

# University of California Undergraduate College Completion

## *Using Unit-Taking Strategies to Improve College Graduation Rates*



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## Executive Summary

The University of California system graduation rate is 63% for four-years and 83% for six-years. However, people inside and outside the university have pointed to significant differences between campuses and among particular groups of students. Students graduate at different rates for many different reasons, but one determining factor is purely mechanical. In their earliest student years, many students enroll for fewer than 15 units per term, the minimum a student needs to take per term in order to earn the 180 units for graduation in four years. Not graduating on time has serious consequences. For students, not graduating or taking additional time to graduate results in significant costs both in terms of delaying careers and lost wages. For the university, low graduation rates reflect poorly on the quality of the institution and may prevent reaching out to additional students.

This project addresses the association between unit-taking and graduation. Two hypotheses are considered: 1) if UC campuses encouraged or required students to take a certain number of units that would allow them to earn 180 units in four years as the default course schedule for students, graduation rates would increase, 2) some students are not graduating in four years because of work responsibilities and financial limitations. If they are asked to take more units the additional burden would cause further stress and lower performance outcomes. Evidence from this research and previous UCOP research supports the first hypothesis. Considering this evidence, the report turns to the options UC campuses have to address unit-taking behavior.

The five alternatives considered are: 1) let present trends continue, 2) have each campus develop a minimum unit requirement for students in their first year, 3) have each campus develop a minimum unit requirement for students all four years, 4) have campuses emphasize predictive strategies to direct advising resources toward early intervention for students not taking the 45 unit average needed to graduate in four years, 5) develop an information campaign to address this information gap with the goal of getting students throughout the system to voluntarily complete a full-load of 15 units per term.

Many criteria can be used to evaluate how successful these different options may be, four will be considered in this report: 1) maximizing effectiveness (increased graduation rates), 2) maximizing efficiency (control costs), and 3) maximize graduation rates for disadvantaged subgroups, 4) improve student wellbeing.

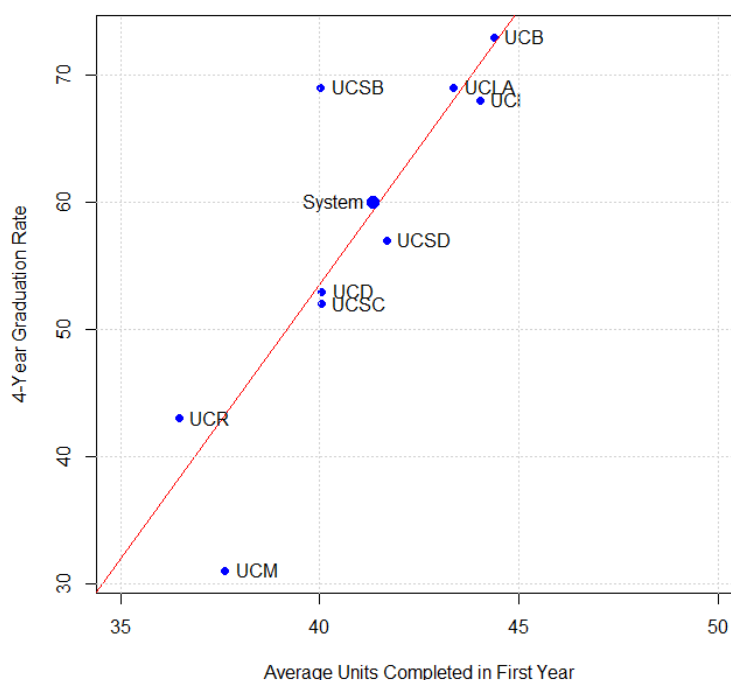
After considering the alternatives through the lenses of these criteria, this report recommends that each campus develop a first year unit requirement. This would change the default option for students from being a full-time student taking 12 units per term to full-load students taking 15 units on time to graduate in four years.

## Part 1: Addressing the Issue of Graduation Rates at UC

The University of California leads many public university systems in graduating its students, allowing them to pursue their future careers. With a system-wide four-year graduation rate of 63% and a six-year graduation rate of 83%, all campuses are supporting the success of their students. However, pressure exists from within the university and state government to increase that graduation rate further. As UCOP President Janet Napolitano proclaimed at the 2015 Undergraduate Completions Conference, "We are already doing so much, but we need to roll up our sleeves and see what we can do to improve even further."

This is particularly the case for reducing gaps in graduation rates for underrepresented students and bringing all campuses up to the same high level. Figure 1 shows the relationship between units completed in the first year and the four-year graduation rate for students attending the University of California from 2007 to 2013. Some campuses have completed fewer units, but have higher graduation rates. A comparison between UCSD and UCSB illustrates this point. UCSB had a four-year graduation rate 71% but students completed 40.02 units in their first year. At UCSD, the four-year graduation rate was 64%, but students completed 41.68 units in the first year. UCSB, UCD, and UCSC have first year unit completion rates between 40.02 and 40.05, but their graduation rates vary from 56% to 71%. The differences between graduation rates and units completed in the first year frame the report that follows. Two central questions will be considered. First, if students take 45 units of more in their first year will they do better? Second, if they will do better, how can the UC system make that happen?

Figure 1. Strong Association between UC Campus Graduation Rates and Unit-Taking Behavior



There are many reasons why students at different campuses graduate at different rates, but one determining factor is purely mechanical. In their earliest student years, many students enroll for fewer than 15 units per term, the minimum a student needs to take per term in order to earn the 180 units for graduation in four years.

The current default option for students is to take a minimum of 12 units per term. This allows students to be considered full-time, meaning they have access to federal financial aid and other resources. A student who takes 12 units per term will complete 36 in their first year. At this rate a student will need five years to graduate. Many full-time students are not full-load students taking the 15 units per term necessary to graduate in four years. A full-time student will accumulate 45 units in a year and require four years to graduate.

Students start out with fewer units in their first year to make sure they do not become overwhelmed in their first year. They increase their unit-taking in their subsequent terms in the next two years and then take fewer units in their final year as they do what needs to be done to fulfill their particular graduation requirements. Over half of fall 2012 freshmen completed 45 or more units, while 63% of them graduated within four years.<sup>1</sup> In other words, almost half of students are not full-load students. These are students who fall behind on graduating in four years and have to take on additional units in future terms in order to catch up. Helping students balance their workload in their first year with their

<sup>1</sup> University of California Report to the Legislature Performance Outcome Measures, 8.

ultimate goal of graduation will help universities improve their graduation rates and help students successfully complete college and experience the benefits of a college degree.

## Part 2: Learning from Other Research

University of California campuses have invested significantly in recruiting a diverse student body. Universities have done a lot to recruit a diverse student body. Now the attention has turned to helping those students complete their degree. Before turning to specifics about unit-taking behavior in the UC system, it is important to lay the groundwork for what is already known about college completion inside and outside of California.

### Clearing Up Concepts of Student Success and Institutional Quality

One of the key terms used in the literature on college completion is *student success*. However, it is not always clear what is meant by student success. This report relies on the following definition of student success: "...improve retention, graduation, and time to degree while maintaining or improving equity and the quality of undergraduate education."<sup>2</sup> This definition allows for a multifaceted understanding of success that encompasses more than simply whether or not a student graduates, but how long it takes them to graduate, and whether this quality education is shared amongst the entire student body.

It is equally important to understand that graduation rates are not synonymous with institutional quality, particularly when making comparisons between different campuses. Student populations can vary significantly across campuses. The flagship public universities tend to have the highest graduation rates compared to other public universities, but that does not automatically equate to a higher quality education for all students.<sup>3</sup> UC Merced is only 10 years old and caters to a student body with a high proportion of students from underrepresented populations, so not surprisingly its graduation rate is not the same as a flagship campus like UC Berkeley, which has a 147 year history and stature as one of the world's best public universities to rely upon. Simply looking at graduation rates does not tell the entire story of institutional quality, especially when considering the different student populations on those campuses.

### National Trends in College Completion

College attainment has been steadily increasing, but seems to have reached a plateau. Between 1968 and 2007 college attainment has remained static, as a proportion of college age students completing a degree, but time it takes those students to earn their degree has

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<sup>2</sup> *Undergraduate Student Success: Building on the Past, Changing the Future*, 6.

<sup>3</sup> DeAngelo et al., 3.

increased.<sup>4</sup> While attainment has flattened, the return to education has continued to increase.<sup>5</sup>

Table 1. Fewer than 50% of College Students Nationwide Graduate in Four Years

Category	Percentage
4 Year Graduation	38.9%
6 Year Graduation	61.2%
Private 4 Year Graduation	64%
Public 4 Year Graduation	23.5%

Source: DeAngelo, et al.

Significant differences in graduation rates exist between public and private institutions. Private institutions graduate 64% of their students in four years while public institutions graduate only 23.5%. The difference between public and private institutions shrinks by the six year mark due to differences in academic preparation. If public institutions enrolled students with the same characteristics as private institutions, degree attainment should be expected to increase by as much as 140%.<sup>6</sup> Academic preparation matters.

Many believe if all low-income students had the same preparation than gaps in graduation rates would disappear. However, national studies have shown that pre-college test scores do not explain even half of the difference in college outcomes,<sup>7</sup> meaning that something about the college experience also plays into whether and when certain students graduate.

