



**MATHEMATICS
COURSETAKING AND
CALIFORNIA STATE
UNIVERSITY ELIGIBILITY:**

**Follow up to the University
Eligibility Study for the Public
High School Class of 2015**

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I. BACKGROUND OF THE STUDY

A. Summary of key findings from the original study

In 2017, the California Governor's Office of Planning and Research released the [University Eligibility Study for the Public High School Class of 2015](#), researched and written by RTI International using transcript data evaluated by the University of California Office of the President Transcript Evaluation Service (TES).

That study, the fifth legislatively-mandated study since 1990 to estimate the percentage of California public high school graduates who meet the freshman admission requirements of the University of California (UC) and California State University (CSU), found that the percentage of California public high school graduates in 2015 who graduated eligible for admission to the CSU system was 41%, an increase of eight percentage points from 2008, the last time the State estimated eligibility rates.

B. CSU proposes increasing required number of math courses

The CSU is considering requiring a year of quantitative reasoning for all freshmen applicants, in addition to the three required mathematics courses in subject area "c" (covering algebra I, geometry, and algebra II or higher). Though the proposal has not yet been formally introduced, the CSU has indicated that applicants would be able to meet the additional requirement by taking a fourth year of area "c" mathematics or by taking additional area "d" laboratory science courses, area "g" computer science or quantitative reasoning courses, or career and technical education (CTE) courses with a quantitative reasoning component.

C. Research Questions

In order to understand the impact of the potential change on eligibility rates, we investigated two questions:

1. For what proportion of the nearly 60% of graduates who were not eligible for CSU admission was the current mathematics requirement (subject area "c" of the "a-g" course requirements) a contributing factor?
2. If the subject area "c" requirements for admission in 2015 had required high school graduates to complete an additional year of mathematics, at a more advanced level than is currently required, or an additional area "d" science course, what would the CSU eligibility rates have been for 2015 graduates, overall and for various subgroups of graduates?

We examined both questions for all 2015 public high school graduates and for students with various characteristics, including gender, race/ethnicity, and socioeconomic status and by region of the state where students attended high school.

The first question is designed to help us understand how many students already struggle to meet eligibility requirements in mathematics and whether there are differences by subgroup in the proportions of students meeting or not meeting the current subject area "c" requirements.

The second question is intended to provide some sense of how the potential changes to CSU eligibility requirements could impact eligibility rates for students overall and for particular subgroups of students. While students would likely change their course-taking in response to any changes in subject area "c" requirements, having some sense of how many students are already taking the recommended number of courses can be useful in understanding what the potential impact on eligibility may be. Furthermore, this information can help public high schools and their districts understand how they may have to adjust course offerings and support for

students to ensure all students have the opportunity to meet the additional requirements prior to high school graduation.

D. Analysis procedures

Working with the same data as the 2015 study and roughly the same population size of 250,000 students, RTI analyzed the data to answer the research questions.

The first research question—“For what proportion of the 60% of graduates who were not eligible for CSU admission was the mathematics requirement (subject area “c” of the “a-g” course requirements) a contributing factor?”—was broken down into three separate questions.

- A. What proportion of ineligible public high school graduates did not complete the subject area “c” requirements but completed all other “a-g” area requirements?
- B. What proportion of ineligible public high school graduates did not complete the subject area “c” requirements and did not complete at least one other of the “a-g” requirements?
- C. What proportion of ineligible public high school graduates completed the subject area “c” requirements?

These three questions were also examined for each of the subcategories of graduates previously listed.

For the second research question—“If the subject area ‘c’ requirements for admission in 2015 had required high school graduates to complete an additional year of mathematics, at a more advanced level than is currently required, or an additional subject area ‘d’ science class, what would the CSU eligibility rates have been for 2015 graduates, overall and for various subgroups of graduates?”—the analysis looked at how many students would meet the requirement with only a traditional mathematics course or through either a math or a science course. Unfortunately, the data did not allow for the inclusion of additional courses such as computer science, quantitative reasoning, or CTE courses that would have been categorized as subject area “g” courses. The transcript data as evaluated by the University of California Office of the President Transcript Evaluation Service (TES) indicated whether a student completed courses categorized as subject area “g” but not which specific courses; because many courses classified as subject area “g” do not have a quantitative reasoning component, it would not be a fair assumption that students completing subject area “g” courses did so with a course that included quantitative reasoning.

