	100.00%	32.54%

Course By SLO	Expected Performance	Performance
Use the binomial theorem to expand the power of a binomial (Active from 2017 SP)	100.00%	43.92%
MATH170 - Analytic Geometry and Calculus I		
Apply the concept of inverse to exponential, logarithmic, trigonometric, and hyperbolic functions to evaluate derivatives and integrals of these functions (Active from 2023 FA)	100.00%	0.00%
MATH190 - Analytic Geometry and Calculus II		
Determine various geometric measurements including area of a region between curves, volume of a solid, arc length of a curve, and area of a surface of revolution by constructing and evaluating a definite integral (Active from 2024 SP)	100.00%	39.81%
MATH225 - CALCULUS III		
Demonstrate a basic understanding of two- and three-dimensional vectors, the geometry of the plane and space, and apply these concepts in applied problems (Active from 2017 SP)	100.00%	64.26%
Use partial derivative to calculate rates of change of multivariable functions (Active from 2017 SP)	100.00%	53.14%
Use multiple integrals to compute the volume, mass, center of mass, and related quantities for multivariable functions (Active from 2017 SP)	100.00%	52.70%
Demonstrate an understanding of mathematical definitions and theorems such as the fundamental theorem of line integrals, Green's theorem, the divergence theorem, and Stokes' theorem, and use them appropriately (Active from 2017 SP)	100.00%	49.52%
MATH110A - Mathematics for Elementary Teachers		
Students select appropriate strategies to apply in solving a nonroutine problem and explain why the solution makes sense (Active from 2020 SP)	100.00%	47.63%
Students explain the conceptual foundations for addition, subtraction, multiplication, and division (Active from 2020 SP)	100.00%	40.64%
Students demonstrate operations with real numbers using both standard and nonstandard algorithms (Active from 2020 SP)	100.00%	37.20%
Students learn to recognize, analyze, interpret and apply patterns. (Active from 2020 SP)	100.00%	59.44%
Students demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers, and the number systems (Active from 2020 SP)	100.00%	34.13%
Students demonstrate a depth of understanding of estimation techniques. (Active from 2020 SP)	100.00%	35.68%
MATH110B - Mathematics for Elementary Teachers		
Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop arguments about geometric relationships (Active from 2017 SP)	100.00%	33.18%
Apply transformations and use symmetry to analyze mathematical situations (Active from 2017 SP)	100.00%	32.70%
Demonstrate an understanding of measurable attributes of objects and the units, systems, and processes of measurement (Active from 2017 SP)	100.00%	33.18%
Apply appropriate techniques, tools, and formulas to determine measurement (Active from 2017 SP)	100.00%	33.18%
MATH112S - Enhanced Elementary Statistics		
Identify, compute, and interpret basic statistics such as measures of center, variation, and position, and demonstrate an understanding of the distinction between a statistic and a parameter (Active from 2021 FA)	100.00%	34.65%

Course By SLO	Expected Performance	Performance
Solve application problems using the appropriate distribution, such as binomial, normal, and sampling (Active from 2021 FA)	100.00%	27.38%
Construct and interpret confidence intervals (Active from 2021 FA)	100.00%	24.89%
Determine the validity of a statement using hypothesis testing (Active from 2021 FA)	100.00%	22.92%
MATH5 - Mathematics Learning Strategies		
Utilize good habits of mind as described by the iFALCON project: focus, advance, link up, comprehend, and embrace new ideas (Active from 2013 FA)	100.00%	53.44%
Communicate mathematical thinking coherently and clearly with appropriate use of mathematical notation and vocabulary (Active from 2013 FA)	100.00%	48.77%
Demonstrate the ability to apply general problem-solving strategies and logic to mathematics problems and to problems encountered in real-world situations (Active from 2013 FA)	100.00%	47.28%
Apply Bloom's taxonomy to mathematics learning by: remembering, understanding, applying, analyzing, evaluating, and creating (Active from 2013 FA)	100.00%	48.00%
MATH70 - Plane Geometry		
Analyze characteristics and properties of two-dimensional and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships (Active from 2013 FA)	100.00%	35.84%
Demonstrate an understanding of and determine the length, perimeter, area, volume, and angle measures involving plane and solid figures (Active from 2013 FA)	100.00%	45.54%
Use concepts of similarity and congruence to solve and model real world applications (Active from 2013 FA)	100.00%	42.01%
Apply a coordinate system to graph and analyze geometric shapes (Active from 2013 FA)	100.00%	38.29%
MATH105 - Activity-Based Probability and Statistics for Elementary and Middle School Teachers		
Select and use appropriate ways to summarize and analyze numerical or categorical data using tables, graphical displays and numerical summary statistics (Active from 2013 FA)	100.00%	0.00%
Interpret, use, and demonstrate an understanding of measures of center and spread in particular properties of the mean (Active from 2013 FA)	100.00%	0.00%
Demonstrate an understanding of and apply basic concepts of probability (Active from 2013 FA)	100.00%	0.00%
Demonstrate an understanding of the role variation plays in statistics (Active from 2013 FA)	100.00%	0.00%
MATH112 - Elementary Statistics		
Identify, compute, and interpret basic statistics such as measures of center, variation, and position, and understand the distinction between a statistic and a parameter (Active from 2013 FA)	100.00%	37.50%
Solve applications problems using the appropriate distribution such as binomial, normal, and sampling (Active from 2013 FA)	100.00%	31.70%
Construct and interpret confidence interval for appropriate population parameters (Active from 2013 FA)	100.00%	31.04%

