



The Impact of COVID-19 on Community College Enrollment and Student Success: Evidence from California Administrative Data

George Bulman
University of California, Santa Cruz

Robert Fairlie
University of California, Santa Cruz, NBER

Although enrollment at California's four-year public universities mostly remained unchanged by the pandemic, the effects were substantial for students at California Community Colleges, the largest higher education system in the country. This paper provides a detailed analysis of how the pandemic impacted the enrollment patterns, fields of study, and academic outcomes of these students through the first four semesters after it started. Consistent with national trends, enrollment dropped precipitously during the pandemic – the total number of enrolled students fell by 11 percent from fall 2019 to fall 2020 and by another 7 percent from fall 2020 to fall 2021. The California Community College system lost nearly 300,000 students over this period. Our analysis reveals that enrollment reductions were largest among African-American and Latinx students, and were larger among continuing students than first-time students. We find no evidence that having a large online presence prior to the pandemic protected colleges from these negative effects. Enrollment changes were substantial across a wide range of fields and were large for both vocational courses and academic courses that can be transferred to four-year institutions. In terms of course performance, changes in completion rates, withdrawal rates, and grades primarily occurred in the spring of 2020. These findings of the effects of the pandemic at community colleges have implications for policy, impending budgetary pressures, and future research.

VERSION: April 2022

Suggested citation: Bulman, George, and Robert Fairlie. (2022). The Impact of COVID-19 on Community College Enrollment and Student Success: Evidence from California Administrative Data. (EdWorkingPaper: 22-553). Retrieved from Annenberg Institute at Brown University: <https://doi.org/10.26300/v0b8-0431>

The Impact of COVID-19 on Community College Enrollment and Student Success: Evidence from California Administrative Data

George Bulman^a Robert Fairlie^{a,b}

^aDepartment of Economics, University of California, Santa Cruz, ^bNBER

March 2022

Abstract: Although enrollment at California’s four-year public universities mostly remained unchanged by the pandemic, the effects were substantial for students at California Community Colleges, the largest higher education system in the country. This paper provides a detailed analysis of how the pandemic impacted the enrollment patterns, fields of study, and academic outcomes of these students through the first four semesters after it started. Consistent with national trends, enrollment dropped precipitously during the pandemic – the total number of enrolled students fell by 11 percent from fall 2019 to fall 2020 and by another 7 percent from fall 2020 to fall 2021. The California Community College system lost nearly 300,000 students over this period. Our analysis reveals that enrollment reductions were largest among African-American and Latinx students, and were larger among continuing students than first-time students. We find no evidence that having a large online presence prior to the pandemic protected colleges from these negative effects. Enrollment changes were substantial across a wide range of fields and were large for both vocational courses and academic courses that can be transferred to four-year institutions. In terms of course performance, changes in completion rates, withdrawal rates, and grades primarily occurred in the spring of 2020. These findings of the effects of the pandemic at community colleges have implications for policy, impending budgetary pressures, and future research.

JEL: I23, I21

Keywords: pandemic, COVID-19, coronavirus, community college, enrollment, grades, completion, students of color

Bulman: gbulman@ucsc.edu. Fairlie: rfairlie@ucsc.edu. We thank Mallory Newell, Jake Knapp and Bradley Olin for helpful conversations about institutional effects within the community college system. We thank Thomas Brock, Michal Kurlaender, and seminar participants at the University of California, Sacramento Center, College Board Forum, and UC Davis Wheelhouse: The Center for Community College Leadership and Research Workshop at UCLA for comments and suggestions.

1 Introduction

Understanding the impacts of COVID-19 on community colleges is important, as they enroll nearly half of all students attending public institutions and more than half of all students of color. Since community colleges, in addition to providing workforce training, serve as an important gateway to four-year colleges and universities, they can be seen as a crucial part of the post-secondary educational system in the United States. In fact, in some states, including California, nearly half of all students attending a four-year institution previously attended a community college.¹ With recent calls for major expansions in enrollments and provision of four-year transfer courses, one can expect that community colleges will gain even greater importance.² Impacts of the pandemic on community colleges are therefore likely to have important effects on both the supply of labor in vocational careers and the higher educational system as a whole.

The net impact of the pandemic on community college enrollment relative to four-year institutions is theoretically ambiguous. The transition to remote instruction, as well as changes in health and work status, could reduce enrollment among community college students relative to their four-year college peers given their more tenuous patterns of attachment and the emphasis on hands-on technical training in many vocational programs. Additionally, community colleges serve different student populations and open-enrollment does not provide an excess supply of interested students from which to choose to maintain enrollment levels. On the other hand, given the weak labor market during the pandemic, young adults might have been attracted to open-enrollment and relatively inexpensive community colleges. Nationally, data reveal a 10 percent decline in public two-year college enrollment from fall 2019 to fall 2020 in the beginning of the pandemic (NSC 2021), and a 12 percent reduction in initial public two-year enrollment for the 2020 high school cohort relative to the prior cohort (Howell et al. 2021). In contrast, public four-year enrollment increased slightly in fall 2020 (0.2 percent), while initial enrollments decreased by less than 3 percent for the 2020 high school cohort. More recently, however, enrollment at both public two-year colleges and four-year colleges dropped by 3 percent from fall 2020 to fall 2021.

¹ See U.S. Department of Education (2010); CCCCCO (2009); Sengupta and Jepsen (2006).

² In California, the number of transfer-eligible students at community colleges was projected to increase by 50 to 70 over a six year period (Johnson and Mejia 2020).

The effects of the pandemic on academic outcomes such as course loads, pass rates, and grades among community college students is also theoretically ambiguous. Students might have struggled with online learning given the lack of structure, requirement of more self-discipline, and technological disruptions. On the other hand, instructors might have been more lenient in grading, students were less distracted by social events, job opportunities were limited, COVID-19 relief aid was available, and options for taking courses pass/no pass increased. Thus, GPAs and other outcomes might have improved instead of worsened in the pandemic. The empirical evidence is mixed. Students at Arizona State University studied less and were more likely to withdraw from classes and delay graduation in the spring of 2020 (Aucejo et al., 2020). In contrast, while students reported challenges with online learning at Queens College in New York City, GPAs were higher and there was no effect on credits earned during the spring semester (Rodríguez-Planas, 2020, 2021).³

In this paper, we use administrative college-level panel data covering the universe of students and courses from the California Community College System to analyze the impact of COVID-19 on community college enrollment and academic outcomes. We are careful to include a consistent set of colleges throughout the time period analyzed to remove the possibility that colleges not reporting data contribute to an overstatement of enrollment losses. We explore five fundamental and policy-relevant questions regarding impacts of the pandemic. First, did community colleges experience falling enrollment during the first four semesters of the pandemic (spring 2020 through fall 2021) in contrast to the UC and CSU systems, and were there disproportionate impacts on enrollment across racial and ethnic groups? Second, in fall 2020 and fall 2021, were new students dissuaded from starting community colleges and was this effect larger than for continuing students trying to stay on track with their educational goals? Third, which types of courses were affected the most? Specifically, did enrollment effects differ for vocational courses relative to academic courses that can be transferred to four-year institutions, and how did trends differ across fields of study? Fourth, were falling enrollments in the pandemic concentrated in a few community colleges or were losses spread across all campuses, and did having a larger online presence prior to the pandemic insulate colleges from

³ Ahn, Lee and Winters (2020) find that high school graduation rates increased, perhaps due to limited labor market opportunities during the early stages of the pandemic.

enrollment losses? Fifth, how were course loads, completion, and grades affected by the pandemic?

We explore these questions for the California Community College system which has 116 colleges and enrolls roughly two million students per year.⁴ Consistent with national patterns, we find that community college enrollment dropped precipitously in the first four semesters of the pandemic in contrast with mostly stable enrollment in the CSU and UC systems. The total number of enrolled students fell year-over-year by more than 50,000 students or 4 percent in spring 2020 and by more than 180,000 students or 11 percent in fall 2020.⁵ Enrollment dropped even further in the next two semesters of the pandemic with YOY drops of 10 percent in spring 2021 and 7 percent in fall 2021. From fall 2019, just prior to the start of the pandemic, to fall 2021, California community colleges lost a total of nearly 300,000 or 17 percent of students. All racial and ethnic groups experienced reduced enrollment in the pandemic, but African-American and Latinx students experienced the largest drops. Continuing students comprised the bulk of the net change in enrollment and experienced much larger enrollment drops from fall 2019 to fall 2021 relative to first-time students in percentage terms. Negative enrollment effects were observed in every community college in the system and, interestingly, colleges with large online presences prior to the pandemic were not protected from losing students as courses moved online during the pandemic.