Academic preparation can be measured in a variety of ways. High school grades may be more indicative of study skills and determination rather than native intelligence. Standardized test scores may tell more about native intelligence. Success in college usually requires a balance between the two. Success is not determined by academic preparation alone. Other factors include gender, parental education, income, and ethnicity.

Female students have outpaced male students both in terms of graduation and how long it takes students to earn a degree. Considerable differences in four-year graduation by gender in the last decade that continues to increase. More women complete college degrees than men and they are more likely to complete those degrees in four years. This gap begins to disappear after five-years partly due to greater proportion of men in fields that traditionally take longer to complete, like engineering.

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<sup>4</sup> Bowen, Chingos, and McPherson, 27.

<sup>5</sup> Bowen, Chingos, and McPherson, 28.

<sup>6</sup> DeAngelo et al., 29.

<sup>7</sup> Bowen, Chingos, and McPherson, 26.

While gender gaps diminish between four and six years, the same cannot be said for the impact of parental education. A gap of 14.7 percentage points between parents who went to college and those that did not exists even after six years has passed.<sup>8</sup> This suggests that some aspect of family education level influences college graduation in ways that additional time in college cannot change. Also, income level has been found to decrease the likelihood of graduation and increase the time it takes students to graduate.<sup>9</sup>

## Ethnicity

Campuses are not just interested in increasing graduation rates overall, but also in removing differences in subgroups. Important differences in completion by ethnicity exist. In a recent national study, the highest attainment group nationally was Asian-American students at 44.9% and the lowest is for Native American students at 16.8%.<sup>10</sup> At flagship institutions, the six-year graduation rate for African-American males is 59%, while it is 75% for white men and 72% for African-American women. Even after accounting for all background characteristics, the six year graduation rate is still lower than white men by six percentage points. This leads to the conclusion that African American men who go to more selective institutions have higher than average rates of success than their group overall. In other words, African-American students are most successful when they go to the most selective institution they are admitted to.<sup>11</sup> Similar conclusions can be reached for Latino students. This leads to the conclusions that where these students enroll may matter more than is the case for other subgroups.

Disparities in subgroups matter if universities are interested in increasing graduation rates. If the groups with the lowest graduation rates do not increase, overall rates will not increase as quickly as universities would like. It is difficult to raise overall degree attainment without concentrating efforts on URM and low SES students. Public institutions will determine the national success of these subgroups because of the concentration of college students at public institutions.

Understanding these national trends will help determine the factors that this project will look at when determining how unit-taking behavior influences whether a student graduates and when. These trends illustrate that a complete understanding of how students decide how many units they take will have to include academic preparation, parental education, income, ethnicity, and gender.

## Hawai'i "15-to-Finish"

Some of the impetus for further research on how student unit-taking behavior impacts graduation rates comes from results at the University of Hawai'i through their "15-to-Finish"

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<sup>8</sup> DeAngelo et al., 13.

<sup>9</sup> Bowen, Chingos, and McPherson, 25.

<sup>10</sup> DeAngelo et al., 43.

<sup>11</sup> Bowen, Chingos, and McPherson, 210.

program, which encourages students to take 15 or more units per term.<sup>12</sup> The central finding of their research is that as students unit loads increased to 15 or more units per term, their academic performance improved as well.

The University of Hawai'i has three four-year campuses. The flagship institution at Manoa has traditionally had the highest graduation rates. Hilo tends to follow in second place and West Oahu tends to fall well below the other two. Between 2009 and 2011, 63% of students at Manoa and Hilo completed less than 15 units per term. 85% at West Oahu finished less than 15 units per term. The most significant proportion of students fell between 12 and 14 units. In other words, the majority of students were one course short of a full-load.

The University of Hawai'i compared the group of students completing 15 or more units per term with students who were completing fewer than 15 units per term. Students who completed 15 or more units had higher academic performance even after controlling for background characteristics. The students who completed more than 15 units per term had higher high school GPAs, higher SAT/ACT scores, and were in higher ranks than the peers who took fewer than 15 units per term. In other words, students who took 15 or more units were more academically prepared than their peers who did not. Students who completed over 15 units per term also performed better while they were enrolled. Most notably, they had higher initial GPAs, completed a greater proportion of the units they attempted, and were more likely to persist to future terms and graduate. These lead to two potential conclusions. First, it is hardly surprising to conclude that more prepared students were more likely to graduate. The second possible conclusion is that it was not just their preparation that mattered, but the fact that they were taking a full-load and started off on the right foot.

In order to make sure that the differences in performance while in college were due to differences in the number of units completed rather than prior academic preparation or student demographic factors, their Institutional Research staff created an academic preparation index based on key academic factors like test scores and high school grade point average. They also controlled for demographic factors and still found that students who completed over 15 units had higher measures of academic success in college. The University of Hawai'i found that all, but the very lowest levels of academic preparation, first-year students performed better if they completed over 15 units per term.

This led the University to launch a media campaign called "15-to-Finish" to get this information to students. After that campaign launched the proportion of students taking over 15 units increased to 52.5%, average credits completed per term increased from 13.8 to 14.3, and the number of students who completed between 12 and 14 units decreased from 61.7% to 44.3%. None of these results were confined to only high academic preparation students. As unit load increased, academic performance also increases.

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<sup>12</sup> *15 To Finish: Summary Tables Fall 2009 to Fall 2013.*

These positive results have led other universities to consider whether they can expect similar results in their unique context. One goal of this analysis that follows is to replicate the work done by the University of Hawai'i to determine whether the same results would be present at UC.

## Part 3: Current University of California Completion Strategies

This is not the first piece of work done on college completion and campuses are actively pursuing strategies to encourage more students to graduate on time. This section will outline recent UCOP research on college completion and outline some of the campus specific research and completion strategies currently in use across the system. This section is not designed to be an exhaustive account of campus completion strategies, but acknowledge the significant amount of work being done across the system to positively influence graduation.

Based on a study of the 2004, 2008, and 2012 entering fall cohort, approximately half of UC's undergraduates take a full-load. Taking a full-load during the regular academic year, guarantees students graduate in four years. This breakout session brought together campuses that have successfully used minimum cumulative progress (MCP) policies, academic requirements, technology, advising, curriculum review, and space planning strategies to provide the most efficient academic pathways while also providing students a healthy sense of urgency to stay on track towards graduating in 4 years.

Previous work at UCOP outlined the four factors that slow progress toward a degree: maturity, motivation, physical and mental health, and academic ability and preparation. Impediments toward graduation were divided between institutional and non-institutional factors. The institutional impediments are: better advising, getting courses for major, and getting general education courses. The non-institutional factors are: taking extra courses for interest, changing majors, needing to work, taking reduced courseloads.<sup>13</sup> The non-institutional impediments are more common than institutional factors, which is important to understand when considering potential interventions. Not all of this can be solved at the institutional level.

### University of California System Specifics

UCOP research has helped improve understanding of the characteristics that graduating students possess. There is a complementarity between "...studying hard and challenging yourself academically leads to good grades" and that "...completing more rigorous coursework which leads to higher test scores."<sup>14</sup> Students who balance good study habits and strong curriculums have both the good grades and high test scores. Previous research has shown that those students with higher high school GPAs are more likely to graduate, and this is particularly the case for students seeking to complete STEM degrees. These good

<sup>13</sup> *Undergraduate Time-to-Degree Report*, 106.

<sup>14</sup> *Undergraduate Time-to-Degree Report*, 10.

study habits that were evident in high school grades may be more important indicators of whether a student will graduate, rather than test scores, which may point more toward availability of college preparation classes.

Students who finish in four years generally have the following characteristics<sup>15</sup>:

- Have completed some university level courses before entering.
- Do not change majors.
- Do not fail a course.
- Completed units to be considered full-time.
- Experience no financial problems or difficulties.
- Have no personal or health problems.
- Completed only a sufficient number of units to graduate.

Each campus has a four-year advising program that seeks to help all students, whether or not they are experiencing personal or academic challenges, but some groups of students still have trouble graduating within four years. Of particular interest are the students who take only one additional term to one additional year to graduate, the students who almost graduated in four years and have the greatest potential to become four-year graduates.

Students who graduated after an additional year of study had the following characteristics:

- They were more likely to be Engineering and Computer Science students.
- Students who had one or more risk factors<sup>16</sup> often ended up graduating after four years.
- Students with significant work responsibilities.
- Changed majors.
- Completed multiple majors.
- Brought fewer units to UC
- Took fewer units during each term at UC
- Had more total units at graduation and accumulate more total units than they need to offset unit differences.

While all of these different factors warrant consideration, this report will focus primarily on how many units a student has when they arrive on campus and how many units they take when they are in their first year.

Various campuses have also considered what options they have to increase graduation rates and separated policies into those amenable to policy change and those not amenable to policy change:

- Differences amenable for policy change:
  - Less unit requirements.
  - More aid to Pell recipients and high work students.
  - More advising resources.
  - Taking more units over a greater number of summers.

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<sup>15</sup> *Undergraduate Time-to-Degree Report*, 1-4.