Course By SLO	Expected Performance	Performance
Determine the validity of a statement using hypothesis testing (Active from 2013 FA)	100.00%	27.64%
MATH114 - College Algebra		
Demonstrate an understanding of the properties of linear, non-linear, and functions, and use them to evaluate expressions, solve equations, and solve applications (Active from 2013 FA)	100.00%	42.59%
Use technology appropriately to explore and analyze linear, non-linear and functions (Active from 2013 FA)	100.00%	39.06%
Use simple linear algebra techniques to solve systems of equations (Active from 2013 FA)	100.00%	41.45%
Explore and analyze conic sections (Active from 2013 FA)	100.00%	37.63%
Identify geometric or arithmetic sequences and use the Binomial Theorem to expand the power of a binomial (Active from 2013 FA)	100.00%	35.62%
MATH116 - Calculus for Managerial, Biological, and Social Sciences		
Apply the basic techniques of differentiation and integration to polynomial, rational, exponential, and logarithmic functions to investigate the behavior of mathematical models from the general, social, and management sciences (Active from 2013 FA)	100.00%	35.45%
Demonstrate an understanding of, apply, and interpret the relationships between derivatives and anti-derivatives in applied and theoretical models (Active from 2013 FA)	100.00%	31.92%
Interpret and analyze how the techniques of differentiation and integration apply to models of marginal analysis and rates of change. (Active from 2013 FA)	100.00%	27.78%
Use the topics from calculus in conjunction with the graphing calculator to obtain precise graphs of models, including a graphical analysis of rates of change, concavity, and extrema for the model (Active from 2013 FA)	100.00%	28.38%
MATH140 - Trigonometry		
Demonstrate an understanding of the definitions of the six basic trigonometric functions and use them to evaluate expressions, solve equations, and solve applications (Active from 2013 FA)	100.00%	40.67%
Demonstrate an understanding of how to select an appropriate trigonometric identity to solve equations involving trigonometric functions (Active from 2013 FA)	100.00%	32.29%
Demonstrate an understanding of mathematical (trigonometric) symbols, notation, and syntax and use them appropriately (Active from 2013 FA)	100.00%	36.76%
Explore and analyze trigonometric functions using technology appropriately (Active from 2013 FA)	100.00%	38.67%
MATH170 - Analytic Geometry and Calculus I		
Demonstrate an understanding of what a derivative is and interpret it in terms of instantaneous rates of change and slopes of tangent lines (Active from 2013 FA)	100.00%	48.68%
Use the Riemann sum to demonstrate an understanding of the definition of the definite integral (Active from 2013 FA)	100.00%	47.44%
Apply the concepts of differentiation and integration and problem-solving techniques to application problems (Active from 2013 FA)	100.00%	49.06%

Course By SLO	Expected Performance	Performance
Demonstrate an understanding of mathematical definitions and theorems such as the fundamental theorem of calculus, the squeeze theorem, and the mean value theorem, and use them appropriately in formulating proofs (Active from 2013 FA)	100.00%	46.02%
MATH190 - Analytic Geometry and Calculus II		
Apply the concept of inverse to exponential, logarithmic, trigonometric and hyperbolic functions in order to evaluate derivatives and integrals of these functions (Active from 2013 FA)	100.00%	50.33%
Demonstrate an understanding of the techniques of integration and apply their concepts to applications problems (Active from 2013 FA)	100.00%	45.38%
Demonstrate an understanding of the notions of convergence and apply them to analyze sequences and series (Active from 2013 FA)	100.00%	51.61%
Demonstrate an understanding of mathematical definitions and theorems and use them appropriately in formulating proofs (Active from 2013 FA)	100.00%	49.91%
MATH250 - Linear Algebra and Differential Equations		
Use the concepts of linear algebra to solve systems of both linear and differential equations (Active from 2013 FA)	100.00%	60.99%
Demonstrate an understanding of the properties of Laplace transforms and be able to solve differential equations by selecting an appropriate inverse transform (Active from 2013 FA)	100.00%	66.19%
Create, analyze, and interpret a second order differential equation to model a problem involving simple harmonic motion (Active from 2013 FA)	100.00%	69.06%
Demonstrate an understanding of the concepts of vector space, subspace, linear independence, span, basis, inner products and associated norms (Active from 2013 FA)	100.00%	59.57%
Solve first and second order differential equations using a variety of methods (Active from 2013 FA)	100.00%	65.25%
MATH110A - Mathematics for Elementary Teachers		
Select appropriate strategies to apply in solving a nonroutine problem and explain why the solution makes sense (Active from 2013 FA)	100.00%	19.18%
Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers, and the number systems (Active from 2013 FA)	100.00%	19.18%
Explain the conceptual foundations for addition, subtraction, multiplication, and division (Active from 2013 FA)	100.00%	19.18%
Demonstrate operations with real numbers using both standard and nonstandard algorithms (Active from 2013 FA)	100.00%	19.18%

B. SLO Assessment Analysis : Version by **Lopez, Manuel** on **12/09/2024 23:27**

1. Explain the frequency (i.e., when and how often) and content of assessment process (e.g., planning, data collection, and results) for the program (e.g., department meetings, advisory boards, etc.). Also, describe the process for reviewing and discussing outcomes data.

The Math Department submits SLO data for all courses at the end of every Fall and Spring semesters. Last semester, Spring 2024, the Math Department reached 100% submission of SLO data from both full-time and part-time faculty.

The Math Department has developed multiple assessment questions for each SLO, which are available on our Math Resources site on Canvas. All faculty members have access to these questions and are encouraged to use them prior to final exams. However, our department has been less effective in reporting and discussing assessment results at the departmental level. Rather than collaborating as a cohesive team, we have primarily tackled this task on an individual basis. In the past, we collectively graded assessments and engaged in discussions about the outcomes and potential improvements. While this approach fostered valuable conversations about student success, it was neither efficient nor sustainable. Moving forward, we have adopted a more unified and systematic approach to enhance our effectiveness in this crucial area. We will implement a system (described in the next question) that regularly monitors SLO

assessments and enhances department-wide discussions about the results. In the future, it will be important to compare SLO data from before AB 705/1705 with data collected from 2024 onward.

2. Describe the process for development of plan for improvement and summarize the changes that discipline faculty plan to implement based on the analysis of the student learning and program effectiveness. Provide specific examples.

Our program currently offers 13 different courses. We will divide the courses into three groups and develop, implement, and assess one action item for each course in the group based on SLO data from the previous semester. The action items will seek to improve the performance of one SLO per course, and consequently, to improve retention and success rates across our entire program. To manage this work effectively, the department as a whole will focus on one group of courses per year, creating a 3-year cycle to complete the assessment of all the action items created for all the courses in our program. During our monthly department meeting, the faculty involved in the implementation of the action items in the courses on which we are focusing on a that particular year will provide an update on the progress being made. While the department as a whole will focus on one group each year, all faculty will be working on an action item for at least one course that they are currently teaching.