The administrative data also contain information on courses taken and academic outcomes among enrolled students. Reductions in enrollment were large for both vocational courses and academic courses that are eligible to transfer to four-year institutions. Fields with the largest reductions from fall 2019 to fall 2021 include Education, Interdisciplinary Studies, and Mathematics. Conditional on enrollment, student course loads were similar before and during the pandemic. However, there were significant changes in course completion rates and grade distributions, especially during the first semester of the pandemic (spring 2020). From spring 2019 to spring 2020, course completion fell from 73 to 71 percent. The underlying cause was that a much higher percentage of students withdrew or dropped their courses, while course fail

⁴ The California Community College system enrolls 20 percent of all community college students in the United States, and 30 percent of all Californians ages 18-24 (CCCCO 2020).

⁵ These reductions are smaller than those initially reported in the media and by policy organizations (e.g., Burke and Willis 2021). Preliminary enrollment data for the fall of 2020 did not include reporting for all campuses, causing analyses based on aggregate counts to overstate the enrollment change. Additionally, preliminary enrollment counts did not capture a small subset of students who took only asynchronous independent study courses.

rates decreased substantially. The percentage of course grades of “A” increased from 40 percent in spring 2019 to 50 percent in spring 2020 whereas the percentage of courses with B’s and C’s decreased. The grade distribution remained elevated and only partially returned to pre-pandemic patterns in the next three semesters.

Our analysis builds on preliminary findings of the overall effects of the pandemic on college enrollment and student success. We provide a detailed analysis of changes in community college enrollment, heterogeneity across campuses, and patterns of course taking and student outcomes. The California Community College system provides an ideal setting to study these questions because of its size and diversity. The findings contribute to the broader literature on the effectiveness of online education, which generally finds worse outcomes for online relative to in-person instruction prior to the pandemic, and negative effects of online instruction during the pandemic.⁶ Revealed preference of students in community colleges, which offer substantial flexibility in course taking and enrollment, suggest that students may view online classes as inferior to in-person classes. The findings can also be interpreted in the context of a broad literature that documents increased enrollment during economic downturns (e.g., Betts and McFarland 1995; Barr and Turner 2013; Long 2015), shedding light on the unique characteristics of the pandemic and changes in instructional formats.

2 Recent Trends in Community College Enrollment

We first examine the impact of COVID-19 on how many students enrolled in the California Community College system. To first think about the timing of potential impacts, on March 11, 2020, the World Health Organization (WHO) declared COVID-19 a pandemic.⁷ A few days later, on March 16, the San Francisco Bay Area imposed shelter-in-place or social-distancing restrictions, and on March 19, the California imposed statewide restrictions. New York State followed the next day, and by early April most states imposed social distancing restrictions that shifted in-person instruction to online. The timeline suggests that health concerns and shelter-in-

⁶ For examples of evidence prior to the pandemic, see Figlio, Rush and Lin (2013), Bowen et al. (2014), Xu and Jaggars (2014), Alpert, Couch and Harmon (2016), Krieg and Hansen (2016), Bettinger et al. (2017), and Cacault et al. (2021), and Bulman and Fairlie (2016) for a review. In the context of California community colleges, Hart, Friedmann, and Hill (2018) find that online courses result in lower completion and passing rates. Recent studies of the impact of online classes during the pandemic include Bird, Castleman, and Lohner (2021) and Kofoed et al. (2021).

⁷ Coronavirus cases were first found in China in December 2019 and in the United States near the end of January 2020. NYTimes (<https://www.nytimes.com/article/coronavirus-timeline.html>)

place restrictions would have had their first potential effects during the spring semester of 2020 and full impacts starting in the fall of 2020.

2.1 Data

The data on enrollment and course outcomes used in this study were downloaded through extracts from the California Community Colleges Chancellor's Office (CCCCO) DataMart system and compiled into a college-level panel dataset. Currently, three community colleges have not released their enrollment data for fall 2021, so these colleges are excluded in prior years to maintain a balanced panel before and after the pandemic.⁸ It should be noted that California totals across years that are downloaded from the DataMart system do not make these adjustments.⁹ Three community colleges operate on the quarter system so we use their fall and spring quarters to align with fall and spring semesters.

2.2 Enrollment Trends

Figure 1 displays the number of students enrolled in the community college system each semester over the past decade.¹⁰ We show two trend lines to address changes in available data: i) all community colleges with data for that semester, and ii) all community colleges with data for fall 2021 (excluding three colleges as noted above).¹¹ The trend lines show that enrollment in community colleges decreased substantially in the spring semester of 2020, with enrollment falling by more than 50,000 students, or 3 percent, relative to spring 2019 as instruction switched from in-person to online during the semester. Enrollment declined even more sharply in fall 2020, with a year-over-year (YOY) enrollment decrease of 181,000 students, or 11 percent. The larger drop in enrollment in the fall of 2020 relative to the spring is likely due in part to students

⁸ The community colleges with missing fall 2021 data are San Francisco Centers (enrollment of 20,262 in fall 2019), Copper Mountain (enrollment of 1,852 in fall 2019) and Victor Valley (enrollment of 13,523 in fall 2019).

⁹ The DataMart system notes: "Statewide results for the most recent term should not be considered complete until all districts have submitted data."

¹⁰ Student enrollment include all students enrolled for any course and are not limited to full-time students.

¹¹ We also checked an additional trend line after removing colleges with high adult education enrollment to verify that the pattern is not driven by these institutions. Communications with the California Community Colleges Chancellor's Office indicate that there were underreporting issue with asynchronous independent study courses. Some students who would have, in prior years, shown up as enrolled with a small number of credits were not being captured as enrolled in fall 2020. The final version of the data used in this study has corrected current and past enrollment counts to minimize this issue.

fully anticipating that classes would not be held in person and because some classes that could only be held in-person were cancelled.

As the pandemic continued, enrollment dropped further. From spring 2020 to spring 2021 enrollment dropped by 158,000 students or 10 percent. And, from fall 2020 to fall 2021 enrollment dropped by 106,000 or 7 percent. Combining the YOY changes in the pandemic, fall 2021 enrollment is 288,000 or 17 percent lower than where it was in fall 2019 just prior to the start of the pandemic.

Looking at YOY changes by semester back to 1992, the changes in student enrollment during the pandemic were large outliers. The drops in enrollment from fall 2019 to fall 2020, spring 2020 to spring 2021, and fall 2020 to fall 2021 were much larger than YOY changes over the last two decades. The magnitude of the YOY changes in spring 2020, fall 2020 are unchanged when we estimate an event-study regression that adjusts for a time trend and includes semester dummy variables. We focus the remaining analysis on YOY comparisons for simplicity and clarity.

In contrast to these patterns, enrollment in the California State University and University of California systems mostly did not change in the pandemic.¹² Figure 2 displays undergraduate enrollment totals for both systems of higher education. In the CSU system, total undergraduate enrollment increased by 0.5 percent (2,098 students) from fall 2019 to fall 2020 and decreased by 2.3 percent (9,873 students) from fall 2020 to fall 2021. Total undergraduate enrollment in the University of California system increased by 0.1 percent (328 students) from fall 2019 to fall 2020 and 1.8 percent (4,080 students) from fall 2020 to fall 2021. It is likely that selective admissions with excess demand allowed these four-year institutions to better maintain enrollment levels during the pandemic.

2.3 Patterns by Race and Ethnicity

The California Community College system has a diverse student body with 50 percent Latinx, 12 percent Asian, 6 percent African-American, and 25 percent non-Latinx white students. Did enrollment fall disproportionately among students of color? Figure 3 displays YOY changes in student enrollment for major racial and ethnic groups. African-American enrollment dropped

¹² In addition to the California Community College System, the California State University and University of California systems are part of the California master plan for higher education.

YOY by 5 percent in spring 2019, 14 percent in fall 2020, 12 percent in spring 2021, and 7 percent in fall 2021. From fall 2019 to fall 2020, enrollment dropped by 20 percent (17,500 students) among Black students. Latinx students, who represent nearly half of all students statewide, experienced YOY drops of 2 percent in spring 2020, 11 percent in fall 2020, 12 percent in spring 2021, and 7 percent in fall 2021. Latinx enrollment in the community college system dropped by 18 percent (135,000 students) from fall 2019 to fall 2021. Asian students experienced smaller enrollment drops in the pandemic, but these enrollment losses were still very large. Asian enrollment dropped YOY by 3 percent in spring 2020, 7 percent in fall 2020, 8 percent in spring 2021, and 10 percent in fall 2021.¹³ The total loss in enrollment from fall 2019 to fall 2021 was 16 percent (28,000 students) among Asian students. White, non-Latinx students also experienced large losses in the pandemic, but there was a downward trend prior to the pandemic. White enrollment dropped by 16 percent from fall 2019 to fall 2021, but it also dropped by 10 percent from fall 2017 to fall 2019, which was just prior to the start of the pandemic.

Although all racial and ethnic groups experienced large decreases in enrollment during the pandemic, African-American students experienced the largest effects and followed by Latinx students. This evidence is consistent with the enrollment patterns of new high school graduates, which reveal the largest changes for Black and Latinx students nationally (Howell et al. 2021).