<sup>16</sup> Risk factors include whether the student identifies as an underrepresented minority, first generation students, and low-income students

- Identify opportunities to improve students' sense of belonging.
- Technology
- Differences not amenable to policy change
  - Changes to majors

This report will focus primarily on the role that risk factors, advising, and unit-taking play on UC campuses, leaving many ripe opportunities for future exploration. For example, evidence from UCOP research suggests that integrating students into college is more predictive than units taken,<sup>17</sup> meaning finding ways to improve students' sense of belonging may be more productive than a unit-taking strategy.

As it relates to unit-taking, a lot of work has already been done to understand student behavior related to their academic program. Some of the notable findings included:

1. 33% of students complete an annual average of 15 or more units per term.
2. Trend toward more undergraduate and transfer students taking full-loads at all campuses except Santa Cruz, Merced, and San Diego.
3. Undergraduates who completed their degree in four years take 2 more units per term, on average, than students who do not graduate in four years.

It is important to note that differences in graduation rates are not associated only with the number of units at graduation. Lower graduation rates are caused by dropouts, not students staying for another semester to graduate, many of whom may have valid reasons to stay for that additional semester. In other words, even if all the students who stayed beyond four years graduated, there would still be a significant differences in graduation rates because of the proportion of students who drop out. The conclusion of UCOP research was that retention of students from their first to second years really matters.

## Use of Summer

Research units at campuses have found that summer is a great time to make up work that was not fulfilled during the regular academic year. It can also provide students an opportunity to get a head start on their college career by taking courses and becoming familiar with the campus.<sup>18</sup> UCLA students claim that summer session courses “sped” up degree completion by “a lot” (26%) or “a little” (37%) and almost 80% of students take at least one summer course.<sup>19</sup> Summers can be pivotal for getting some students the additional academic resources needed to graduate on time.

Two ways that students take advantage of summer: First, some students go to campuses that take better advantage of summers through their four years on campus. Also, students who do not graduate by the spring of their fourth year may take another semester to fill in missing units. UC campuses generally count these students toward their four-year graduation rates, which provide a “summer bump” in their four-year graduation rates. The

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<sup>17</sup> *University of California Report to the Legislature Performance Outcome Measures*, 8.

<sup>18</sup> “Undergraduate Completions Conference: Academic Pathways”

<sup>19</sup> *Undergraduate Time-to-Degree Report*, 100.

challenge for particular subgroups is that access to financial aid is sometimes limited, which raises questions of whether summers are offered equally to students of all socioeconomic groups.

## Student Employment

One hypothesis for why students are not graduation is that they have many non-academic demands on their time, most notably having a job to support financing their education. UC research does indicate that students who worked over 20 hours per week (roughly 3% of the UC student body) are impacted significantly. It matters whether that work was completed on-campus or off-campus. Students who are working over 20 hours per week off-campus are most adversely affected. While student employment is an important factor for some students, particularly those working over 20 hours per week, many students did not say that employment was the most significant reason why they did not graduate.

## Campus Specifics

In addition to system-wide efforts, campuses have taken on the issue of improving graduation rates as well. Part of the challenge of analyzing the UC system is the significant differences between each campus. While not all campuses are the same, some general trends are shared by many of the campuses when it comes to graduation rates:

- Most campuses show improvement over time.
- There is a secondary bump from trailing summers.
- Few students remain beyond 6 years.
- STEM Majors have more units at graduation.<sup>20</sup>

Campuses have already started to implement some academic or administrative policies to encourage graduation. A variety of strategies “implemented by Undergraduate Deans, departments and other units on campus to minimize logistical barriers to and extra steps taken before degree completion”<sup>21</sup> are in place at UC campuses.

- Encourage students to take a full-load of units each term.
- Require declaration of second major by outset of senior year.
- Get students struggling academically to change majors earlier in college career.
- Require passage of college algebra by winter quarter freshmen year for STEM students who have not already completed calculus.
- Provide early advising for students interested in sciences, such as getting them to take chemistry in their first term and provide backup majors for students who do not succeed in pre-med and engineering courses.

The next section will outline some of the efforts undertaken by each campus, but will pay particular attention to strategies and initiatives that highlight some of the key directions

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<sup>20</sup> *Undergraduate Time-to-Degree Report*, 101.

<sup>21</sup> Baxter.

campuses are taking to improve graduation rates. It is not meant to be an exhaustive analysis of each and every program at each and every campus.

## UC Berkeley

UC Berkeley's Student Learning Center provides support for retention efforts. The Student Learning Center includes discipline specific content experts that can assist students in the introductory courses that are required for their majors. The Common-Good Curriculum (CGC) initiative has helped streamline all departments that are critical parts of the general education system so that key course offerings are more reliably offered to students to improve the ease of which students' progress through majors. Also, the Fall Program for Freshmen (FPF) works with some students who were not admitted for fall enrollment to start their Berkeley career through the Extension program and provide additional support until they enroll in the spring. These students have a 94-95% graduation rate, which exceeds the 6-year graduation rate for UC Berkeley students generally. The Summer Bridge program provides an academic residential college program that focuses on easing the transition to Berkeley before the fall begins. This program has strong representation of Pell and Dream Act eligible students many of whom are either low-income, first-generation, and/or undocumented. The Freshmen Edge program provides summer opportunities for students to get acquainted with the campus before the fall semester begins.

## UC Davis

UC Davis commissioned a task force to specifically tackle time-to-degree issues on campus. The task force had three primary goals designed to better understand who finishes degrees in shorter time and who takes longer and why. Also, to use that information to inform policy changes to shorten the time it takes students to earn a degree.<sup>22</sup>

Previous research at UC Davis showed particular concern for students who work. A quarter of students who did not graduate in four years report that they did not take a full courseload because of employment responsibilities. UC Davis reports that student employment can explain 71.9%-100% of the increased time it takes students to earn a degree. While this report does not compare the effects of student employment to unit-taking behavior across campuses, it is important another example of how campus may differ across more factors than simply student demographics.

UC Davis also implemented a minimum progress toward a degree plan and highlights the expectation that it will occur in four years. Minimum progress is defined as "at least 13 units passed over all quarters of enrollment. Undergraduates falling below this requirement are not in good academic standing and may be disqualified from further enrollment."<sup>23</sup>

## UC Irvine

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<sup>22</sup> *Undergraduate Time-to-Degree Task Force*

<sup>23</sup> "UC Davis General Catalog"

UC Irvine has a Summer Bridge Program that provides support for 87 first-generation, low-income students from low API<sup>24</sup> high schools to be immersed in an academic and residential experience for six weeks before the fall semester begins.<sup>25</sup> UC Irvine is also piloting the Student Success Collaborative, which provides predictive software to identify early warning signs for particular students so that advising staff can intervene and help students at risk of not graduating. Because the system is still in the pilot stage, its effectiveness is still to be determined.

## UCLA

UCLA has a suite of college completion programs unified under the umbrella of “Tassels to the Left” (TtL). Some elements of this program include:

- Summer transition programs
- Specialized counseling for on-time graduation
- Peer learning support
- Sense of belonging initiatives<sup>26</sup>

Having different opportunities to intervene in a student’s academic career means that whenever challenges arrive, a safety net is in place.<sup>27</sup>

Challenge 45 is another initiative influencing degree completion, albeit indirectly. The initiative seeks to bring all majors to 45 units or less. This would make graduating in four years a little bit easier for majors that have seen “curricular creep” where units were slowly added over time.

They have also been working to develop models to predict at-risk groups for graduation. These models are yet to reach the accuracy to attach them to particular students to determine whether they will graduate, right now they are only used for information purposes.<sup>28</sup>

## UC Merced

UC Merced has seen recent declines in average units completed and the proportion of full-load students. UC Merced has documented the differences in retention rates for Pell recipients and first-generation students, with over a 5 percentage point gap in retention rates for both of these groups.<sup>29</sup> These challenges complicate the idea of changing how many units students take. If certain groups with risk factors are already struggling, can you reasonably ask them to take more and convince them that they might actually do better?

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<sup>24</sup> California Academic Performance Index (API)

<sup>25</sup> “Undergraduate Completions Conference: Campus Roundtable Discussions”

<sup>26</sup> “Undergraduate Completions Conference: Campus Roundtable Discussions”

<sup>27</sup> “Undergraduate Completions Conference: Campus Roundtable Discussions”

<sup>28</sup> “Undergraduate Completions Conference: Campus Roundtable Discussions”

<sup>29</sup> *First Year Success and Four-Year Graduation Rates of First-Time, Full-Time Entering Fall Cohorts of Freshmen, 1-4.*

Also, a significant proportion of UC Merced students take developmental courses in writing and/or mathematics, which is associated with lower graduation rates. UC Merced also has a lot of students who graduate one semester late. If they did not graduate late, they would meet Governor's proposal and 29% of those students complete that final semester at a different campus.<sup>30</sup> These efforts have not answered why some students have completed their degrees and others have not, but they have continued to deepen the institutional knowledge of college completion.