The minimum number of required “a-g” yearlong courses required for CSU admission is 15; if CSU were to require an additional quantitative reasoning course, students would need to complete at least 16 yearlong courses to meet the additional requirement. Therefore, the analysis focused only on public high school graduates who had completed at least 16 yearlong “a-g” courses instead of the current minimum of 15. For these students, the following questions were examined:

- A. What proportion of public high school graduates completed at least one year of advanced math? (TES defines advanced math as mathematics courses taken by students beyond the standard sequence of algebra I, geometry, and algebra II as long as they completed those courses with a grade of “C” or better.)
- B. What proportion of public high school graduates completed at least one year of advanced math or three or more years of science (subject area “d”)? Students had a third year of science if they had completed at least one year each of biology, physics, and chemistry.

These proportions were then applied to the original eligibility rates calculated for the 2017 study and the adjusted eligibility rates are reported here.

II. RESULTS

A. Mathematics Coursetaking Among Ineligible Students

Of the roughly 250,000 California public high school graduates in 2015 who were not otherwise eligible for CSU admission that year, 64% did not complete the subject area “c” requirements with a grade of C or better, and 5% completed all other “a-g” requirements except for math (Table 1). In other words, completion of the CSU mathematics requirements was a barrier to eligibility for most of the ineligible graduates, but math was not the sole factor contributing to most students’ ineligibility.

There was little variation in subject “c” completion rates among ineligible graduates by gender, with 64% of female and 65% of male graduates who were not eligible for CSU admission completing the subject area “c” requirements.

Similarly, there was little variation in the subject “c” completion rates among students of different racial/ethnic identity, with one exception. American Indian and Hispanic students who were not otherwise eligible for CSU admission had subject area “c” completion rates of 32% and 33% percent, respectively. Ineligible white graduates completed subject area “c” requirements at a rate of 35%, and 36% of ineligible black graduates completed these requirements. Asian students who were not otherwise eligible for CSU admission had the highest rate of subject area “c” requirements among race and ethnicity groups, completing the math requirements at a rate of 55%.

Ineligible graduates who were socioeconomically disadvantaged (as defined by the California Department of Education based on such factors as eligibility for free or reduced-price school lunch and parent education level) completed the subject area “c” requirements 35% of the time and ineligible graduates who were not identified as socioeconomically disadvantaged completed the subject area “c” requirements 35% of the time.

Among regions of the states, there was some variation in the in the rates of mathematics course completion (see Figure 1 for the counties included in each region). Ineligible graduates in regions 1 and 3, which are mostly rural regions in the northern part of the state, completed subject area “c” requirements 27% of the time. In other words, 73% of ineligible students in these regions did not complete subject area “c” requirements with grades of C or better. Compare this with region 2, the San Francisco Bay Area, where 42% of ineligible students completed the subject area “c” requirements. Forty percent of ineligible graduates in both regions 6 and 7 completed the subject area “c” requirements.

Figure 1. Regions



Table 1. Percentage of CSU-Ineligible Graduates by Subject Area “c” Completion: 2015

	Did not complete subject area “c”		Completed subject area “c”
	Completed all other “a-g” requirements	Did not complete at least one other “a-g” requirement	
All graduates	4.5	59.9	35.6
Gender			
Male	3.2	61.3	35.5
Female	6.2	57.9	36.0
Race/ethnicity			
Latino ^a	4.6	62.6	32.8
Asian American ^b	4.6	40.8	54.6
White	4.8	59.8	35.4
African American	4.4	60.1	35.5
American Indian	3.4	64.6	32.0
Socioeconomic status			
Socioeconomically disadvantaged	4.4	60.7	34.9
Not socioeconomically disadvantaged	4.9	57.9	37.2
Region^c			
1—North and Sacramento Valley	2.1	71.3	26.7
2—San Francisco Bay Area	5.2	52.8	42.0
3—Sierra and Central/San Joaquin Valleys	4.6	68.6	26.8
4—Central Coast	4.4	61.8	33.8
5—Inland Empire	4.9	61.1	34.0
6—Los Angeles and Orange Counties	5.3	54.4	40.3
7—Southern Border	3.8	56.1	40.1

^a Latino ethnicity is identified independently of race.