2.4 Enrollment Losses by Type of Student

The California Community College system classifies students into several categories related to their current or previous enrollment in a community college, another college, or high school. Students in these groups have varying levels of attachment to education and therefore may have responded differently to the pandemic and the switch to fully online courses. Table 1 reports enrollment totals and changes in enrollment for different classifications of students, focusing on changes in fall enrollments. Interestingly, large enrollment changes were not concentrated among first-time students. First-time students in the community college system, students returning to college after taking time off, and students continuing with their educations all experienced a

¹³ In the California Community College system, Filipino student counts are not included in Asian student counts. Filipino students experienced enrollment YOY drops of 5 percent in spring 2020, 8 percent in fall 2020, 10 percent in spring 2021, and 13 percent in fall 2021.

decrease in enrollment of 11 percent between fall 2019 and fall 2020. Apparently, many high school graduates chose not to start college when it became clear that classes would be held remotely, and students returning to community college after taking time off might have seen enrollment decreases for similar reasons. One would expect these students to have less attachment to college and thus to be more likely to not enroll or defer enrolling due to the pandemic and shift to online courses. However, surprisingly, community college students continuing with their educations experienced a similar magnitude of change. That is, being connected to a community college and having greater insights into the impact of moving classes online did not attenuate negative enrollment responses.

A group that might have been less likely to want to disrupt their longer-term education plans are students transferring between community colleges in the system or from a college outside of the system. Further, transferring between campuses could increase if students moved in response to the pandemic (e.g., if students moved home). We find that the number of transfer students decreased by 7 percent, which was also large. In contrast to the patterns for other types of students, special admit students, primarily high-school students taking community college courses, actually increased in the fall of 2020 by 4 percent. High school students taking courses at community colleges might not have had as much flexibility to drop classes given the requirements and strict timeline for graduating from high school. Also, the tradeoff for these students was between taking a high school class online or a community college class online.

The patterns differed somewhat for the drop in enrollment from fall 2020 to fall 2021. Specifically, enrollment among first-time students and students returning after time off decreased by 1 and 4 percent, respectively. In contrast, first-time transfer students experienced a much larger drop in enrollment rates at 16 percent from fall 2020 to fall 2021. Continuing students experienced the same enrollment drops from fall 2020 to fall 2021 as from fall 2019 to fall 2020 (11 percent for each year). Thus, in the pandemic enrollment dropped less for first-time students than for continuing students when measured as the change from fall 2019 to fall 2021. Finally, special admit students experienced an additional increase in fall 2021 as many high schools continued to face difficulties with in-person vs. remote learning in the pandemic. The larger reduction in enrollment of continuing students in both the fall of 2020 and 2021 drive the overall changes, and understanding why this population was disproportionately affected is an important area for future research.

2.5 Enrollment Losses by Course Type and Field

Figure 4 displays YOY changes in course enrollments for degree applicable, transfer and vocational courses.¹⁴ Overall, no course type was spared from large drops in enrollments in the pandemic. Vocational course enrollment fell by 14 percent from fall 2019 to fall 2020, and 4 percent from fall 2020 to fall 2021.¹⁵ That is, enrollment changes in response to the pandemic could significantly alter career investment among students and the supply of skilled workers in the labor force. This imposes an especially significant cost on students who would have pursued high return degrees and certificates in fields such as nursing.¹⁶ Perhaps more surprisingly, at the opposite side of the spectrum enrollment in academic courses that are transferable to four-year colleges such as those in the CSU and UC systems also fell substantially (13 percent in fall 2020 and 9 percent in fall 2021).¹⁷ This suggests that there was no systematic shift of students into lower-cost community colleges who would otherwise have attended four-year institutions.

Were some fields of study spared enrollment losses in fall 2020 and others hit especially hard? In conversations with officials at various community colleges we learned that the primary response to the pandemic was that colleges did not drop sections for classes but instead switched to teaching them remotely. The main exceptions were that programs such as nursing and medical fields were considered essential and were generally taught in-person even in spring 2020. Colleges continued to operate a handful of allied health programs in-person that would train medical professionals to help with the community response to COVID. On the other hand, the small subset of courses that were impossible to convert to online instruction because of

¹⁴ Vocational courses earn credit for vocational degrees and certificates. Transfer courses earn credit that can be used at four-year colleges such as CSUs and UCs. Courses are not limited to one category.

¹⁵ Course taking for basic skills or remedial class that do not count for credit towards degrees and transfers to other colleges also experienced a large drop from fall 2019 to fall 2020 (35 percent). But, basic skills course enrollments were dropping rapidly prior to the pandemic because of recent legislation (i.e. California Assembly Bill 705 in 2017). In response to the legislation, colleges made changes to student assessment and placement processes to emphasize faster student completion of transfer-level English and math and expand direct entry into transfer-level courses (RPGroup 2021).

¹⁶ The literature generally finds positive labor market returns to community college degrees and longer-term certificates, with the largest positive effects for training in the healthcare sector (Stevens, Kurlaender, and Grosz 2019; Liu, Belfield, and Trimble 2015).

¹⁷ Partly reflecting pre-pandemic decisions and commitments, the number of incoming transfer students to the CSU and UC systems from California community colleges increased by 8 percent and 4 percent, respectively, from fall 2019 to fall 2020.

dependence on physical facilities (e.g. automotive, aviation, cosmetology, culinary arts, dental hygiene, horticulture and welding) were cancelled.

Table 2 reports enrollment changes by field. We focus on YOY changes from fall 2019 to fall 2020 and fall 2020 to fall 2021. Some fields experienced large enrollment losses in the pandemic. Among larger fields, Education, Engineering and Industrial Technologies, and Interdisciplinary Studies each lost more than 20 percent of enrollment from fall 2019 to fall 2020 and Fine and Applied Arts lost 19 percent. On the other side of the spectrum, Physical Sciences, Biological Sciences, Foreign Language, and Psychology experienced enrollment losses of 3 percent or less in fall 2020. Enrollment losses from fall 2020 to fall 2021 shifted a little with some new fields experiencing large losses. Foreign Language, Mathematics, and Social Sciences each experienced losses of 15 percent or higher. Interestingly, Engineering and Industrial Technologies reversed course with an increase of 7 percent in enrollment in fall 2021 after losing 30 percent in fall 2020.

These results indicate that losses were felt across a wide range of fields of study, including academic subjects, and were not limited to vocational programs. But, there is some evidence that early in the pandemic the largest reductions were in fields in which online learning might be inferior (e.g. industrial technologies, teaching aides, art, and police training). Overall, the results reveal that the pandemic not only reduced the supply of labor with career technical training, but also the supply of students eligible to transfer to four-year colleges and universities.

2.6 College Losses and Pre-Pandemic Online Share

Were enrollment losses felt by all community colleges or were they concentrated in only a few colleges? Figure 5 displays the distribution of enrollment losses from fall 2019 to fall 2020 across community colleges in the system. We focus on this year-over-year change because it is the largest and it shows the general pattern for other YOY changes. Every college in the system experienced at least some loss in enrollment in fall 2020. A large number of colleges experienced losses in the range of 8 to 16 percent, while only a handful of colleges experienced losses of less than 2 percent or more than 20 percent. The distribution of losses from spring 2020 to spring 2021 and fall 2020 to fall 2021 also indicate that losses were not concentrated in only a few colleges but were felt across the system.

Given the system wide shift to remote instruction, an interesting question is whether the relative online presence of community colleges prior to the pandemic limited enrollment losses? This would be the case if, for example, colleges with more pre-existing online offerings had an easier time transitioning courses online while maintaining quality, or if they serve students who are more willing and accustomed to taking online courses. Many community colleges in the system had strong distance learning presences before the pandemic. Using data from fall 2019, we identify the online percentage of course enrollments for each community college, which reveals an interquartile range of nearly 10 percentage points, with 13 percent online at the 25th percentile and 22 percent online at the 75th percentile. Figure 6 displays a scatterplot of the percent change in student enrollment from fall 2019 to fall 2020 by the online share of course enrollments in fall 2019. We focus on the fall 2019 to fall 2020 change because courses were offered almost exclusively online in the fall of 2020, but patterns are very similar for the spring 2020 to spring 2021 and fall 2020 to fall 2021 changes. In the figure, each point represents a different college in the system. There does not appear to be a strong relationship between student enrollment changes and pre-pandemic online shares. The point estimate from a linear regression through the data is small, negative and not statistically significant (which we also find for the spring 2020 to spring 2021 and fall 2020 to fall 2021 enrollment changes). Apparently, having a larger online presence prior to the pandemic did not protect colleges from enrollment losses in the pandemic.¹⁸

3 Student Outcomes

3.1 Course Loads

We turn to examining how enrollment intensity and student success changed during the pandemic. We first focus on patterns of course taking. The pandemic might have impacted the number of units taken by students, affecting their longer-term time to degree or transfer preparedness. One possibility is that students dislike online learning and might have shifted their total units downward, taking only the most important courses that they needed and postponing

¹⁸ A regression analysis that includes additional college characteristics (i.e. the share of underrepresented students of color, percent of students on financial aid, percent of course enrollments in basic skills courses, and the transfer rate to 4-year colleges) does not reveal statistically significant predictors of enrollment drops. One exception is that we find that colleges with higher shares of underrepresented students of color experienced smaller drops in enrollment, but the magnitude is small. An increase of 0.10 in the underrepresented minority student share is associated with an 0.007 smaller drop in enrollments.

others. Alternatively, with higher unemployment, students may have pursued more full-time education. Table 4 reports the distribution of students taking different unit loads from spring 2019 to fall 2021. On average, course loads did not change substantially. The percent of students taking 15 or more units, for example, was 10 percent in fall 2019, 10 percent in fall 2020, and 10 percent in fall 2021. Similarly, the percent of students taking 15 or more units was 9 percent in spring 2019 and 10 percent in both spring 2020 and spring 2021. While it may be the case that students who remained enrolled tended to be those inclined to take higher course loads, the lack of significant changes in the distribution of unit totals provides some evidence that there was not a major shift towards lower or higher loads during the pandemic. The losses in the pandemic were not simply due to low-unit enrollment students.