UC Merced also has developed a degree audit system that provides individualized information to students to understand how particular curricular changes may impact the number of terms it takes to graduate. Another one of their programs is the Fiat Lux Scholars program that identifies 300 first and second year low income undergraduates. They live together and receive additional academic support. They also provide midterm grade reports for all lower division courses so that students have time to try and turnaround their performance before the term ends.<sup>31</sup>

## UC Riverside

UC Riverside has also seen declines in average units completed and the proportion of full-load students. They have targeted introductory mathematics courses as an area of particular interest. There is particular need for precalculus to make up for previous math preparation. They have also experimented with Early Assist programs based on the model of athletic advising programs, but have been unable to find any impact on grades for this early intervention program.<sup>32</sup>

UC Riverside has also joined the University Innovation Alliance, a group of ten universities (UCR is the only California representative) with the support of the Lumina Foundation and the Ford Foundation, which will share strategies to improve student success with a particular focus on low-income students.<sup>33</sup>

Finally, UC Riverside has also launched a "Finish-in-Four" campaign, which provides guidelines to students with the goal of getting a higher proportion of students to graduate in four years. Some of the guidelines include taking an average of 15 units per term (45 units per year), reducing employment hours, and creating a stronger plan for the entire four years at UCR.

## UCSB

UCSB Minimum Cumulative Progress (MCP) was implemented in fall 2008 to provide a mandatory term-by-term progress for students. This created a new default for all students.

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<sup>30</sup> *First Year Success and Four-Year Graduation Rates of First-Time, Full-Time Entering Fall Cohorts of Freshmen*, 1-4.

<sup>31</sup> "Undergraduate Completions Conference: Campus Roundtable Discussions"

<sup>32</sup> *UCR Graduation Rate Task Force Report*, 24.

<sup>33</sup> Lovekin.

If they did not follow the requirements, they had to respond to a university inquiry about why they fell behind and/or complete a waiver. It is important to note that the cohort analyzed in this report started at UCSB before the program was fully implemented. This means that understanding the complete effect of the program will be a challenge until the first cohort to be exposed to the program for a six year period is available.

The program provides “guideposts for academic progress.” College credit earned prior to high school graduation does not count toward MCP but do count toward graduation, so students are all on the same page as far as how many classes they have to take even if they have a lot of college credit earned before their college enrollment. UCSB is the only UC campus with a four-year unit requirement.

Table 2. UCSB Minimum Cumulative Progress requirement

MCP Quarters	Per Quarter Units	Units Completed
1	12	12
2	15	27
3	15	42
4	14	56
5	15	71
6	15	86
7	15	101
8	15	116
9	16	132
10	16	148
11	16	164
12	16	180

Research at UCSB showed that average units in first year increased from 14.2 per term to 14.7 per term. More students are now full-time and receive additional financial support as a result. UCSB attributes the success of MCP to active monitoring of students’ progress. A clear sequence of actions that takes place: “The policy communicates the expectation, and depending on the campus, triggers an action; such as placing the student on probation and/or counseling to determine what the student needs to get back on track.”<sup>34</sup> Accompanied by clear academic requirements for students to understand required course sequences for particular majors and real time reports for advisors about student progress,

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<sup>34</sup> “Undergraduate Completions Conference: Campus Roundtable Discussions.”

students and advisors have a better sense of how many and what classes they need to take when.<sup>35</sup>

## UCSC

One key difference between Santa Cruz and other UC campuses is that most Santa Cruz courses are five units, instead of four. This allows students to take three courses per term to get to 15 units per term and graduate in four years. It should be noted that their graduation rate is still 56%, so it does not mean that if all campuses had five unit courses that more students would graduate. It just means more students would be taking a full-load, which would mean they would have fewer semesters where they have to overload on units.

They also had a stated goal of increasing retention by two percent and reducing attrition after year two to less than ten percent.<sup>36</sup> A particular challenge for UCSC is that their attrition rate between first and second year is the same as it is for between second and third year,<sup>37</sup> meaning strategies that just focus on the first year may not be sufficient. A 7-week Summer Academy is starting in summer 2015 and various extended orientation and first-year experience support programs provide opportunities to help students integrate themselves into the student experience.

## UCSD

Many of the conversations about student success at UCSD start with their residential college atmosphere that provides targeted student experiences to aid in increasing sense of belonging. In addition to the general structure of the campus, academic requirements lay out degree requirements for students and communicate expectations for particular majors.

The campus has also started to study how majors are structured and whether unit requirements need to be adjusted to make it easier for students to graduate on time without sacrificing academic quality. This will be complemented by the development of the Teaching and Learning Commons that will provide additional resources for students.<sup>38</sup>

## Remaining Questions about Campus Strategies

It is important to identify the many different strategies that campus have had in place for many years and their recent initiatives that are seeking to improve student success. After considering the various campus strategies in place, important questions remain about how

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<sup>35</sup> "Undergraduate Completions Conference: Academic Pathways."

<sup>36</sup> Fernald, 2.

<sup>37</sup> Fernald, 5-6.

<sup>38</sup> "Undergraduate Completions Conference: Campus Roundtable Discussions."

this impacts graduation. Previous research at UCOP identified the following three questions that have not been answered by previous college completion research or campus strategies:

1. What is the difference in units students are attempting and units they are completing? Does this impact graduation rates?
2. Much of the research has focused on 15 units per term as a magic number, but is it more informative to look at buckets of units that students fall into?
3. Why is proportion of students taking over 15 units going up?

This report will try to answer these three questions. The overarching question is can we use data to inform understanding of student unit-taking behavior, and is there anything we can do to use unit-taking behavior to improve graduation rates.

Reviewing campus strategies currently employed by UC campuses illustrates that campuses have already identified a lot of the low hanging fruit and are employing the strategies they have deemed most effective given limited resources. UC campuses already have instituted advising programs, early intervention programs, and other equally valuable student success programs. Unit-taking behavior is one aspect of college completion that has not been addressed at all of the UC campuses, at least not to the same degree as UCSB.

In order to make understanding differences between campuses more clear, campuses were divided into different categories based on graduation rates and units completed in their first year.

Table 3. Campuses Differ Significantly by Graduation Rate and Units Completed

	<b>High Graduation Rate (over 70%)</b>	<b>Middle Graduation Rate (60%-70%)</b>	<b>Low Graduation Rate (less than 60%)</b>
<b>High Units Completed (over 43)</b>	UCB (76% / 44.38) UCLA (72% / 43.36) UCI (75% / 44.02)		
<b>Middle Units Completed (40-43)</b>	UCSB (71% / 40.02)	UCD (60% / 40.05) UCSD (64% / 41.68) System (66% / 41.34)	UCSC (56% / 40.04)
<b>Low Units Completed (less than 40)</b>			UCR (50% / 36.46) UCM (39% / 37.62)

Note: Parentheses denote four-year graduate rate / units completed in the first year.

This categorization demonstrates the significant differences in unit-taking and graduation rates. It shows that within similar ranges of graduation rates the number of units completed in the first year vary significantly. Conversely, in similar ranges of units completed, graduation rates vary significantly.

These categories will be revisited when analyzing the options campuses will have in improving graduation rates. Three key groups of campuses will be used in determining how campuses can move forward: 1) high graduation rates and high units completed, 2) middle graduation rates and middle units completed, 3) low graduation rates and low units completed.

## Part 4: Understanding Unit-Taking Behavior at the University of California

The general message is students who completed at least 45 units in their first year had a better chance of graduating and earning a higher initial college grade point average than their peers who did not earn at least 45 units. Even students who do not have the highest levels of academic preparation or belong to groups that typically take longer to graduate (most notably students from underrepresented groups, first generation students, and low-income students) have higher GPAs in college and are more likely to graduate than their peers who did not take up to 45 units in their first year. UC campuses require students to take a certain number of units to qualify as full-time students, but those numbers are not the same as the number needed to graduate in four years.

### Two Possible Hypotheses

This leads to two different hypotheses. First, if UC campuses encouraged or required students to take a certain number of units that would allow them to earn 180 units in four years as the default course schedule, they would see graduation rate increases and improved student performance. This would not just be for high achieving students, but also students from lower academic preparation backgrounds with the risk factors attributed with longer time-to-degree and less frequent graduation.

The alternative hypothesis is that, while it may be true that students with 45 or more units are performing better than their peers, this has more to do with the fact that they have fewer sources of stress allowing them to take on the additional work and perform better. In other words, the students taking over 45 units are not the students who are working over 20 hours per week, dealing with financial stress at home, or struggling with campus culture and sense of belonging. Further burdening students with increased unit requirements would make on-time graduation an even more difficult hurdle.

### Understanding the UC Student Body

This report uses data from the cohort of first-time freshmen students who started at a UC campus in the 2007-08 academic year and tracks them through the 2012-13 academic year, a six-year period. Future analysis will compare multiple cohorts over time. All units have been converted to quarter units to allow for comparison across campuses, including UC Berkeley and UC Merced, the only two campuses on a semester calendar. This report analyzes the unit-completing behavior for the 38,868 students in the cohort during their first year at UC. A UC student graduates after completing 180 quarter units. A student will graduate in four years if they average 15 units per term, five years if they average 12 units per term, while a student who averages 11.25 units will graduate in six years.