Here are the courses on which the Department will focus on during our first 3-year cycle:

- 2024-2025: Group 1: Math 104, Math 110A, Math 110B, Math 112, and Math 112S.
- 2025-2026: Group 2: Math 114, Math 116, Math 140, and Math 155.
- 2026-2027: Group 2: Math 170, Math 190, Math 225, and Math 250.

Beginning Fall 2024, we are establishing an ongoing opportunity to meet on the 4th or 5th week of the semester to discuss the SLO reports for the classes of focus for the year generated on eLumen for the previous semester. In addition, we have started sharing our contributions in real time via Google Docs.

Here is a sample of the ongoing discussion for Math 112/112S from Fall 24:

How is SLOs' data influencing your teaching?

Common Threads: When students don't perform well in a particular SLO area, we try to make adjustments to improve in this area, including:

- Readjusting the course schedule to allow more time on that particular topic
- Finding an activity that might help to drive the concept home better
- Preparing a wider variety of problems (examples) for lessons, homework, quizzes, and exams.

Comments worth noting: Some faculty do not really track them; others indicate that they "adjust their teaching" but do not mention exactly how they adjust.

What is one thing you can do differently to try to improve one SLO in one course?

Common Threads: Many specifically wanted to improve on the hypothesis testing SLO, providing more scaffolding, time, productive struggle, and preparation for this topic throughout the semester.

Comments worth noting:

- We can get feedback from our students on how they felt about particular topics.
- We can collaborate with each other to develop lessons that focus on particular SLO's.
- One instructor wanted to focus on the SLO: construct and interpret confidence intervals for appropriate population parameters, which is closely related to Hypothesis Testing decision-making.

How will you track the effectiveness of your action item throughout the year?

Common Threads:

- Getting students to do group work in class so that we can assess on the spot is a good way to track effectiveness.
- Creating assignments that break down the steps and then assessing how students perform. Feedback must be provided before the summative exams.
- For the SLO's we would like to stress we could also increase the point-values in questions relating to that topic.
- Keeping a record of how students are performing throughout each semester is necessary for tracking the effectiveness.

Comments worth noting: We could also keep a record of how often we collaborate and discuss SLO's with each other.

How will you collaborate with your colleagues on this effort?

Common Threads:

- By planning a collaboration meeting schedule for the semester, we can create lessons together. After delivering the lesson, we can discuss the results and then modify our lesson.
- We will share/trade problems/worksheets/activities with colleagues and get feedback on the wording and scaffolding problems from formative assessments.
- Email conversations can also be helpful, along with sharing materials in Math Resources Site.

Comments worth noting: If we don't have shared availability to physically meet, we could share video lessons that promote discussion of our particular SLO's and then discuss via Zoom or email.

Note: We developed this process for SLO assessment before the new three-year SLO cycle was approved. Moving forward, the Math Department will follow the new SLO guidelines adopted by Senate where we will conduct assessments in years 1 & 2, and review in year 3.

C. Curricular Course Review : Version by **Lopez, Manuel** on **12/09/2024 23:27**

1. Provide the curriculum course review timeline to ensure all courses are reviewed at least once every six years.

We will conduct a curriculum course review for all our courses once every three years:

Fall 2024: Math 104, Math 110A, Math 110B
Spring 2025: Math 112, Math 112S

Fall 2025: Math 114, Math 116
Spring 2026: Math 140, Math 155

Fall 2026: Math 170, Math 190
Spring 2027: Math 225, Math 250

Fall 2027: Math 104, Math 110A, Math 110B
Spring 2028: Math 112, Math 112S

Fall 2028: Math 114, Math 116
Spring 2029: Math 140, Math 155

Fall 2029: Math 170, Math 190
Spring 2030: Math 225, Math 250

2. *Explain any course additions to current course offerings.*

Recent changes in California law (AB 705, AB 1705) and changes in Title V language, required us to create new courses to support the increasing number of students who are taking transfer-level math courses.

Because of AB 705 and AB 1705, which removed prerequisite courses from Math 112, Math 114, and Math 155, we created three new courses: Math 112S, Math 114S, and Math 155S. These are our enhanced statistics, college algebra, and precaclulus courses. These courses aim to meet the needs of students who now have access to transfer-level math courses but need additonal support, such as just-in-time remediation and additonal contcact hours with the course instructor. We are in the process of developing two new enhaced courses: Math 116S and Math 170S.

Due to changes in Title V, all students pursuing an AA degree must take a college level math course. To meet the needs, the math department created Math 104: Survey of Mathematics, specifically to serve non-STEM and non-business students. Although students are taking Math 104, the UC is not accepting this as a transfer-level math course. It is unlikely that Math 104 wil be approved for elective credit by the UC and therefore, it will not be approved for CalGETC. Nevertheless, Math 104 will be a viable option for Plan A students at Cerritos College, and we expect the number of sections of this course to continue to increase over the next few years.

We are also working with the Business Department in creating Math 130/BA130 (Business Statistics). However, we are having challenges aligning methods of evaluation. In the Business Department, multiple choice tests are the norm. In the Mathematics Department, we opt for "essay tests" in which problem solving techniques and critical thinking are assessed through free-response questions where students must show the work that supports their answers.

3. Explain any course deletions and inactivation's from current course offerings.

As we have explained before, because of AB 705 and AB 1705, we no longer offer any pre-transfer-level math courses: Math 40, Math 60, Math 70, Math 75, Math 80, Math 80A, and Math 80B.

We also stop offering some transfer-level math courses due to a lack of demand: Math 105 and Math 115.

4. Discuss how well the courses, degrees, and/or certificates meet students' transfer or career training needs. Consider the following questions:

- ***Have all courses that are required for the program's degrees and certificates been offered during the last two years? If not, has the program established a course offering cycle?***
- ***How has degree and/or certificate completion changed over time?***
- ***Are there sufficient completers compared with the size of your program?***

The Mathematics Department offers several sections of all our courses every semester. This not only meets the needs of students pursuing our AS-T in mathematics degree, but the needs of a vast number of students pursuing degrees and certificates from other programs in our college that have specific math requirements.