3.2 Course Completion and Grades

Course completion is likely to be a primary outcome affected by the shift to remote learning. Figure 7 displays course completion rates since fall 2012. Course completion is defined as receiving a passing grade in the course relative to failing, dropping or withdrawing from the course. There is a strong seasonal component (i.e. fall vs. spring) to course completion, and thus we focus on YOY changes within fall or spring semester. Course completion trended upwards and reached a high of 72 percent in spring 2019. In spring 2020, course completion dropped to 69 percent. Course completion did not change in fall 2020 from the previous year (70 percent).¹⁹ This reduction in completion rates is consistent with Bird, Castleman, and Lohner (2021), which finds negative effects on completion of similar magnitude among community college students in Virginia.

The major cause of the decrease in course completion rates in spring 2020 was that a much higher percentage of students withdrew from courses during the semester. Figure 8 displays course withdrawal rates and course fail rates, which are the primary reasons for not completing courses. While course withdrawals increased substantially in spring 2020, this was offset by a large reduction in course fail rates. In fall 2020, both withdrawal and fail rates

¹⁹ There is some evidence that course completion rates declined more at community colleges with higher shares of underrepresented students of color (data are not available on the full grade distribution by student race and ethnicity). From linear regressions using college-level data, we find that an increase in college underrepresented share of 10 percentage points is associated with larger course completion rate declines of 0.3 percentage points in spring 2020 and 0.4 percentage points in fall 2020. Both relationships are statistically significant.

reversed course. However, withdrawal rates remained elevated relative to pre-pandemic levels. Partially offsetting this effect on course completion, however, fail rates remained lower in fall 2020 than fall 2019.

As the pandemic continued into 2021 course completion returned closer to long-term levels. Course completion rates returned to 72 percent in spring 2021, and nearly 70 percent in fall 2021. Withdraw rates and fail rates generally returned to long-term levels instead of the disruption found in spring 2020 at the very beginning of the pandemic.

The decrease in fail rates in courses might be due in part to instructors being more lenient in grading during the pandemic. Table 3 reports the distribution of grades from spring 2019 to fall 2021. The percentage of courses with A's increased from 40 percent in spring 2019 to 50 percent in spring 2020 whereas the percentage of courses with B's and C's decreased. The shift in the grade distribution is too large to be fully explained by the increased withdrawal rate among students who would have otherwise earned low grades. Thus, there is evidence that instructors were more lenient in awarding high grades during this period.²⁰ The percentage of A's decreased in spring 2021 to 47 percent but not fully back to pre-pandemic levels. Additionally, in fall 2020 and fall 2021 the percentage with A's remained high but lower than the 50 percent level reached in the disrupted spring 2020 semester at the very beginning of the pandemic.

The unanticipated disruption in spring 2020 resulted in more changes in course completion, withdrawals and grades than during fall 2020. It was well known among students that fall 2020 would be held online, and thus adjustments might have already been made through enrollment decisions and by instructors in their teaching methods. Those students enrolling in online courses during fall 2020 likely did so with full knowledge that courses would be taught remotely. Instructors were also more likely to be prepared to teach their classes remotely.

4 Implications

We use administrative college-level panel data for the California Community College System to evaluate COVID-19 impacts on students in the system. In contrast to the CSU and UC systems, we document large enrollment losses during the pandemic that are consistent with national

²⁰ In a randomized experiment at West Point during the pandemic, students assigned to online classes performed less well on their final exams (Kofoed et al. 2021). This suggests that grade increases during online semesters is likely due to faculty lenience rather than increased learning.

trends. These losses were widespread across colleges in the system. We also find that there was a substantial drop in course completion among community college students in the rapid movement to remote instruction in spring 2020. Colleges with larger online programs prior to the pandemic were not insulated from these effects. Reduced enrollment is evident in both four-year transferrable and career-oriented classes.

These findings, in conjunction with national evidence that enrollments at community colleges remain down in the fall of 2021, have important policy implications and raise questions about how to reverse these effects. Future studies can shed additional light on why enrollment at community colleges was so much more sensitive to the pandemic and the shift to online courses than was enrollment at four-year colleges. In particular, the interplay between labor market opportunities, college costs, and fields of study seem especially compelling. For example, our evidence suggests that, despite the economic downturn and low cost of community college courses relative to tuition at four-year institutions, students were not systematically drawn to community colleges. Indeed, enrollment declines at California's community colleges occurred despite significant federal aid for students and institutions through the Higher Education Emergency Relief Fund in 2020 and 2021.²¹ This highlights the tenuous nature of enrollment patterns for the types of students who attend community colleges, as well as the potential vulnerability of the institutions themselves. It will be important to examine whether reductions in enrollment ultimately reduce the fraction of students who earn associate's degrees in technical fields or who transfer to four-year colleges, and whether short-run reduction in enrollment translate into permanent reductions in educational attainment that affect future labor market returns.

Community college enrollment might bounce back as courses move back to being held in person and health and work conditions return to normal. There also might be some pent-up demand for community college as perspective students postponed entering college or current students took time off during the pandemic. However, nationally, such a return to normal was not evident in the fall of 2021, suggesting that additional policy efforts may be necessary.

²¹ The Higher Education Emergency Relief Fund was funded through the CARES Act and Coronavirus Response and Relief Supplemental Appropriations in 2020 and the American Rescue Plan of 2021. For a summary of funds dedicated to California community colleges, see, for example, Cook (2021).

To the extent that community college students are especially responsive to the cost of education, changes in tuition and grants could help to restore enrollments. A shot in the arm might come from the recent donation to the California college system from the Jay Pritzker Foundation, which is the largest ever to the system and provides \$100 million in scholarships to students over 20-years. The availability of financial aid might be especially helpful for Black and Latinx students for whom we observed higher enrollment losses. Nationally, Democrats in Congress are proposing to make community college tuition free which could generate a further rebound and boost. Another promising avenue for future enrollments are high school students. Our analysis reveals that enrollment only dropped by 1 percent for this group. As high school students became more familiar with remote instruction an increasing number might take advantage of the option of enrolling in advanced online courses at community colleges.

However, the large and persistent reductions at community colleges may also reflect shortcomings in the quality of the programs being offered and student beliefs about their economic returns. While certain programs, such as nursing, have been found to produce significant increases in earnings, others exhibit little evidence of such benefits. Further, Grosz (2019) documents that the programs offered by community colleges significantly lag changes in demand from employers, while Baker et al. (2018) find that many community college students are not well informed about the returns to different fields. Thus, building enrollments back to their prior levels could be aided by improvements in the quality of programs overall and the availability of sufficient capacity in high-demand fields. Providing potential matriculates with accurate information about earnings returns could further increase demand. Brock and Diwa (2021) note that the pandemic has highlighted the vulnerability of community college enrollments, especially for students of color, and the need for policies that improve community college funding and the quality of the programs they offer.

Improving community college quality and expanding offerings poses a particular challenge when revenue is down. From the college perspective, the revenue losses from missing nearly a quarter million students in the California community college system might be severe and have lingering budgetary consequences. Unlike the CSU and UC systems, California's community colleges are open enrollment and cannot simply accept a higher percentage of applicants when demand decreases. They also do not have the same buffer created by the overhead on research grants and donors. Addressing budgetary shortfalls will be crucial for

ensuring future educational opportunities for low-income and students of color. Given the unique circumstances of the pandemic, federal and state governments might have to step in with short-term gap funding to fill the void created from lost tuition and other expenditures by students. In January of 2022, the U.S. Department of Education announced \$198 million in American Rescue Plan funding targeting continuing enrolment and reenrolment at community colleges as well as the expansion of programs that supply in-demand fields (US DOE 2022). Similarly, the budget proposed by Governor Newsom in California includes hundreds of millions of dollars targeted to retaining and re-enrolling community college students, providing additional grant aid, and expanding training for in-demand health care fields (Burke and Smith 2022). Future research can assess whether such initiatives were successful in rebuilding community college enrollments and the pipeline they provide to four-year institutions and the labor market.