Table 4. 46% of UC Students do not take a Full-Load

<b>Group</b>	<b>Mean or Percentage</b>
Number of Students in Cohort	38,868
URM	20.68%
First Generation	28.55%
Four Year Graduation	65.73%
Six Year Graduation	83.38%
% Female	56.17%
High School GPA	3.79
High School SAT	1790
Pell Eligible	39.62%
Average Units Completed in First Year	41.34
Average Units Attempted in First Year	41.29
% Completing $\geq 45$ in First Year	46%
Transferred Units	10.03

The average UC student does not complete 45 units in your first year. Berkeley was the only campus where students attempted over 45 units, but they did not complete over 45 units. In other words, students at all campuses currently choose to start with a lighter load in their first year and then make up for those units in their next few years in college. The lower bound of units taken is 12 units per term, or the number of units required to maintain full-time student status, which gives students access to financial aid and other resources. The upper bound is simply the maximum allowed at each campus. It is important to note that some students may complete fewer units over the course of their first year and fill in the gap with college credit earned through other means like Advanced Placement exams or community college courses.<sup>39</sup>

Students decide how many units to take based on their perceived preparedness for college. Part of this readiness comes from their preparation. Students who completed over 45 units per term were different from students who did not complete 45 or more units. Students who completed over 45 units in their first year entered college with higher high school GPAs

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<sup>39</sup> The current data structure for these transferred units provides the total units transferred into the UC, but does not allow for determining whether units actually counted toward the student's degree.

and higher SAT scores. Also, they were less likely to come from underrepresented minority ethnic groups, first-generation families, or be Pell grant recipients.

Table 5. More Prepared Students are more likely to take over 45 Units

	Completed 45+ Units in First Year	
	No	Yes
HS GPA	3.74	3.85
SAT	1747	1842
Female	57%	58%
URM	23%	15%
First Gen	35%	27%
Pell	43%	36%

Even if academic background helps determine how many units a student takes, it is not the only factor that determines whether that student graduates. Despite the fact that 46% of students are taking fewer than 45 units in their first year, the four-year graduation rate is 66%. Many students catch up despite taking fewer than 45 units in their first year. Understanding how unit-taking strategies impact graduation will help determine which interventions will serve to increase graduation rates. The general message is that students who take more units are more likely to be from higher academic preparation backgrounds and be from demographic groups that have higher graduation rates. After controlling for these background factors, we can see that students who take more units are more likely to graduate and are more likely to perform better in terms of first-year GPA than their counterparts who take fewer units. After showing these relationships we can determine which groups of students could benefit from interventions and in the next section describe those potential interventions.

Table 6. Various Factors Influence the Likelihood a Student Graduates in Fewer Terms

<b>Factors that Influence Graduation</b>	
<i>Factors</i>	<i>Increase or Decrease Time to Degree</i>
More Units Completed in First Year	Decrease
Higher High School GPA	Decrease
Female	Decrease
SAT	Decrease
More AP Transferred Units	Decrease
First Generation Student	Increase
Pell Grant Recipient	Increase
*See Data Appendix for Statistical Analysis	

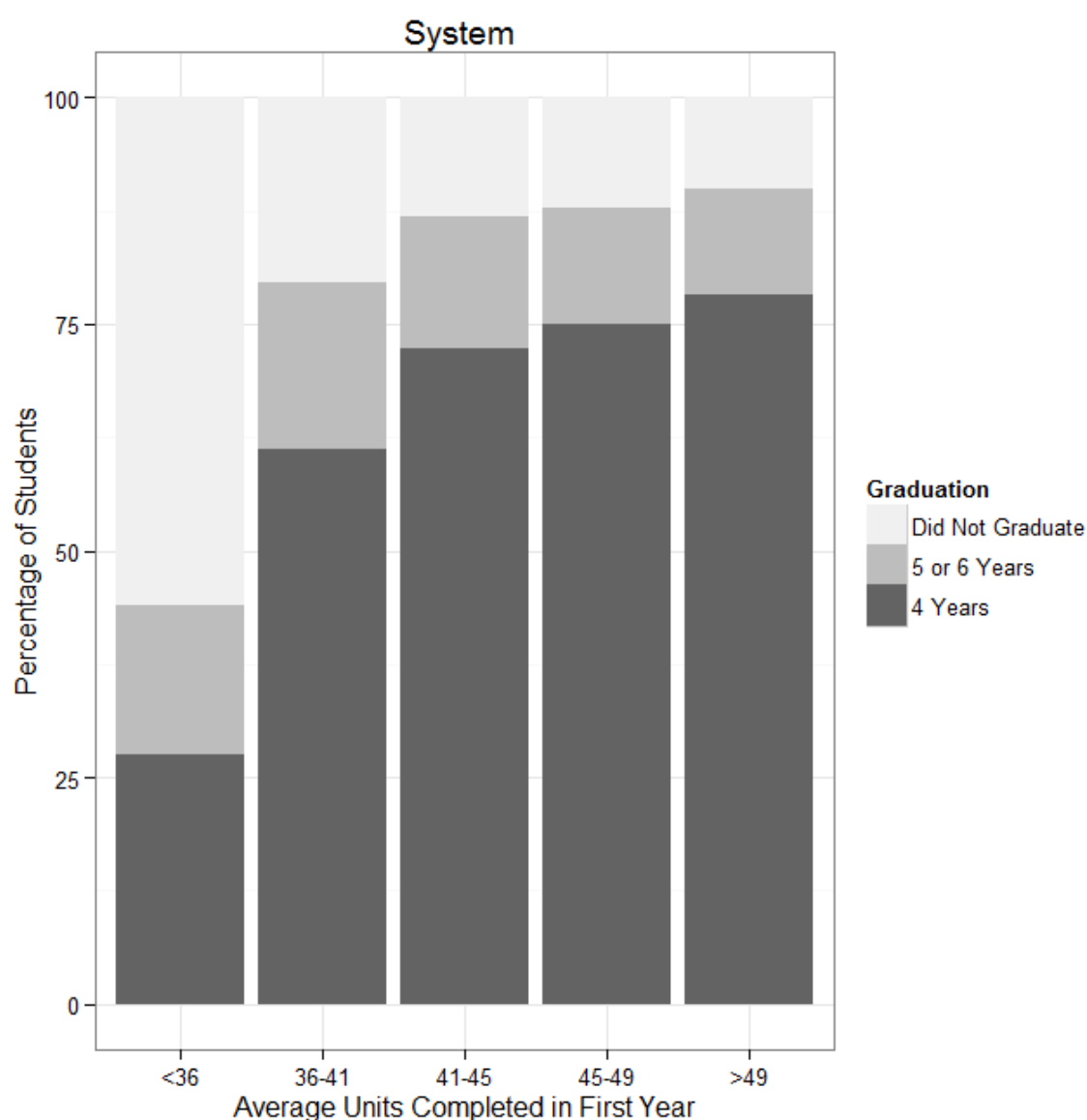
The table illustrates how background factors are important in determining when a student graduates and the likelihood they will eventually graduate. However, the one factor that students can control while they are enrolled at a UC campus is the number of units they take and how well they perform. Even for students who belong to groups that traditionally have lower than average graduation rates, the number of units completed in the first year matters for graduating in a timely manner.

Three groups that have received particular attention in conversations about college completion due to their disproportionately low graduation rates are: 1) underrepresented minority groups, 2) first-generation students, and 3) low-income students. The system-wide graduation rate is almost 66% while these three groups have graduation rates of 56%, 59%, and 61% respectively. These differences play out at the campus level as well. Systemwide, over 75% of students in each bucket over 41 units completed, graduated within four years. The 36 to 41 unit group<sup>40</sup> includes many of the students that do what they need to do in

<sup>40</sup> This analysis uses the bucket of students completing between 36-41 units in their first year in order to capture full-time students who are taking at least 12 units per term, while leaving out students who are not completing sufficient units to be considered full-time.

order to maintain full-time status but are not taking a full-load. In this category, 65% graduate in four years, well below the other buckets. Significant differences exist between campuses and ethnic groups. For example, UCLA students taking between 36-41 units graduated in four years 68% of the time. At UC Riverside, only 55% graduated in four years. White students taking between 36 and 41 units graduated in four years roughly 70% of the time. African-American students in the same bucket only graduated in four years slightly over 50% of the time. Latino students fell in between at roughly 60% of the group graduating in four years.

Figure 2. Students who Take Less than 41 Units are less likely to Graduate in 4 Years



The Hawai'i "15-to-Finish" program showed that students who took over 45 units had better academic performance than students who did not take over 45 units. In other words,

students who took more units had better GPAs, completed a higher ratio of their courses, and were more likely to graduate. The results from the UC system are quite similar.

Table 7. Factors that Influence Graduation Also Influence Student Performance at UC

<b>Factors that Influence College GPA*</b>	
<i>Factors</i>	<i>Increase or Decrease Time to Degree</i>
More Units Completed in First Year	Increase
Higher High School GPA	Increase
Female	Increase
SAT	Increase
More AP Transferred Units	Increase
First Generation Student	Decrease
Pell Grant Recipient	Decrease
*See Appendix for Data and Statistical Analysis	

The same factors that reduced the time it takes a student to graduate, improve the initial college GPA. The factors that increased the time it takes a student to earn a degree are the same as the factors that were associated with lower initial college GPAs.

While the connections between first-year unit-taking behavior and graduation are noteworthy, further research will look into performance throughout the four to six year period a student spends in the UC system.