Here is a table showing the number of degress completed in our program over the past 6 years.

Award Program	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	2023-2024
Mathematics AS/T	30	37	33	30	20	11
Mathematics AA/T	3				1	
Total	33	37	33	30	21	11

Over the past two years, we have seen a decrease in the number of students pursuing an AS-T in mathematics. Typically, this degree is obtained by students who transfer to the univeristy as math majors. The decrease in interest in majoring in mathematics has coincided with an increase in interest in majoring in computer science and in various engineering fields. Mathematics courses remain essential for these popular fields, and the Mathemacis Department will continue to offer enough sections of the courses needed to meet the needs of all our students.

5. *Are any licensure/certification exams required for program completion or career entry?*

- ***If so, what is the pass rate among graduates?***
- ***Set an attainable, measurable goal for pass rates and identify any applicable performance benchmarks set by regulatory agencies.***

N/A

Section 4. Program Reflection

A. Six-Year Program Reflection : Version by **Lopez, Manuel** on **12/03/2024 21:39**

1. Provide an analysis of your program throughout the last six years, reflecting on student demographics and enrollment. Reflect on any changes you would like to see in your program in the next six years.

Any attempt to analyze our program over the last six must begin with the with the acknowledgment that a world pandemic and two recent state laws fundamentally altered the educational environment in which we operate. The combined effect of the COVID-19 pandemic and the implementation of AB 705 and AB 1705 in the Mathematics Department at Cerritos College created a perfect storm of challenges and opportunities.

The COVID-19 pandemic forced a rapid transition to online and remote learning, disrupting traditional in-person classes, which were the norm in our department. We had to quickly adapt to new modes of instruction, often with limited preparation or experience with virtual platforms. The pandemic exacerbated existing equity issues. Low-income students, students of color, and those with disabilities, faced additional barriers to success in online learning. The digital divide and lack of access to resources became significant challenges in supporting these students. The pandemic also led to heightened stress, anxiety, and mental health concerns for both students and instructors, which affected students' ability to engage with and succeed in math courses.

AB 705, which passed in 2017 but was more widely implemented in 2019, meant that many students who would have traditionally been placed in developmental math courses (pre-transfer-level courses) were now placed directly into transfer-level math courses. This accelerated pathway increased the pressure on our departments to redesign math courses and implement support systems for students who were less prepared for these courses. AB 1705, passed in 2022, built on AB 705 by setting stricter guidelines that eliminated all pre-transfer-level courses, which, in 2018-2019, accounted for 63% of our enrollment.

To meet the needs of our students in this challenging environment, we implemented several measures:

1. The overwhelming majority of math faculty, both full-time and part-time, became certified to teach online. Part of the required training increased our focus on student support and challenged us to reconsider our teaching strategies and methods of assessment. For many of us, this was an opportunity to engage for the first time with the affective domain in our teaching practices and to consider its impact on student learning.
2. Once the pandemic ended, we continued to offer a significant number of sections of online and hybrid courses to meet student demand.

3. We developed new courses with built-in support to offer just-in-time remediation to underprepared students placed directly in transfer-level math courses.
4. We expanded our use of embedded tutors to support our students.
5. We participated (and continue to participate) regularly in professional development opportunities to improve our teaching skills, explore culturally relevant pedagogy and practices, learn about equitable grading, learn about new technologies to enhance the learning experience of our students, and more.

When the dust settled, and we looked at our enrollment data, one trend that caught our attention was the low enrollment of women in calculus classes.
This table shows the **success rates** disaggregated by gender for all calculus classes and our linear algebra and differential equations class.

Note that, by and large, success rates for female and male students are very similar. In fact, for every course, females students have a higher success rate in at least one academic year. This suggests that women, on average, do as well in these courses as men.

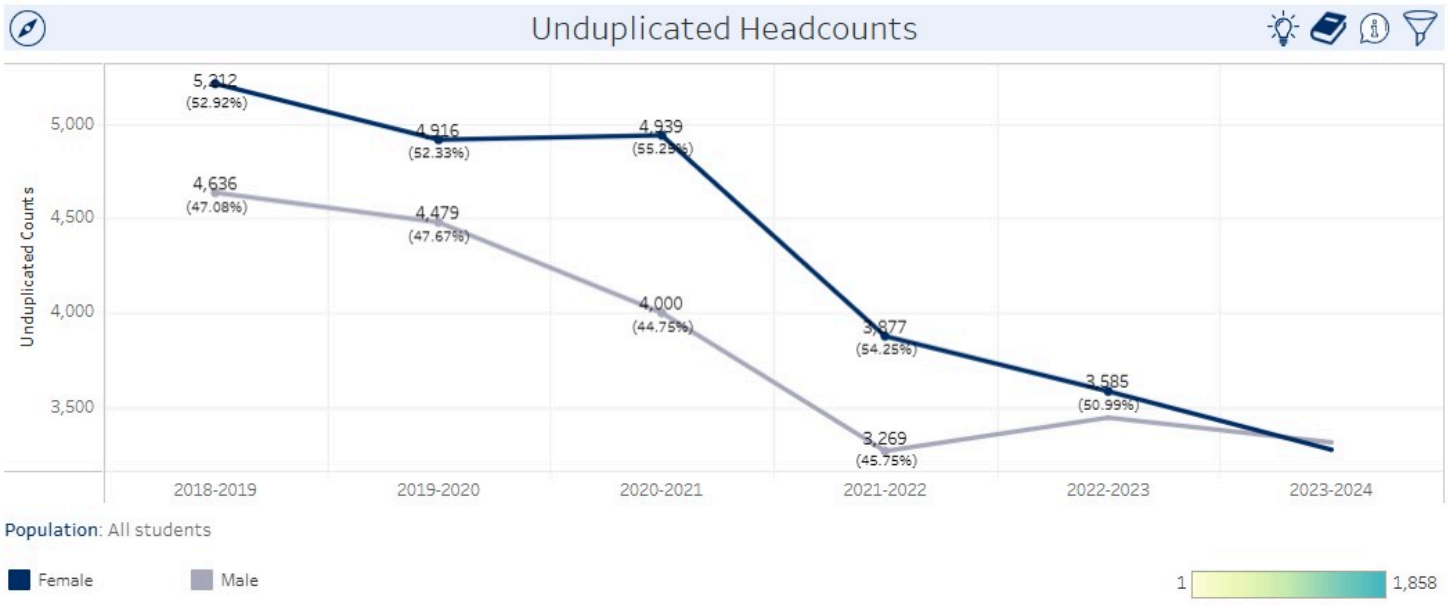
But now, look at the **unduplicated head counts** for men and women in these same courses.