References

- Alpert, William T., Kenneth A. Couch, and Oskar R. Harmon. 2016. "A randomized assessment of online learning." *American Economic Review* 106 (5): 378-82.
- Aucejo, Esteban M., Jacob French, Maria Paola Ugalde Araya, and Basit Zafar. 2020. "The impact of COVID-19 on student experiences and expectations: Evidence from a survey." *Journal of Public Economics* 191 (2020): 104271.
- Ahn, Kunwon, Jun Yeong Lee, and John V. Winters. 2020. "Employment Opportunities and High School Completion during the COVID-19 Recession." IZA Discussion Paper 13802.
- Baker, Rachel, Eric Bettinger, Brian Jacob, and Ioana Marinescu. 2018. "The effect of labor market information on community college students' major choice." *Economics of Education Review* 65: 18-30.
- Barr, Andrew, and Sarah E. Turner. 2013. "Expanding enrollments and contracting state budgets: The effect of the Great Recession on higher education." *The ANNALS of the American Academy of Political and Social Science* 650 (1): 168-193.
- Betts, Julian R., and Laurel L. McFarland. 1995. "Safe port in a storm: The impact of labor market conditions on community college enrollments." *Journal of Human Resources* 30 (4): 741-765.
- Bird, Kelli, Benjamin L. Castleman, and Gabrielle Lohner. 2021. "Negative impacts from the shift to online learning during the COVID-19 crisis: evidence from a statewide community college system." Working paper.
- Bowen, William G., Matthew M. Chingos, Kelly A. Lack, and Thomas I. Nygren. 2014. "Interactive learning online at public universities: Evidence from a six-campus randomized trial." *Journal of Policy Analysis and Management* 33 (1): 94-111.
- Brock, Thomas, and Cameron Diwa. 2021. "Catastrophe or Catalyst? Reflections on COVID's Impact on Community Colleges." *Journal of Postsecondary Student Success* 1 (2) : 2-17.
- Bulman, George, and Robert W. Fairlie. 2016. "Technology and education: Computers, software, and the internet." In *Handbook of the Economics of Education*, vol. 5, pp. 239-280. Elsevier.
- Burke, Michael, and Daniel Willis. 2021. "California's community colleges at critical crossroads as more students opt not to attend." *EdSource*.
- Burke, Michael, and Ashley Smith. 2022. "Newsom offers new money if California college systems meet equity goals." *EdSource*.
- Cacault, M. Paula, Christian Hildebrand, J r my Laurent-Lucchetti, and Michele Pellizzari. 2021. "Distance learning in higher education: evidence from a randomized experiment." *Journal of the European Economic Association* 19 (4): 2322-2372.

- Cook, Kevin. 2021. "Federal Stimulus Funds Bolstered California Colleges and Universities." Public Policy Institute of California.
- Figlio, David, Mark Rush, and Lu Yin. 2013. "Is it Live or Is It Internet? Experimental Estimates of the Effects of Online Instruction on Student Learning." *Journal of Labor Economics* 31 (4): 763-784.
- Grosz, Michel Z. 2019. "Do Postsecondary Training Programs Respond to Changes in the Labor Market?" SSRN Working Paper 3499831.
- Hanushek, Eric A., and Ludger Woessmann. 2020. "The Economics Impacts of Learning Losses," OECD Education Working Paper No. 225.
- Hart, Cassandra MD, Elizabeth Friedmann, and Michael Hill. 2018. "Online course-taking and student outcomes in California community colleges." *Education Finance and Policy* 13 (1): 42-71.
- Howell, J., M. Hurwitz, J. Ma, M. Pender, G. Perfetto, J. Wyatt, and L. Young. 2021. "College enrollment and retention in the era of COVID." College Board.
- Johnson, Hans, and Marisol Cuellar Mejia. 2020. "Increasing Community College Transfers: Progress and Barriers." Public Policy Institute of California.
- Kofoed, Michael, Lucas Gebhart, Dallas Gilmore, and Ryan Moschitto. 2021. "Zooming to Class?: Experimental Evidence on College Students Online Learning During Covid-19." IZA Discussion Paper 14356.
- Krieg, John M., and Steven E. Henson. 2016. "The educational impact of online learning: How do university students perform in subsequent courses?" *Education Finance and Policy* 11 (4): 426-448.
- Liu, Vivian YT, Clive R. Belfield, and Madeline J. Trimble. 2015. "The medium-term labor market returns to community college awards: Evidence from North Carolina." *Economics of Education Review* 44: 42-55.
- Long, Bridget Terry. 2014. "The financial crisis and college enrollment: How have students and their families responded?" In *How the financial crisis and Great Recession affected higher education*, pp. 209-233. University of Chicago Press.
- National Student Clearinghouse. 2020. "Overview: Fall 2020 Enrollment Estimates." Term Enrollment Estimates Series, National Student Clearinghouse Research Center Report.
- National Student Clearinghouse. 2022. "Overview: Fall 2021 Enrollment Estimates." Term Enrollment Estimates Series, National Student Clearinghouse Research Center Report.
- Rodríguez-Planas, Núria. 2020. "Hitting Where It Hurts Most: COVID-19 and Low-Income Urban College Students." IZA Discussion Paper 13644.
- Rodríguez-Planas, Núria. 2021. "COVID-19 and College Academic Performance: A Longitudinal Analysis." IZA Discussion Paper 14113.

RPGGroup. 2021. "Enrollment and Success in Transfer-Level English and Math in the California Community Colleges System Fall 2015 to Fall 2019 Statewide Analysis"

Stevens, Ann Huff, Michal Kurlaender, and Michel Grosz. 2019. "Career technical education and labor market outcomes evidence from California community colleges." *Journal of Human Resources* 54 (4): 986-1036.

U.S. Department of Education. 2022. "Biden-Harris Administration Takes Actions to Support Students' Basic Needs and Mitigate the Spread of COVID-19 at Colleges and Universities." Press Release.

Xu, Di, and Shanna S. Jaggars. 2014. "Performance gaps between online and face-to-face courses: Differences across types of students and academic subject areas." *The Journal of Higher Education* 85 (5): 633-659.

Figure 1: California Community College System Student Enrollment by Semester

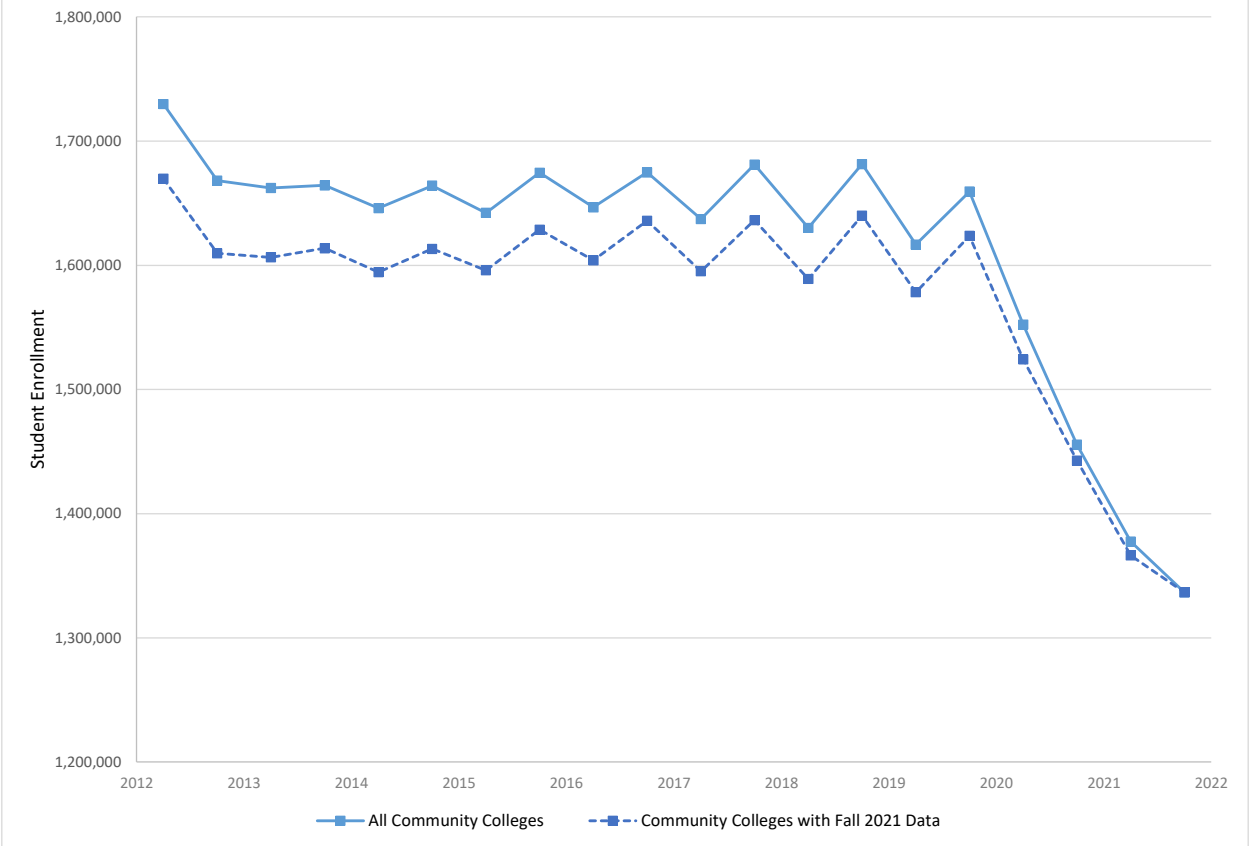


Figure 2: California State University and University of California System Fall Undergraduate Student Enrollment