^b Asian American included Pacific Islander and Filipino American for historical comparison with previous eligibility studies. There is wide variation in the eligibility rates among subcategories of Asian American graduates, but for the purposes of this study the disaggregated Asian American data could not be further analyzed with adequate reliability.

^c See Figure 1 for the counties included in each region.

B. How Increased Requirements May Affect Eligibility

This analysis examines how many 2015 graduates could have met an increased requirement by having completed an additional year of mathematics (*math-only*) and how many 2015 graduates could have met an increased requirement with either an additional year of mathematics or science (*math-or-science*). The data did not allow for the inclusion of coursetaking in computer science, quantitative reasoning or applicable CTE courses in the analysis.

If CSU had required 2015 graduates to have met an increased requirement with math-only, the eligibility rate would have been 34% instead of the 41% originally reported in the 2016 report (Table 2). If graduates could have satisfied the increased requirement with math-or-science then the eligibility rate would have been 35%. While this overall rate is in line with the expectation of the Master Plan for Higher Education, an examination of results among different student groups reveals that an increase in mathematics requirements could potentially have a more negative effect on some groups of students and could potentially exacerbate existing inequities among subgroups.

The proposed changes to mathematics requirements could potentially lower the rates of eligibility for both males and females. The eligibility rate for 2015 female graduates was 47% but could be as low as 38% with math-only or 39% with math-or-science. Male graduates were eligible at a rate of 35% but this rate could drop to as low as 30% with math-only or 31% with math-or-science. While such a change in requirements could potentially result in the eligibility rate for male graduates dropping below the target eligibility rate of 33%, the impact on eligibility rates appears to be potentially greater for female graduates; females' rate may drop by as much as nine percentage points (with math-only) whereas male graduates' rates may only decline by five percentage points (with math-only). When math-or-science is included, the rate for females may decline by eight percentage points while the rate may decline by four percentage points for males.

Among racial/ethnic subgroups, white and Asian American students' eligibility rates may drop with the proposed change in mathematics requirements; however, both of these groups could continue to be eligible at rates above the target rate of 33% set by the Master Plan for Higher Education. On the other hand, black students could see the biggest decline in their rate of eligibility, with the rate dropping from 30%, already the lowest eligibility rate among subgroups, to 22% with math-only. The rate could decrease to just 23% if the requirement could be satisfied with math-or-science. The eligibility rate for Latino students could also drop from 32% to as low as 25% with math-only or 26% with math-or-science. American Indian students could also see their eligibility rates drop from 35%, currently just above the target rate of 33% set by the Master Plan for Higher Education, to 28% with math-only or 30% with math-or-science, both rates being below the target rate.

The eligibility rate for socioeconomically disadvantaged students could potentially drop from 34%, just above the target rate established by the Master Plan for Higher Education, to 27% with math-only or 28% with math-or-science. This change could potentially widen the gap in eligibility rates between socioeconomically disadvantaged and non-disadvantaged students from the current difference of 18% to 22% with math-only.

Increased requirements could potentially result in different impacts on eligibility rates by a school's region as well (see Figure 1 for a description of the counties within each region). Students graduating from high schools in region 2, the San Francisco Bay Area, and region 7, San Diego and Imperial counties, would continue to have the highest rates of eligibility in the state, and those rates could remain well above the 33% target set by the Master Plan for Higher Education. However, eligibility rates in region 1, the northern-most part of the state, could drop from 31% to as low as 25% with math-only or 26% with math-or-science. Similarly, the eligibility rate for region 3, which includes the Eastern Sierra and the Central and San Joaquin Valleys, could decline from the current rate of 34% to 27% with math-only or 28% with math-or-science.