Course	Select Student Attribute	2018-2019 Academic Year	2019-2020 Academic Year	2020-2021 Academic Year	2021-2022 Academic Year	2022-2023 Academic Year	2023-2024 Academic Year
		722 (100.00%)	832 (100.00%)	935 (100.00%)	782 (100.00%)	852 (100.00%)	1,040 (100.00%)
MATH 170	Female	168 (36.05%)	168 (33.53%)	174 (34.46%)	155 (39.95%)	177 (41.07%)	159 (32.58%)
	Male	298 (63.95%)	333 (66.47%)	331 (65.54%)	233 (60.05%)	254 (58.93%)	329 (67.42%)
MATH 190	Female	84 (30.22%)	112 (30.11%)	133 (33.42%)	99 (31.94%)	98 (34.27%)	110 (32.26%)
	Male	194 (69.78%)	260 (69.89%)	265 (66.58%)	211 (68.06%)	188 (65.73%)	231 (67.74%)
MATH 225	Female	26 (20.31%)	39 (27.46%)	57 (30.48%)	60 (32.26%)	52 (30.06%)	74 (31.62%)
	Male	102 (79.69%)	103 (72.54%)	130 (69.52%)	126 (67.74%)	121 (69.94%)	160 (68.38%)
MATH 250	Female	18 (24.66%)	31 (28.97%)	47 (28.83%)	36 (24.66%)	41 (25.31%)	66 (32.35%)
	Male	55 (75.34%)	76 (71.03%)	116 (71.17%)	110 (75.34%)	121 (74.69%)	138 (67.65%)

Women enroll in these classes in significantly lower numbers than men.

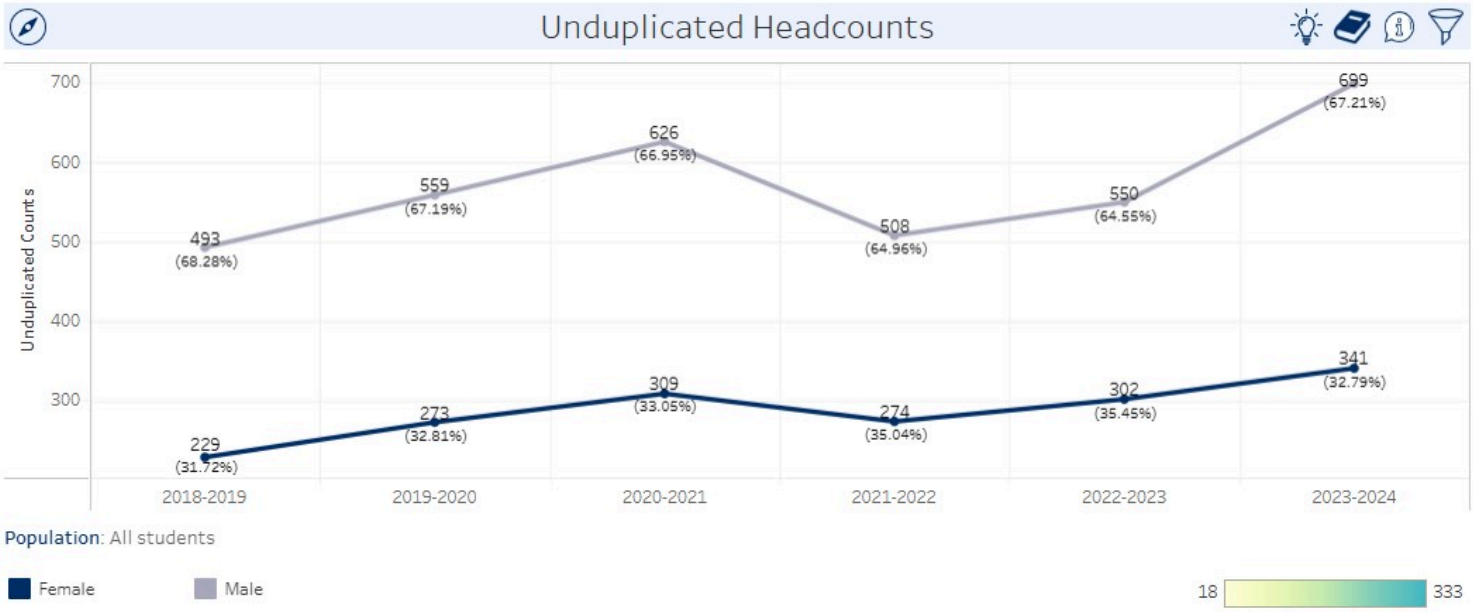
Here is a more striking way to see the issue.

Look at unduplicated counts in all math classes, disaggregated by gender.



In all but one year, the number of women is greater that the number of men.

Now, look at the unduplicated headcounts disaggregated by gender for all calculus classes and our linear algebra and differential equations class.



Every year, the number of men enrolled in calculus classes is significantly greater than the number of women in these classes, even though success rates for both genders are very similar. Why does this happen?