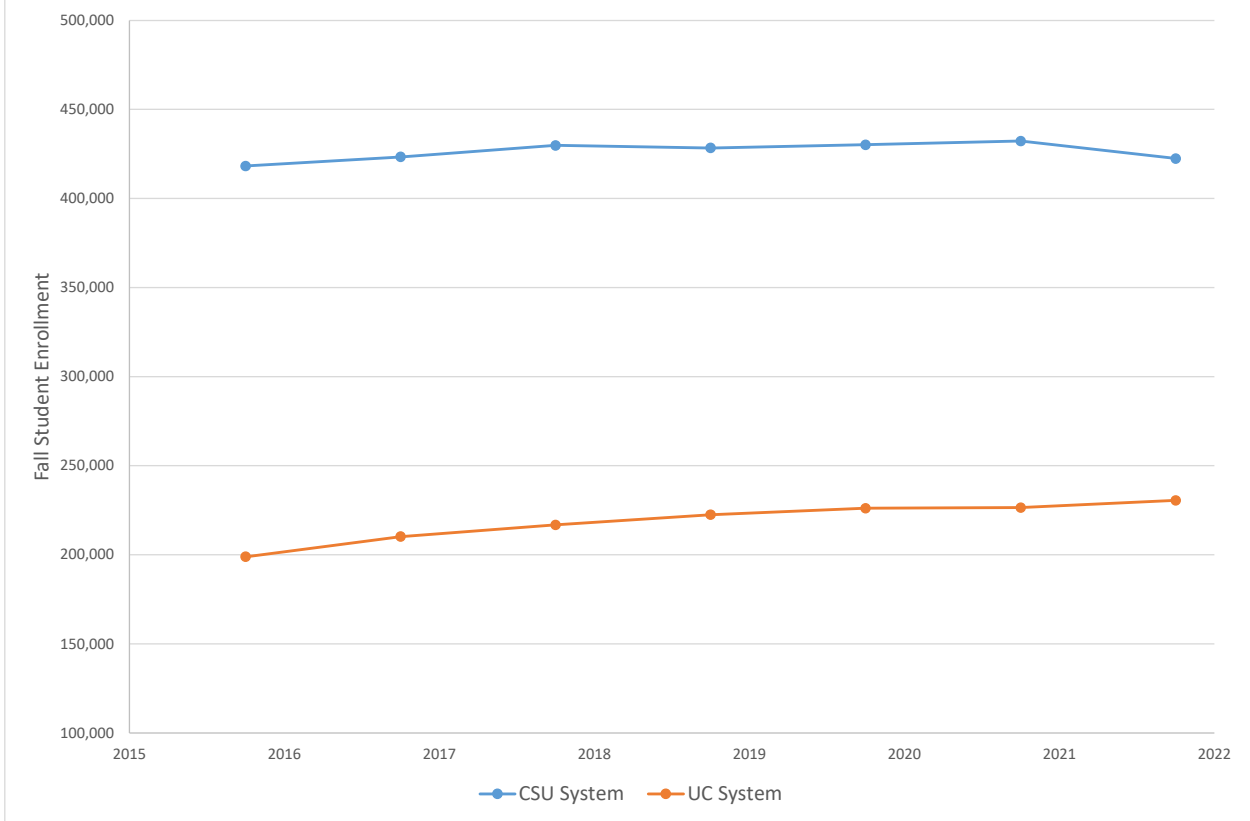


Figure 3: California Community College Systemwide Year-over-Year Enrollment Change by Race and Ethnicity

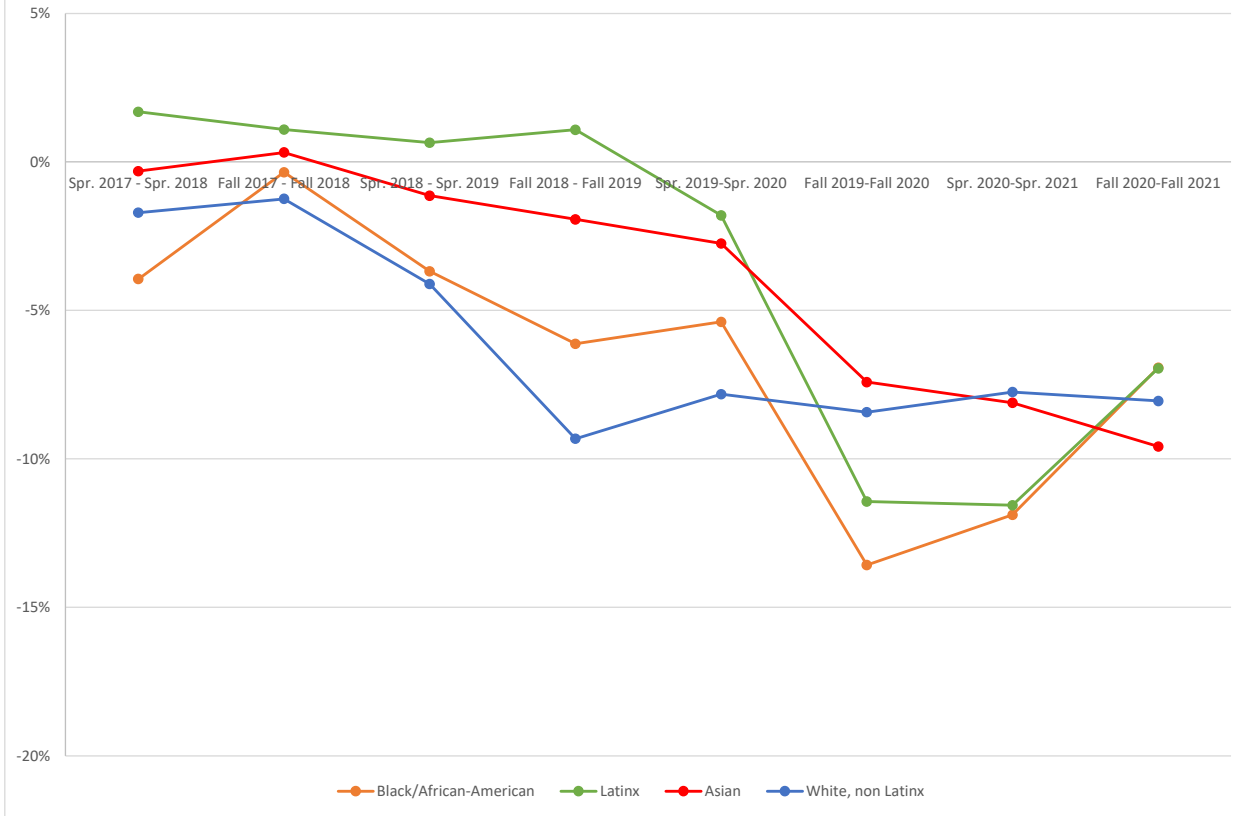


Figure 4: California Community College Systemwide Year-over-Year Enrollment Change by Course Type