## Returning to the Two Hypotheses

Now that a basic understanding of unit-taking behavior and student success is in place, we can return to the two possible interpretations of unit-taking behavior. What does all of this information tell us about whether students who decide to take 45 or more units in their first year are better positioning themselves for success than students who do not take a full-load or if students who are not taking a full-load? Or, are students making a rational decision about how much they can take on given the significant stressors on their life?

The evidence provided lends more support to the former. Students regardless of academic or personal background do better on average if they take 45 or more units in their first year. Low-income students or students from underrepresented minorities are being told to set lower expectations as far as their course schedules are concerned, but less evidence exists to show that taking more units would actually lead to substandard performance. In fact the opposite is true. More evidence is present that in the UC system that if they took enough units to accrue 45 units by the end of their first year, they would actually do better in terms of academic performance and increase their likelihood of graduation. This brings into question the advising strategy of telling students with substandard academic preparation to take it easy their first year so that they become more integrated into the academic and social life of the university before they catch up in terms of academic rigor.

At the end of the day, increasing the default number of units a student takes is not a silver bullet for increasing graduation rates for particular groups of students or particular campuses. There is no easy answer to bring all campuses up to the same level of four-year graduation, but it is important to note that some campuses may find that changing the unit-taking behavior of students, particularly in their first year, may help more students reach graduation.

Assuming the story about this cohort shares similarities with future cohorts, we can turn to what UC campuses can do about it.

## Part 5: What Options do Campuses Have?

With a clearer understanding of unit-taking behavior in the UC system, we can consider the opportunities this creates for campuses. While each campus is different in many ways from each other, five primary alternatives exist for each campus to consider:

- Let present trends continue.
- Campuses develop unit requirement strategy for the first year.
- Campuses develop unit requirement strategy for all four years.
- Campuses emphasize predictive strategies to direct advising resources toward early intervention for students not taking the 45 unit average needed to graduate in four years
- Develop an information campaign could help address this information gap with the goal of getting students throughout the system to voluntarily take more units to increase their chances of graduating.

### Description of Alternatives

#### Let Present Trends Continue

Between 1997 and 2009 the graduation rate increased from 46%-63% system-wide, an average of 1.3 percentage points per year. There are not any other trends expected that

would dramatically alter the increasing graduation rates. This trend also includes the current advising strategies that are currently in place. Each campus employs a team of advisors that the administration has deemed the most effective given their limited resources. The state legislature recently set current targets to increase the four-year graduation rate from 62% to 66%. The target they establish for low-income students is to increase graduation rates from 56% to 60%.<sup>41</sup>

### **First-Year Unit Requirement Strategy**

Each campus would develop a unit requirement for students in their first year. This would require students to take a specific number of units each term in their first year that would sum to 45 units. The typical first-year unit requirement will include a waiver option for particular groups of students who cannot reasonably be expected to complete their required units in their first year to be determined by the individual campus. These groups include: varsity athletes, students who have to work over 20 hours per week, and students who have other obligations that prevent them from taking a full-load, such as family obligations.

### **Four-Year Unit Requirement Strategy**

The four year requirement is identical to the first year requirement in every way, except for the fact that the requirement provides an exact unit count for all terms over the four year period a student is expected to be on campus. The waiver option would also apply. An example would be the Minimum Cumulative Progress (MCP) program at UCSB.

### **Predictive Advising Strategies**

This alternative does not specify any unit requirements beyond what is already prescribed for a student to be full-time. Rather than apply additional restrictions on students choice about how many classes to take, advising would be directed at students who are not taking a full-load in their first year. Advisors would reach out to those students and deliver the message about how taking more units can help them graduate in four years and potentially improve their performance during their time on a UC campus.

### **Information Campaign**

An information campaign strategy does not target any group of students in particular. It merely disseminates the message that students who take more units tend to improve the likelihood they will graduate and their performance while they are a UC student. This will involve putting information in the hands of students, rather than actually require a change in behavior or have them sit down with someone to encourage them to change their unit-

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<sup>41</sup> *University of California Report to the Legislature Performance Outcome Measures, 1.*

taking behavior. An example would be the “15-to-Finish” campaign launched by the University of Hawai’i.

## **Criteria to Evaluate Projected Outcomes**

Before determining which of the alternatives will yield the optimal set of outcomes, it is important to understand the evaluative criteria that will be needed to make a recommendation for campuses. It is hard to estimate how these trends will be impacted over time. As the policy becomes more institutionalized, the same rate of improvement will likely decrease since more students will enter with the expectation that they will be a full-load student. These outcomes are estimates for the first year after full implementation. These trends are expected to be present for at least three years after graduation, the time it will take the current trend to reach roughly 4%, the current goal.

### **Maximizing effectiveness:**

Effectiveness for this project will be measured as increases in the overall graduation rates for each campus and the system as a whole. While there are other ways to define how effective a policy may be, decision makers on campus, at UCOP, and in the state capitol are interested in whether or not a policy will move the needle on graduation rates.

### **Maximizing efficiency:**

Maximizing efficiency means that the expected increases in graduation rates are accomplished in the most cost-effective manner. Costs include not just administrative and start-up costs, but also implementation costs of getting various stakeholders interested in the program. For the purposes of this project, costs will include the following three categories: 1) staffing, 2) technology, 3) publicity. While the exact costs for each program at each campus is beyond the scope of this project, it is important to provide estimates to help guide decision-making.

This is accomplished by quantifying how much costs would increase over the current baseline. The baseline is simply the current expenditures being used for undergraduate student success.

Due to the fact that there are several different campuses with their own budgetary concerns, factors that help clarify how much costs are expected to increase were created. For example, under the present situation, the trends in costs remain the same (multiplying costs by 1 will yield the same result).

Staffing is one of the most significant costs involved in any strategy. Many of the alternatives would require staffing to monitor student unit completion. Another aspect of staffing would include increases in faculty. If more students taking more units, then demand for already impacted courses could increase, requiring additional resources directed toward faculty. For every additional 15 students, it is expected that a campus receives 1 FTE (full-time equivalent) position.

Technology is the second most significant expected cost. This has to do with the costs involved in launching and maintaining unit monitoring systems and/or systems that can identify at-risk students.

Publication involves the necessary costs in distributing information about new policies to students. For some campuses and some options this may be as simple as sending out an email to all students. In other cases, this may include a multimedia public awareness effort.

### **Maximize Graduation Rates for Disadvantaged Subgroups:**

This criterion looks at whether graduation rates for the following subgroups are reduced as a result of the policy: students of color, first-generation students, and low-income students. As mentioned previously in this report, these groups have lower graduation rates than the overall graduation rate for the system or any individual campus. The system-wide graduation rate is almost 66% while these three groups have graduation rates of 56%, 59%, and 61% respectively. Due to these differences, it is difficult to predict exact changes in rates, but it is possible determine whether the impact on these groups will be direct and have a stronger effect, or if the impact is indirect meaning rates may increase, but will not be targeted at these groups.

### **Student wellbeing:**

The previous four criteria all involve the administrative design and execution of a policy to influence the number of units a student takes each term and how that leads to that student's eventual graduation or dropout. However, it is also important to measure an alternative's projected outcomes in terms of how it is expected to change a student's overall wellbeing. Wellbeing can be defined along three criteria: 1) restrictions on student selection of courses, 2) improvements to student sense of belonging on UC campuses, 3) overall satisfaction with the undergraduate experience.

## **Evaluating the Options**

The evaluation of the options presented above provides particular information on which programs are going to be most significant in positively changing graduation rates, which programs will have particular cost hurdles to overcome, the programs that will directly target subgroups of interests, and programs that may dramatically change student life at UC campuses.

### **Alternative 1: Let Present Trends Continue**

*Effectiveness:* Letting present trends continue would mean graduation rates would continue to increase. The current average increase in graduate rates is 1.1 percentage points per

year. This trend is based on graduation rates over the last fifteen years. While there does not appear to be a significant change in the future, it is possible.

*Efficiency:* the system could see the aforementioned increase without a significant increase in costs beyond what the campus is already spending on student success initiatives. There is no expected change from the current cost trends experienced by campuses.

*Disadvantaged subgroups:* Students from disadvantaged subgroups do not graduate at the same rates as other students. These differences are more pronounced at particular campuses.

*Student wellbeing:* Clear evidence does not exist about how students feel about their courseload, recent surveys have shown a decreasing level of student satisfaction with their undergraduate experience. If no action is taken, this trend will likely continue.

### Campus Specifics

Campuses with both high graduation rates and high units completed in the first year are benefitting the most from the current trend. They already graduate the majority of their students in four years, meaning they have a set of programs in place that is helping the majority of their students succeed.

Campuses with both low graduation rates and low units completed in the first year are struggling the most in the current trend. They face the greatest pressure to increase their graduation rates as they are in the same system as the high graduation high unit-taking campuses and are expected to contribute to the student success of the brightest California students.

The campuses with low graduation rates and low units completed tend to have a large proportion of students from disadvantaged subgroups. This is also where the largest gaps in four year graduation rates are most apparent. The current trend does not contribute to the convergence of disadvantaged subgroups four-year graduation rate with the high graduation subgroups.