The lower number of women enrolling in calculus courses is the result of a complex web of factors that include societal stereotypes, gender bias, cultural and socioeconomic factors, and institutional barriers, such as the lack of representation and role models. Research shows that women often rate their abilities in subjects like math lower than men, even when they perform equally well. This lower self-confidence can lead them to shy away from challenging courses like calculus 1. Many women may experience imposter syndrome, which is the feeling of not belonging or not being “good enough” in male-dominated fields like mathematics. Another contributing factor may be implicit bias. Studies have shown that teachers may expect less of female students in math, providing them with fewer opportunities to excel or pushing them toward non-math or non-science fields. These biases can impact women's confidence and engagement in math courses. The Mathematics Department has been deliberate in its efforts to address some of these causes. We have recruited and hired the most qualified and exceptional faculty available, and 56% (13 out of 23) of our full-time faculty and 48% (16/33) of our part-time faculty are women. Women participate in leadership positions in our department. They have:

1. Lead the department as chairs
2. Written new curriculum and gotten it approved
3. Lead workshops locally and at state and national conferences
4. Represented our department and division in:
    1. Faculty Senate (The current VP of Faculty Senate is Math Professor Dara Worrell!)
    2. Curriculum Committee
    3. SLO Committee
    4. Instructional Program Review Committee
    5. Chairs Council Committee
    6. Sabbatical Leave Committee
5. Served as union reps
6. Earned Outstanding and Most Outstanding Faculty Awards
7. Developed innovative and effective programs such as Teacher TRAC and Stats in Motion.

Female students at Cerritos College have remarkable role models, yet we must do more to attract women into our STEM math courses. We will develop targeted initiatives to boost mathematical confidence among female and other underrepresented students in calculus 1. For example, we will offer workshops on how to develop a growth mindset, the belief that math ability is not fixed and that through effort and practice anyone can succeed. We can provide resources to help women and other students manage math anxiety. Some faculty are willing to adopt teaching methods that promote active learning, collaborative work, and a nurturing classroom environment where mistakes and math struggles are viewed in a positive light as essential components of the learning process. Creating supportive spaces where students can seek help without stigma can reduce fear and increase confidence. We are also providing mentorship to math students through programs such as Women in STEM Club and the MESA program. We can use these platforms to be more deliberate in our outreach efforts by explicitly outlining the many opportunities available to female students who pursue STEM fields and stating unequivocally that women can succeed in calculus classes and beyond. Several members of our department have pursued professional development opportunities, such as the CRPP (Culturally Responsive Pedagogy and Practices) Program and ACUE (Association of College and University Educators) Certificates in Effective College Instruction, to learn about potential biases and how to create more equitable environments. A bonus of these efforts is that, while they may be targeted to help a specific group of students, the skills and experience gained by the faculty who engage in these opportunities will enrich the learning experience of all students. “A rising tide lifts all boats.” (John F. Kennedy)

In the next 6 years, we will work to achieve the following goals:

1. *Design student-centered class settings to increase effective interaction between the instructor and the students and among students*: To be able to implement more interactive and engaging pedagogies effectively, we will work to reduce the class size from 40 to 27-32. We will advocate for some classrooms to be refurnished with tables instead of individual desks to facilitate collaborative activities and promote student-to-students interactions. Finally, we will work with the Dean of SEM to secure funding for a dedicated computer lab for math instruction in the MCIS building.
2. *Provide access to effective support programs outside of class for increased student success*. We will advocate for funding to create a dedicated math tutoring service provided by the math department in either the MCIS or PST building, as modeled by the Chemistry, Biology, and Physics Departments. We will be more intentional in connecting our students with the resources that are available to support their efforts to succeed: Falcon Nest, AED courses, Student Health Services, etc. We will develop and implement zero-cost short-term math boot camps to prepare students for transfer-level courses. We will continue our collaboration with the Office of Educational Partnerships and Programs (EPP) to expand our dual enrollment offerings to support Cerritos College’s efforts to bring the promise of higher education to a wider segment of our local communities. We will seek and promote more math-specific faculty training in CRPP and equitable practices in the classroom.

3. *Institutionalize adequate, consistent funding for the operation of the Math Learning Center (MLC)*. We will work with the VP of Academic Affairs and the Dean of the SEM Division to secure adequate and permanent funding for the MLC, preferably housed and managed within the SEM Division.
4. *Increase faculty professional development*. We will advocate for institutional funding for full-time faculty to attend state and national conferences and workshops and for part-time faculty to attend intradepartmental workshops.
5. *Promote intradepartmental, interdepartmental, and collegewide collaborations and mentorship*. We will create course shells for Math 104, 112S, 114S, 116S, 155S, and 170S and provide training for all full-time and part-time faculty to use these course shells. We will collect data to assess the effectiveness of the shells for maintenance and improvement. We will also strive to build a stronger community between the full-time and part-time faculty in our department, and we will develop materials and best-practice guidelines to facilitate course mentoring. We will also work to improve ongoing communication with counseling to ensure proper placement of our students and to keep abreast of any changes coming from the state that impact our department. Finally, we'll implement the SLO assessment procedures described in the Program Review Report.
6. *Create a more equitable and inclusive learning environment for women and traditionally underrepresented students in STEM math courses*. We will develop targeted initiatives to boost mathematical confidence among female and other underrepresented students in calculus 1. We will adopt teaching methods that promote active learning, collaborative work, and positive classroom environment. We will provide mentorship to math students. Finally, we will educate instructors on potential biases and how to create a more equitable environment.

2. What is the six-year trend of degrees and certificates awarded? Is there anything you can do to help increase the number of students who acquire degrees and/or transfer?
Here, we present again the table showing the number of degress completed in our program over the past 6 years.

Award Program	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	2023-2024
Mathematics AS/T	30	37	33	30	20	11
Mathematics AA/T	3				1	
Total	33	37	33	30	21	11

As interest in computer science and engineering continues to grow, fewer students are considering majoring in mathematics at the university. While majoring in pure or applied mathematics has never been the choice of large numbers of students, we can promote our program by organizing a couple of events each year where math faculty meet with students to discuss what one can do with a degree in mathemtics. Prior to the pandemic, we used to have Math Field Day, in which local high schools brought teams of students for a friendly math competition on a Saturday morning. Students got to engage with fun and interesting mathematics problems, and they had a change to interact with math faculty in a relaxed and welcoming environment. We will discuss the possibility of bringing back Math Field Day to Cerritos College as a way to promote our discipline.

3. Were there any unplanned events (positive or negative) that affected your program? If so, what were they and how did they affect the program?
Two major events had a significant impact on the Math Department over the past 6 years.