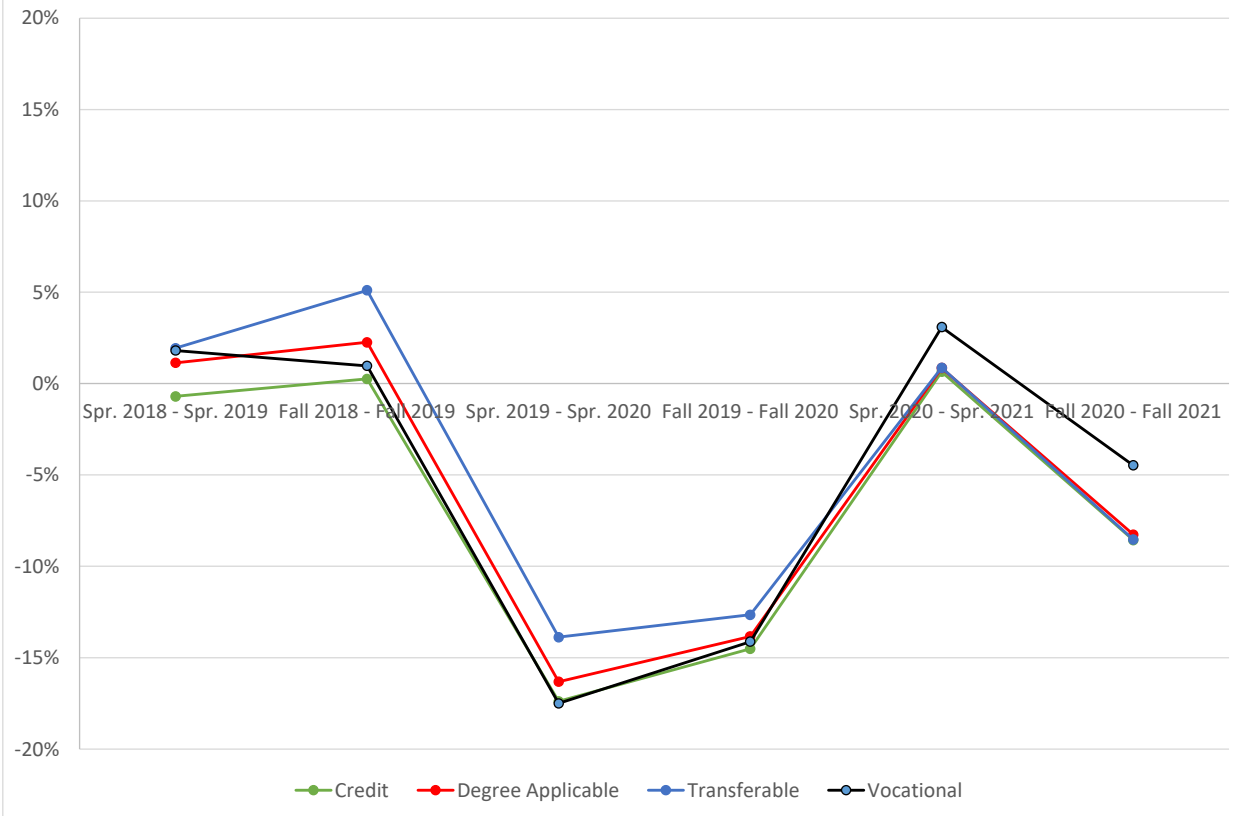


Figure 5: Distribution of Enrollment Losses across Community Colleges from Fall 2019 to Fall 2020

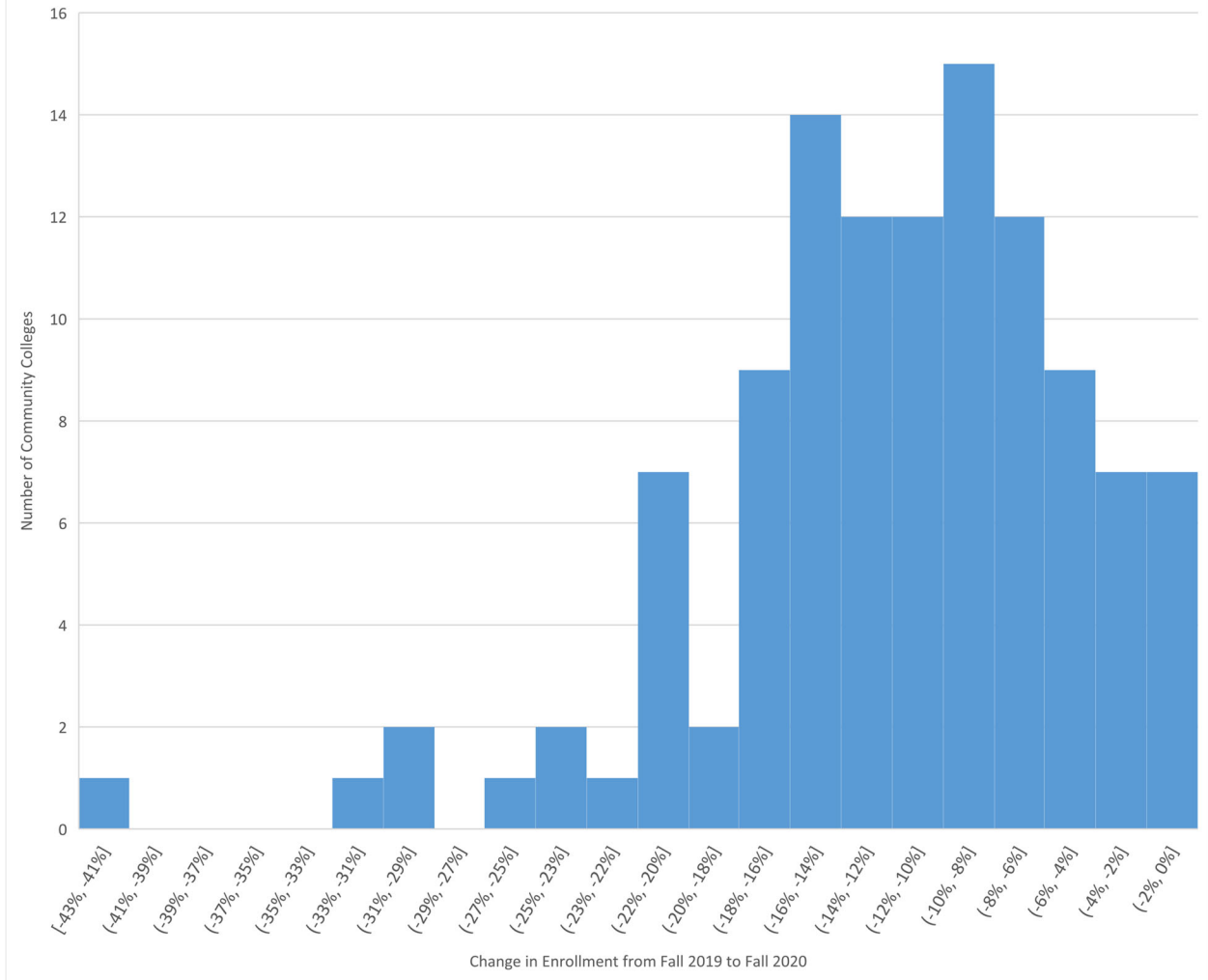


Figure 6: Change in Course Enrollment in Fall 2020 by Pre-Pandemic Online Course Percentage across Colleges

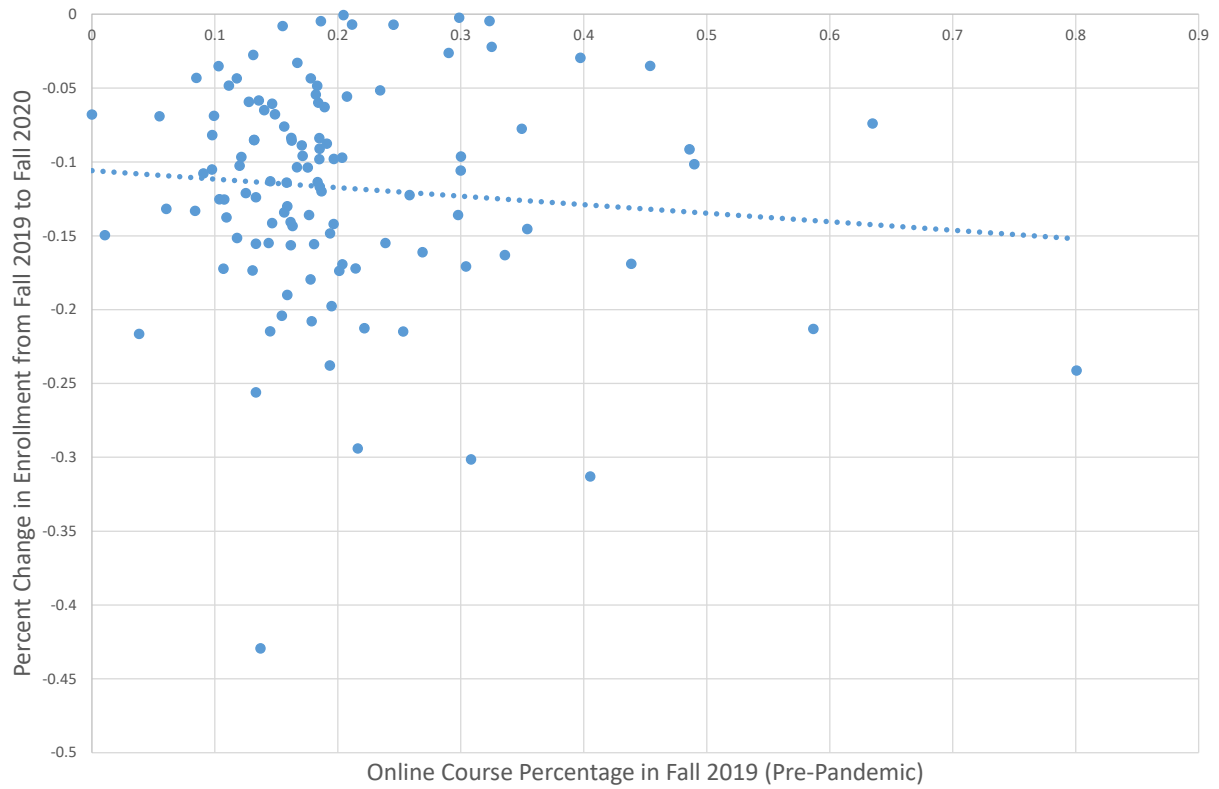


Figure 7: California Community College System Course Completion, Withdraw/Drop, and Fail Rates