## **Alternative 2: First-Year Unit Taking Strategy**

*Effectiveness:* Students who take more units are more likely to graduate in fewer terms. They are also more likely to perform slightly better. The real question is by how much. Since the strategy is for only one year, there may be some students who will follow the plan in the first year, but once restrictions are lifted may take fewer units. There will also be a mix of students who take more units and do better, while some students who take more units and be overwhelmed. This will depend on campus types (see campus specifics section).

*Efficiency:* The expected costs of this plan will increase in all three cost areas. Campuses will need to divert staff resources to the design and implementation of the unit requirement.

Staff will need to be dedicated to working with and monitoring student unit counts. It is also possible that at some campuses the influx on enrollment could mean additional lower division course offerings will be needed. Furthermore, technology will be needed to allow campuses to monitor student progress effectively, and publicity needs to communicate a change in policy.

*Disadvantaged subgroups:* This program is not directly targeted as disadvantaged subgroups. It is merely targeted at getting low unit-taking students to take a full-load of courses. Disadvantaged students make up larger proportions of lower unit count students. Therefore, some convergence in four-year graduation rates is expected, but it will likely be lower than the overall increase in graduation rates because some non-disadvantaged students will benefit from taking additional units as well.

*Student wellbeing:* UCSB implemented their Minimum Cumulative Progress (MCP) program and there was initial student disagreement with the plan because of its restrictiveness and a perceived lack of student inclusion in the process. However, this may have more to do with how the program is introduced, rather than the program itself. While initial restrictions in students' first year may decrease student wellbeing if some students have to increase their courseload to meet full-load requirements. Student sense of belonging may improve because students know that they are starting off on the right foot toward four-year graduation.

### Campus Specifics

More of the academically most prepared students are going to campuses that have high graduation rates and high first-year unit completion. If you are academically prepared and are not taking a full-load, it may be more likely due to a lack of information about the benefits of the program than having to work or take care of additional family responsibilities. Therefore, it is easier for students to change their behavior.

Students at campuses with low graduation rates and low unit-taking are more likely to be less prepared than the overall student body. Campuses in this group are more likely to have a greater percentage of at-risk students in their student body. Research from University of Hawai'i referenced in the initial chapters of this report pointed to the fact that students with all but the very lowest levels of academic preparation still benefitted from the program. There is not a definitive difference between these at-risk students in Hawai'i and California.

## **Alternative 3: Four-Year Unit Taking Strategy**

*Effectiveness:* Students will have a full default option laid out for all four years needed to graduate. This will help reduce the problem of students who follow the first-year requirement and then do not follow through. The students who will not benefit are those who do not follow the program and are subject to some sort of academic sanction and those who receive waivers.

*Efficiency:* Such a strategy will be more expensive than the first year option because monitoring will be needed for three additional years. It likely will not require four times the resources for one year versus four, but costs will increase significantly.

*Disadvantaged subgroups:* Providing a four year default plan prevents information gaps from interfering with graduating in four years. As with the first year option, disadvantaged subgroups are more represented in lower unit buckets, so they could see greater increases in graduation due to constant monitoring. However, there still is not any special targeting toward these underrepresented groups so the convergence of four year graduation rates may still not be as significant as a more targeted approach.

*Student wellbeing:* This is the most restrictive of the alternatives, which means more opportunities exist for students to become frustrated by restrictions. However, it also could put all students regardless of any background factors on a similar academic path while on a UC campus, increasing the overall sense of belonging.

#### Campus Specifics:

While the general principles are the same for the first year requirement, some additional campus specifics need to be considered. Even though this option is the most restrictive, students at high graduation rate and high unit-taking campuses will have to change their behavior the least. This will increase their overall satisfaction with the program knowing that they are on track to graduate while not feeling like they are taking many more classes than they would have otherwise.

At the low graduation rate, low unit-taking campuses, the opposite is true. These students have to make the greatest change in their behavior. They will have to add more units than their counterparts on campuses that already start out taking more units. This could decrease their sense of belonging.

### **Alternative 4: Predictive Advising Strategy**

*Effectiveness:* It is hard to predict exactly how effective additional advising will be. Rather than focus solely on the number of units, a predictive advising approach could target specific students and direct advising resources toward those students. Arizona State has attributed much of their increasing graduation rates to the success of their predictive advising system that provides students with real-time information about their progress.<sup>42</sup> Significant research exists that supports advising as an effective strategy. This is partly to do with the fact that advising can be incredibly helpful to the students who get it, but not helpful at all to the students who do not. The reach is limited by the relative size of the advising staff.

*Efficiency:* It is reasonable to believe that all campuses would like to have sufficient advising to reach out to a significant proportion of students, but resources often limit the possibility

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<sup>42</sup> "ASU 4-Year Graduation Rate up 20 Points since 2002."

to do so. There are significant costs toward implementing a more intensive advising strategy. It is expected that a predictive advising strategy will require significant increases in staffing as well as, for many of the UC campuses, software that will help the campus identify the students that are to be targeted. The monitoring is not as intense as the four year unit requirement because the program will not apply to the entire student body and there does not necessarily need to be any additional publication of academic advising. Due to the high expense of staffing costs, costs will be similar to the four-year unit requirement.

*Disadvantaged subgroups:* Advising can target particular students that are at risk of not graduating on time. This direct impact on particular subgroups of interest provides an opportunity to help students who are facing the most significant challenges toward graduation. The difference in effectiveness is that there is not any requirement that students who are advised have to change their behavior like there is for the unit requirements.

*Student wellbeing:* Having advising conversations with well-trained staff is generally approved of by students. The program does not explicitly lay out course restrictions, but gives students the opportunity to talk through their course selection. Also, having someone who is looking out for a particular student on campus likely leads to a greater sense of belonging.

#### Campus Specifics:

High graduation rate and high unit-taking campuses will not have to target as significant of a proportion of their students because a significant proportion are already graduating and graduating within four years. This does not necessarily mean that the quality of their advising programs is superior, but the proportion of students who will be targeted is smaller.

Low graduation rate and low unit-taking campuses arguably have a greater need for advising because they need more hands on deck to break out to a wider proportion of the campus population.

### **Alternative 5: Information Campaign for Students**

*Effectiveness:* While telling students to take more units was a significant part of the further development of the 15-to-Finish strategy in Hawai'i, it may not prove as successful as changing the default course selection for students. One reason for this is the fact that students are not generally required to respond to information.

*Efficiency:* Resources for an information campaign are non-trivial. They require publications, messaging and public relations staff.

*Disadvantaged subgroups:* It is likely the case that having more information about taking the right number of units will not harm students, but how much it will help particular groups is not something that is easy to prove. What we do know is that the greater proportion of

students from disadvantaged subgroups provides opportunities for greater improvement in graduation rates than it does for students at large. Due to the limited evidence that more the right information will be targeted toward any particular group of students means that little convergence is expected as a result of the information campaign.

*Student wellbeing:* There is little evidence about the connection between student wellbeing and information in the short term. Benefits to student wellbeing will likely come from long-term student success, like graduation.

### Campus Specifics:

The campuses that are most likely to benefit from an information campaign are those where students have the least access to information about how to graduate in four years, or, campuses that have the greatest proportion of students who lack information. It is possible that the best proxy for information access is academic preparation. Students at high graduation rate, high unit-taking campuses are the most likely to be academically prepared for college meaning they potentially have the lowest need for information, despite the fact that a significant proportion of students at all UC campuses are not taking a full-load. Students at low graduation rate, low unit-taking campuses have the greatest proportion of students with low academic preparation meaning highest potential to improve with access to better information.

## **Understanding the Tradeoffs**

Important tradeoffs come along with projecting outcomes for the proposed alternatives. One important trade-off is between restricting students course selection and student wellbeing. Also, a decision has to be made between targeting specific groups of students and the student body overall. Finally, campuses have to decide whether to target students who are dropping out of college or students who are graduating in five years, but with small changes in behavior could graduate in four years.

It is important to note that these four alternatives are not exhaustive of all strategies that could increase graduation rates, but rather the top four for using unit-taking behavior to improve student success.

Other potential campus strategies include:

- Review of curricular requirements, particularly for higher-unit disciplines.
- Incentives for enrolling in summer to improve normative graduation rates.
- Tracking of progression to degree and/or first year GPA.
- Advising support on course selection and change of major.
- Improving campus climate, including sense of belonging.
- Support for students working 20+ hours, potential preference for on-campus employment for freshmen.
- Invest in learning communities for at-risk students.

## Part 6: Recommendation

Each campus develops their own first-year unit requirement that should as the default program for students. A waiver element can be included so that particular populations (varsity athletes, students with disabilities, and other student groups identified by the campus) are not overburdened.

This recommendation stops short of the most effective, and also most restrictive, option like a four-year unit requirement. However, future analysis of first year unit requirements will determine whether restrictions on additional years are necessary.

### Understanding the Recommendation

This recommendation balances the tradeoff between the increases in graduation rates with the expected costs of advising, monitoring, and expressing the value of having more students complete additional units to ensure student success.