Table 2. Eligibility rates for 2015 high school graduates based on actual subject area “c” requirements, subject area “c” requirements plus an additional year of mathematics, and subject area “c” requirements plus and additional year of mathematics or science

	Actual eligibility rate of 2015 high school graduates	Eligibility rate if an additional year of mathematics were required	Eligibility rate if an additional year of mathematics or science were required
All graduates	40.8	33.7	35.0
Gender			
Male	35.3	30.0	31.1
Female	46.6	37.6	39.1
Race/ethnicity			
Latino ^a	32.0	24.5	26.0
Asian American ^b	63.6	58.9	59.6
White	40.0	32.1	33.7
African American	30.5	21.7	23.7
American Indian	37.2	27.6	30.3
Socioeconomic status			
Socioeconomically disadvantaged	34.0	26.8	28.2
Not socioeconomically disadvantaged	52.3	45.1	46.1
Region^c			
1—North and Sacramento Valley	31.1	25.1	25.5
2—San Francisco Bay Area	53.9	48.4	49.2
3—Sierra and Central/San Joaquin Valleys	34.6	27.3	28.3
4—Central Coast	40.9	34.5	34.9
5—Inland Empire	38.1	32.0	32.9
6—Los Angeles and Orange Counties	41.2	32.3	34.3
7—Southern Border	45.5	40.6	41.8

^a Latino ethnicity is identified independently of race.

^b Asian American included Pacific Islander and Filipino American for historical comparison with previous eligibility studies. There is wide variation in the eligibility rates among subcategories of Asian American graduates, but for the purposes of this study the disaggregated Asian American data could not be further analyzed with adequate reliability.

^c See Figure 1 for the counties included in each region.

III. CONCLUSIONS

Most of the 59% of 2015 graduates who were ineligible for admission to CSU had not met the subject area “c” requirements. Therefore, increasing the number of courses required to complete subject area “c” three to four years of quantitative reasoning would likely mean that most California high school students could struggle to meet the more rigorous requirements thereby putting university eligibility further out of reach for these students.

Furthermore, there were some differences in the completion rates of subject area “c” requirements among student subgroups, suggesting that an increase in requirements could result in members of some student groups moving from above or approaching the target eligibility rate of 33% set by the Master Plan for Higher Education to below 30%, including socioeconomically disadvantaged students, Latino students, and African American students.

There were some regional differences in the completion rates of subject area “c” requirements among ineligible students, with students in rural regions completing the subject area “c” requirements at lower rates than their peers in more urban regions of the state.

While students would likely change their coursetaking behavior if CSU were to increase quantitative reasoning requirements, these data suggest that if CSU were to require applicants to complete an additional year of quantitative reasoning, eligibility rates would decline, overall and for all subgroups. Even if students could meet the requirements by taking either a fourth year of mathematics or a laboratory science course, eligibility would still potentially decline for all student groups. (This analysis could not account for students who might meet the new requirements by taking computer science courses, quantitative reasoning courses, or CTE courses with quantitative reasoning components, because TES transcript evaluation data do not indicate whether subject area “g” courses include a quantitative reasoning component.)

Not only would eligibility rates decline for all student groups, there would likely be greater declines for some student subgroups that are already eligible at rates below the 33% target established by the Master Plan for Higher Education, potentially resulting in greater opportunity gaps for black, Latino, Native American, and socio-economically disadvantaged students than already exist. In addition, some regions would likely see their eligibility rates decline to well below the target rate of 33% while others continue to have rates of eligibility well above that target. While this analysis does not suggest that requiring applicants to complete an additional year of quantitative reasoning would greatly widen existing gaps in CSU eligibility between student groups, it does suggest that fewer groups would achieve the target eligibility rate of 33% set by the Master Plan for Higher Education.