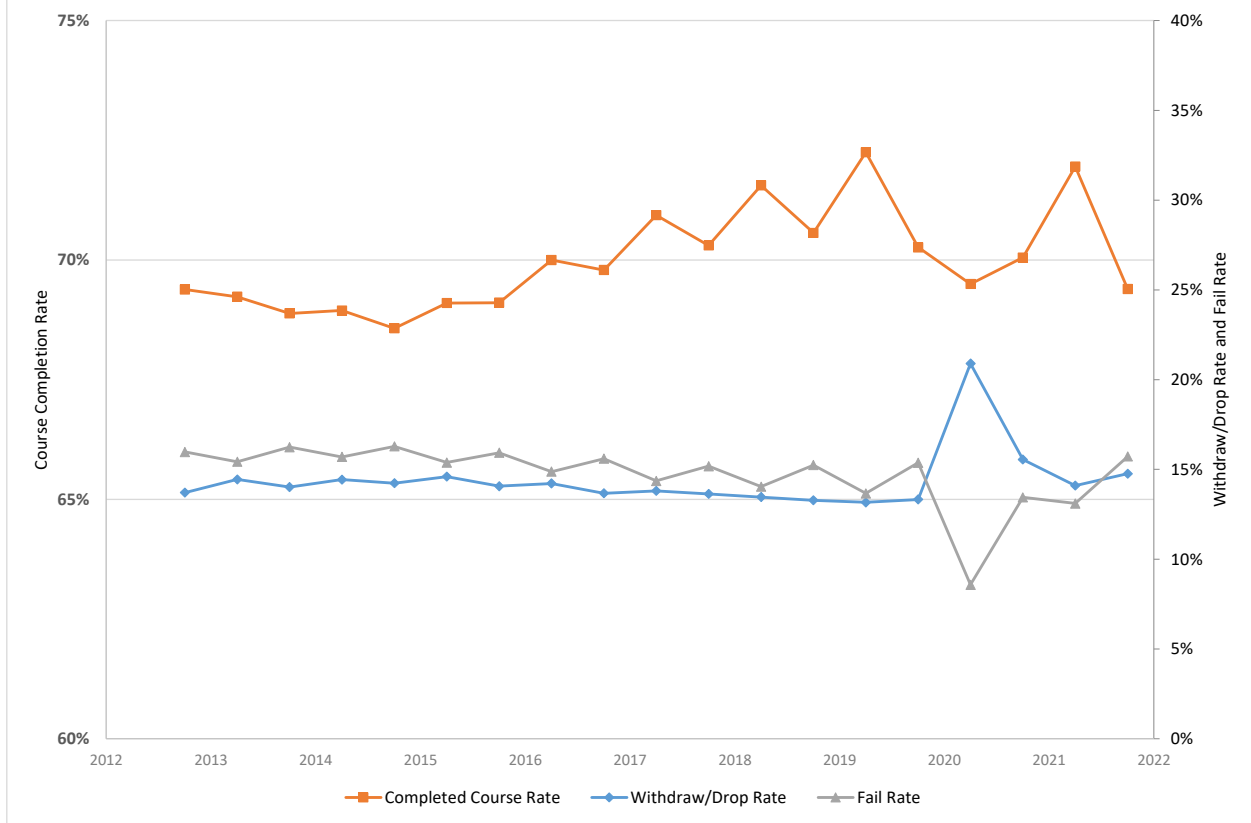


Table 1: Enrollment Changes by Type of Student

Student Type	Fall 2019	Change to Fall 2020	Percent Change	Fall 2020	Change to Fall 2021	Percent Change
Continuing Student	883,678	-97,702	-11%	785,976	-88,547	-11%
First-Time Student	259,578	-29,533	-11%	230,045	-1,258	-1%
First-Time Transfer Student	116,887	-8,261	-7%	108,626	-17,179	-16%
Returning Student	185,251	-20,364	-11%	164,887	-7,129	-4%
Special Admit Student	104,649	3,710	4%	108,359	4,575	4%

Notes: Calculated from administrative data from the California Community College system. The total number of students enrolled of each type is reported. Enrollment is for all colleges except three colleges that did not report enrollment data in fall 2021. See text for more details.

Table 2: Course Enrollment Losses from Fall 2019 to Fall 2021 by Field of Study

Field of Study	Fall 2019	Share of Fall 2019	Fall 2020	Change Fall 2019 to Fall 2020	Fall 2021	Change Fall 2020 to Fall 2021
Agriculture and Natural	29,340	1%	27,590	-6%	27,043	-2%
Biological Sciences	158,068	4%	155,834	-1%	139,265	-11%
Business and Management	213,162	6%	205,463	-4%	187,952	-9%
Education	235,900	6%	170,320	-28%	166,445	-2%
Engineering and Industrial Technologies	135,155	4%	94,621	-30%	100,778	7%
Family and Consumer Sciences	164,299	4%	151,585	-8%	134,084	-12%
Fine and Applied Arts	288,652	8%	233,206	-19%	213,806	-8%
Foreign Language	75,224	2%	75,097	0%	63,031	-16%
Health	128,296	3%	116,108	-9%	113,904	-2%
Humanities (Letters)	601,017	16%	540,826	-10%	468,676	-13%
Information Technology	100,137	3%	95,778	-4%	88,378	-8%
Interdisciplinary Studies	156,187	4%	120,002	-23%	109,491	-9%
Mathematics	406,154	11%	350,377	-14%	285,660	-18%
Media and Communications	71,154	2%	65,395	-8%	61,142	-7%
Physical Sciences	171,459	4%	168,154	-2%	146,880	-13%
Psychology	175,950	5%	170,450	-3%	146,346	-14%
Public and Protective Services	146,406	4%	123,878	-15%	113,389	-8%
Social Sciences	527,507	14%	503,437	-5%	424,031	-16%

Notes: Calculated from administrative data from the California Community College system. The total number of course enrollments for credit in each field of study is reported.

Table 3: Distribution of Course Grades in California Community College System

	Spring 2019		Spring 2020		Spring 2021		Fall 2019		Fall 2020		Fall 2021	
	Courses	Share	Courses	Shar	Courses	Share	Courses	Share	Courses	Share	Courses	Share
Grade A	1,249,257	41%	1,358,209	50%	1,232,064	47%	1,285,305	39%	1,304,345	46%	1,134,226	44%
Grade B	733,196	24%	613,056	22%	567,054	22%	759,969	23%	620,197	22%	545,528	21%
Grade C	453,841	15%	320,405	12%	310,590	12%	481,039	15%	350,636	12%	319,191	12%
Pass (No Letter)	155,387	5%	143,883	5%	109,015	4%	167,775	5%	117,211	4%	105,805	4%
Fail	490,215	16%	300,545	11%	404,133	15%	589,537	18%	459,210	16%	476,810	18%

Notes: Calculated from administrative data from the California Community College system. The total number of courses with each grade is reported. Enrollment is for all colleges except three colleges that did not report enrollment data in fall 2020. See text for more details.

Table 4: Distribution of Student Unit Loads in California Community College System

Unit Load	Fall 2019		Fall 2020		Fall 2020		Spring 2019		Spring 2020		Spring 2021	
	Number	Share	Number	Share	Number	Share	Number	Share	Number	Share	Number	Share
B. 0.1 - 2.9	82,470	6%	55,028	4%	62,761	5%	95,080	7%	81,852	6%	65,187	5%
C. 3.0 - 5.9	431,169	29%	425,507	31%	398,852	32%	428,449	30%	388,435	29%	418,655	33%
D. 6.0 - 8.9	278,163	19%	261,752	19%	236,250	19%	280,113	20%	260,728	19%	253,241	20%
E. 9.0 - 11.9	228,797	15%	210,802	16%	183,563	15%	225,761	16%	214,844	16%	194,482	15%
F. 12.0 -14.9	316,147	21%	264,856	20%	231,434	19%	272,116	19%	261,939	20%	217,811	17%
G. 15 +	147,492	10%	138,045	10%	118,958	10%	133,970	9%	134,239	10%	120,740	10%

Notes: Calculated from administrative data from the California Community College system. The total number of students enrolled at each semester unit load level is reported. Enrollment is for all colleges except three colleges that did not report enrollment data in fall 2020. See text for more details.