One was the Covid-19 pandemic. The effects of this crisis were felt throughout the world. Enrollment at Cerritos College was negatively impacted across all divisions and demographics. Between 2019 and 2022, unduplicated headcounts for the college decreased by 14%. During the same period, unduplicated head counts for the Mathematics Department decreased by 24%. Furthermore, by 2024, unduplicated head counts for the college had bounced back to within 10% below what they were in 2019, while headcounts for the Mathematics Department had furthered dropped to 30% below what they were in 2019. To understand the significant differences between enrollment patterns for the college and enrollment patterns for the Mathematics Department, we must consider the other major event that had a disproportionate impact on the Mathematics Department: The passage of California's AB 705 and AB 1705.

To understand the effect of these new laws on the learning environment of our students, we need to look at three things: The reasons that motivated the creation of these laws, the positive effects that they have had, and the unintended consequences of their implementation.

California's AB 705, enacted in 2017, and AB 1705, implemented in 2022, were motivated by the need to address persistent equity gaps in higher education, particularly for underrepresented students in community colleges. Recognizing that traditional placement methods often led to inequitable access to transfer-level courses, the legislation aimed to increase enrollment in these courses by eliminating reliance on inconsistent and unreliable placement tests and the requirement of several prerequisite courses that were below transfer level. By promoting high expectations and ensuring that all students could access rigorous coursework, these laws sought to improve student success rates and reduce the stigma associated with remedial education. Ultimately, these laws aimed to create a more inclusive educational environment and better prepare students for academic and career advancement.

California's AB 705 and AB 1705 have significantly improved access to transfer-level math courses at Cerritos College. In the 2018-2019 school year, 3073 students successfully completed a transfer-level math course at Cerritos College. In the 2023-2024 school year, that number had increased to 3867, an increase of 26%. Together, these legislative measures have not only increased enrollment in transfer-level math but have also contributed to higher completion rates, particularly among historically marginalized groups. In 2018-2019, Cerritos College awarded 5,031 degrees and certificates, while in 2023-2024, it awarded 8,164. This remarkable 62% increase is, in part, a consequence of the changes instituted by AB 705 and AB 1705. By promoting equitable access to essential courses, Cerritos College is taking significant strides toward fostering a more equitable higher education landscape.

There is, unfortunately, another side to this coin. While AB 705 and AB 1705 have improved access to transfer-level math courses, their implementation has raised concerns about unintended negative consequences. One significant issue is the pressure on institutions to place more students into transfer-level math courses without adequate preparation. Many students, particularly those with weak foundational skills, struggle in these rigorous courses, leading to increased rates of failure and withdrawal. Between 2018-2019 and 2023-2024, the success rate in transfer-level math courses dropped from 53% to 45%. The negative effect of this decline in success rates is exacerbated by the significant increase in enrollment caused by AB 705 and AB 1705. In 2018-2019, out of 5,791 students who enrolled in transfer-level math courses, 2,718 did not complete these courses successfully. In 2023-2024, out of 8,637 students who enrolled in transfer-level math courses, 4,770 did not complete these courses successfully. The number of students falling through the cracks in transfer-level math courses has increased by 75% over the past 6 years! While it can be argued that many of the students who are not succeeding in transfer-level math courses now would not have had the opportunity to even attempt these courses prior to the implementation of AB 705 and AB 1705, the fact remains that far too many students who are enrolling in these classes are not completing them successfully.

The Mathematics Department will continue to strive to meet the needs of all our students wherever in their mathematical development. We will continue to pursue professional development opportunities that will empower us to meet the challenges we face in our new academic landscape. We will work to deepen our understanding of the complex issues that disproportionately impact some segments of our student population, and we will work to develop a more equitable environment for all our students.

4. Please describe any recent achievements in your program by faculty and staff who have won awards or distinctions, new projects your program has implemented, committee work, professional development work, conference presentations, community engagement, or recently published work.

- Math faculty participated in an SEM Faculty Inquiry Group (FIG) led by Earth Science Professor Crystal LoVetere. This FIG was a shared learning experience with a focus on the importance of professor-student relationships for "students at-promise." This label represents students who are at risk for failure or dropping out for a variety of reasons such as the lack of a supportive environment for learning, not having permanent housing, being first-generation college students, low-income students, or underrepresented students.
- Full-time math faculty participated in the project "Culturally Responsive Pedagogy and Practices" (CRPP) to explore the roots and effects of systemic racism in the classroom and ways to fight against them.
- Our two new full-time math faculty members attended the American Mathematical Association of Two-Year Colleges (AMATYC) National Conference. They participated in workshops focusing on statistics, strategies and mindset for student success, and equity and inclusivity.
- Several full-time faculty members attended the California Mathematics Council - South Conference. The theme was "Teaching and Learning Big Mathematical Ideas."
- Math faculty are participating in a project to develop contextualized courses to meet the needs of specific programs. This semester one faculty member is contextualizing a statistics class for business majors. Another faculty member is contextualizing a statistics class for health sciences.

- Full-time faculty served as Data Coach for SEM LCP as strategic partners within the IERP team, directly guided by the Director. As a key member of cross-functional Success Teams, he facilitated data-driven discussions, provided guidance on internal and external data sources, and advocate for enhanced data accessibility to support informed decision-making. By collaborating closely with departments and divisions, he leverages student data effectively for planning and improvement initiatives. The goal is to drive campus-wide progress towards student success and completion through a continuous cycle of data-informed improvement.
- BESTELLAR Mentor: Full-time faculty created mentoring materials for students while working with the BE-STELLAR program. Funded by the National Science Foundation, the BE-STELLAR program is a partnership between Cerritos College and the Columbia Memorial Space Center in Downey which offers paid internships to Cerritos College students. The goals of the program include to increase the number of STEM students (focusing on Hispanics) being retained in STEM majors, among others. Mentoring material topics include goal setting, time management, exam taking and exams preparation, habits for well-being and for productivity, soft skills, resume building, personal statement, how to network, asking for a letter of recommendation, interview practice, internship, and financial well-being.
- MESA (Mathematics, Engineering, Science Achievement) is an academic support and professional development program for students pursuing a calculus-based science, technology, engineering, mathematics (STEM) degrees. Since Spring 2024, one of our full-time faculty members has been the Faculty Sponsor of MESA. A Faculty Sponsor serves as a liaison with the SEM division to advance the main goals set for the program. In their capacity as the MESA Faculty Sponsor, they have 1) established Academic Excellence Workshops, 2) provided administrative support by recruiting student facilitators and tutors, 3) mentored student facilitators, 4) developed and fostered working relationship with faculty in the SEM division, 5) conducted student outreach and recruitment and, 6) participated and supported with field trips and events for MESA students.
- UMOJA Mentorship – Full-time math faculty serve as mentors in this program. Cerritos College developed a mentorship program to connect faculty and Umoja students. Umoja (https://www.cerritos.edu/counseling/umoja/default.htm) is a student support program for African American and first-generation college students. There has been a decline in the transfer rate among male students of color. Mentorship that is rooted in six success factors (https://rpgroup.org/our-projects/student-support-re-defined/successfactorsframework) has been shown to have a dramatic positive influence.
- The Sky is the Limit LCP Day on Friday, April 28, 2023 – Ilva, Patty, Manny, Daniela, Aemiro, Manuel, Ruben
- Spring 2024 BeStellar Faculty FIG – Ruben, Manuel, Alejandra, Patty
- Stats in Motion – Angie
- SEM LCP Open House Wednesday, February 7, 2024.
- Math and Science Collaboration Workshops - 3/28/24, 3/29/204, and 4/5/2024 - James, Daniela, Lora, Manuel, Ian, Manny, Mojdeh, Patty, Ruben, Thanh, Ian
- Full-time faculty participated in a two-day symposium, “Data Science for All” at University of California, Irvine, facilitated by Dr. Chen Li.
- Data Coaching –Thanh
- Program Review – Tom and Patty
- Curriculum – Manuel
- Faculty Professional Development -Angela and Jen
- IT Committee - Aemiro
- Sabbatical Leave – Ilva
- Standards – Ilva
- Senators – Aemiro, Dara, Mojdeh, Ian
- Vice President of Faculty Senate – Dara
- Equity Conference (Ghana) – Dara
- CRPP - Rocio, Aemiro, Alejandra, Daniela, Patty, Manuel, Manny, Ilva
- Faculty Mentor for Math Club – Ilva, Alejandra, Angie
- Faculty Mentor for Women in STEM Club – Patty
- Faculty Mentor for STEM Club – Patty, Rocio
- Maintainance of a Mathematics Resource Canvas Site – Angela
- Math Learning Center – Dara and Lora

5. Provide a status update on goals from the last program review cycle.

We had a set of 10 goals on our last program review cycle. Much of the work we intended to do to accomplish these goals was brought to a halt by the Covid-19 pandemic. Nevertheless, we made progress in several of them. Here is an update:

1. *Repeat high success rates of Stats in Motion Program for CC athletes in Math 112 (80% or higher) with four sections running in the same session, Summer 2020.* The school administration decided that despite its tremendous success, this program was not scalable and cost effective. It is not being implemented at this time.
2. *Monitor the impact of AB705 and our campus response to it by tracking accurate and meaningful data.* We have presented our findings about the impact of AB705 (and AB 1705) on this report.
3. *Develop a plan to consistently report and share SLO information.* We have developed a plan to report and share SLO information and started its implementation this semester as indicated on this report.
4. *Get the transfer-level mathematics courses with just- in-time remediation on the class schedule.* We have developed 3 new courses with built-in support to meet the mandates of AB 705 and AB 1705. These c ourses are Math 112S, Math 114S, and Math 115S. We are in the process of developing Math 116S and Math 170S.
5. *Update curriculum to provide more options for non-STEM majors seeking transfer-level mathematics.* We developed Math 104 to meet the need of non-STEM and non-business students planning to transfer to CSU and for Plan A students. Given recent changes in state law (CalGETC), this course will no longer meet the need of transfer students, but it will continue to be a viable option for Plan A students.
6. *Create consistent and numerous (monthly if not weekly throughout the semester) opportunities for Math faculty to engage in Math Professional Development.* Our new efforts to create faculty communities of practice were derailed by the Covid-19 pandemic. Dealing with the many challenges brought by the pandemic into our professional and personal lives, made it impractical to give this goal the time and effort it required. We are refocusing our commitment to foster collaboration among the menmbers of our departement. This is evident in our current set of goals.
7. *Provide exemplary support to math students using well- trained tutors and staff.* When the Success Center was created and the compensation structure for full-time faculty was changed, the involvment of full-time faculty in the the tutoring process of math students came to an end. We feel that this exclusion of full-time faculty in the tutoring of our students has been detrimental to them. One of our current goals is to create a tutoring program delivered and managed by the math department in the MCIS building.
8. *Provide quality online mathematics education using "best practices" for online instruction.* When this goal was writen, we only had a handful of sections of a few classes online, and a relatively small number of math faculty were teaching these courses. These instructors formed a community of practice that met regularly to develop and improve best practices for teaching math courses online. Then Covid-19 happened, and all faculty were thrusted into online teaching. This event forced us to get training to teach online, and today all but a couple of math faculty are certified to teach online. Many faculty continue to participate in professional development opportunities aimed at improving their online teaching skills.
9. *Increase the number of AA- Transfer degrees obtained in Mathematics from 29 to 35 by 2022.* As seen in this report, the number of math degress earned by Cerritos College students has been in decline. Two reasons that may explain this trend are: 1. Changes in the job market with an increasing interest in applied fields like computer science and engineering, and 2. Learning gaps and regression brought about by the Covid-19 pandemic.
10. *Provide a clear and thorough argument to support the request for an adult hourly who would provide clerical and instructional support to the Mathematics Department.* We did not pursue this idea as there were many other issues that took priority over this. We may revisit this goal in the future.

6. If applicable, describe the resources the program received from the last review cycle and the impact it had on the program?

No Value

Section 5. Program Goals and Resource Requests

A. Six-Year Program Goals and Resource Requests