One of the particularly important pieces of this recommendation comes in changing the default minimum unit load from 12 units to 15 units. Changing the unit default option is not only meant to get new students to take more units each term in the first year for the purpose of ensuring student success. It also important in changing the student culture from having full-time students to full-load students. While other potential options to improve graduation rates could involve identifying students at risk of not completing enough units to graduate in four years, this only helps that one student. Changing the culture of unit-taking behavior could improve the likelihood that a whole entering class of students could start off on the right foot and perform well while they do it.

While there is evidence that a unit requirement strategy in the first year could lead to improved student success outcomes, the effective implementation of this policy depends upon delivering the message behind the policy to build support and understanding. First, campus autonomy is important because campus demographics are different. Second, students need to be brought to the table to help design appropriate unit requirements for students. Finally, the only way to mitigate problems associated with campus autonomy and student reaction is by having a clear message of why this strategy is expected to work.

This begs the question what is the clear message needed for the strategy to work. This comes back down to presenting the two competing stories. The traditional story of advising students to start slow while they get acclimated to college and do not take on too many classes if a student has to also work will make more intuitive sense to people. Changing the default to the second option supported by the research in this report, that students taking more units (especially in their first year) can lead to improved student success, will only be accomplished through showing as many different groups of students as possible why this strategy might work for them. The strategies campuses choose to adopt will only be beneficial to students if they adopt the strategy as part of campus culture.

## Part 7: Conclusion

Increasing graduation rates has been targeted by campuses and government alike as one of the areas ripest for improvement in public higher education. While improving public perception of student success at each UC campus is certainly a reason for this increased awareness, the more important reason is a genuine interest in the success of students at the University of California.

This project focuses on the structure of the relationship between unit-taking behavior and graduation. There is evidence that taking more units is associated with positive academic outcomes, even after controlling for academic preparation and demographic factors. Currently, minimum unit requirement for students to have full-time status are not sufficient to allow those students to graduate in four years. A strategy to get students off on the right foot would help improve graduation rates for many different groups at many different campuses. It is not a silver bullet, but puts all students in a spot to put their best foot forward and graduate in less time and more frequently.

## Statistical and Data Analysis

This report uses data from the cohort of first-time freshmen students who started at a UC campus in the 2007-08 academic year and tracks them through the 2012-13 academic year. All units have been converted to quarter units to allow for comparison across campuses and do not include transferred units (i.e. AP, IB, or other college credit). This report analyzes the unit-completing behavior for the 38,868 students in the cohort during their first year at UC. A UC student graduates after completing 180 quarter units. A student will graduate in four years if they average 15 units per term, while a student who averages 11.25 units will graduate in six years. Semester units were multiplied by 1.5 in order to account for the fact that UC Berkeley and UC Merced follow the semester calendar and the rest of the campuses follow the quarter calendar.

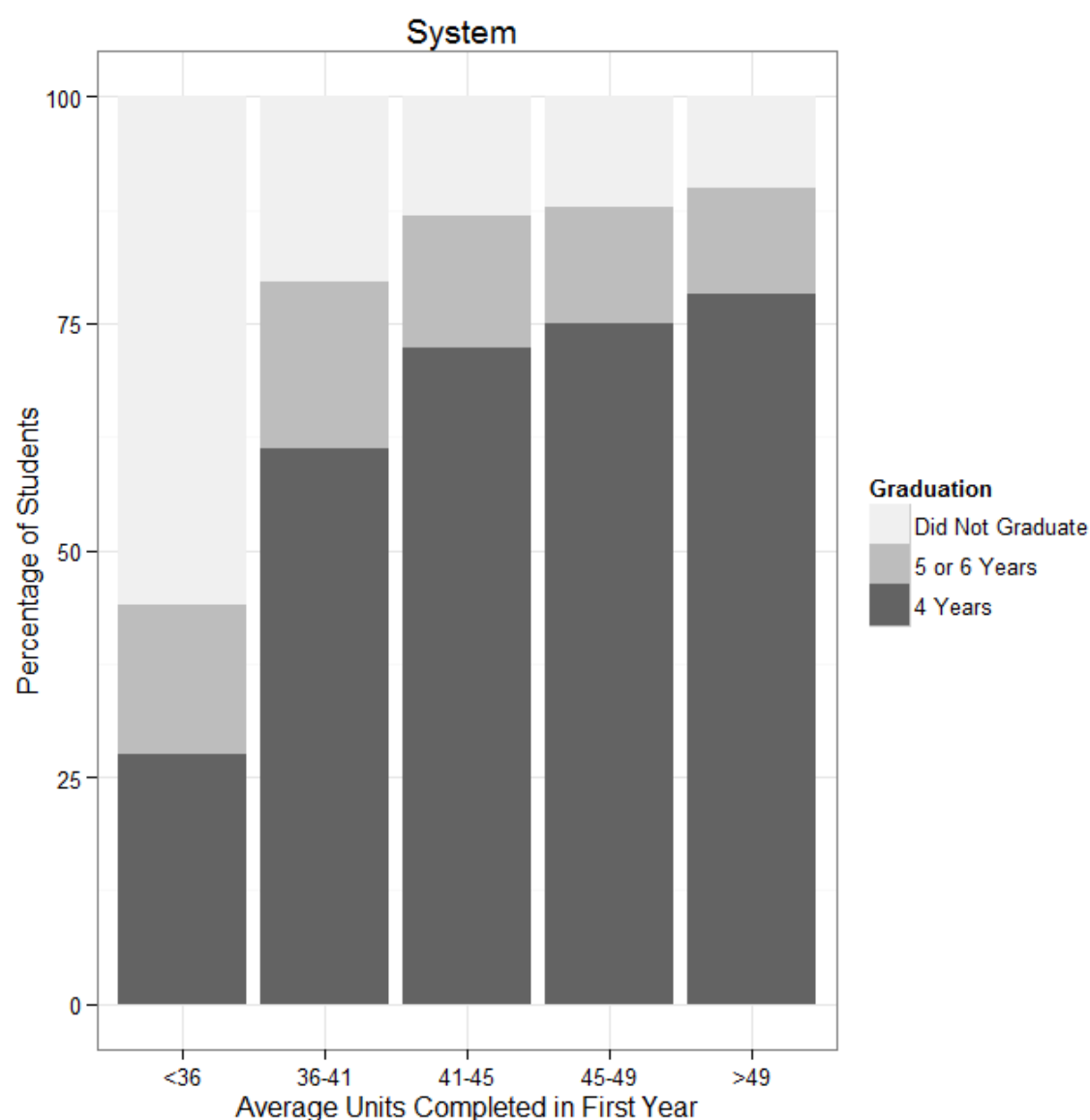
Unit-completing behavior varies across UC campuses. The average UC student completed 42.08 units in their first year. This ranges from a high of 44 units at UCSD to a low of 39.38 units at UCR. No campus averaged over 44 units, including units accrued during the summer term.

Table 9. Wide Variation of in Units per Term across UC Campuses

Campus	Fall	Winter	Spring	Summer	Year
UCB	20.66 (sem)		21.65 (sem)	8.9	44.38
UCD	12.38	14.68	14.46	8.16	40.05
UCLA	13.76	14.43	14.08	7.7	43.36
UCR	12.82	13.73	13.43	7.96	36.46
UCSD	13.48	14.26	14.05	7.82	41.68
UCSC	14.5	14.66	14.48	8.56	40.04
UCSB	13.54	13.77	13.56	7.8	40.02
UCI	13.54	14.21	14.23	8.56	44.02
UCM	20.54 (sem)		21.09 (sem)	8.13	37.62
System	14.41	14.27	15.15	8.23	41.34

Separating the data into buckets can make patterns of unit-taking behavior more clear. The four breaks that made the most sense were: <36 units, 36-41 units, 41-45 units, 45-49 units, and >49 units. the buckets are divided into these specific buckets to allow for comparisons between students who are full-time students, taking 12 units rather than 15 units for the majority of their first year, who would fit in the first two buckets, while full-load students, taking 15 or more units for the majority of their first year, fit in the last two units. The less than 36 unit bucket is meant to capture students who are not completing enough units to have been considered full-time for their entire first year.

Figure 3. System Buckets Help Describe Unit-Taking Behavior



The distribution for unit-taking across the system, and for many of the campuses, follows a wave-like pattern. The number of students in each bucket increases until the wave crashes after 50 units, which has the smallest distribution of students. There are a few exceptions to this general pattern. At UCSD, there is not the decrease in students who are taking over 50 units. UC Riverside more closely resembles a descending staircase. The proportion of students taking under 40 units in their first year is larger than any subsequent bucket. This pattern can also be seen at UC Davis, but this may have to do with the fact that students who fulfilled their Composition Requirement at the community college level would have those units counted as transferred units despite the fact that those units were completed during their enrollment at the university. Another exception is UCSC, where courses are typically five-units. The largest bucket is in the 45-50 unit range because that is the equivalent of three five-unit courses.

Regardless of campus, the bucket with the highest proportion of students not graduating is below 40 units. The share of each bucket that does not graduate declines in each subsequent bucket. In rare instances, the proportion of a bucket that does not graduate is above 50%. The three instances are all in buckets for less than 40 units completed in the first year at UC Merced, UC Riverside, and UCSC. At all other campuses, the proportion does not eclipse 33%.

The most significant difference comes in terms of the proportion of students graduating in four years versus five or six years. Most campuses have a higher proportion of students in each bucket who graduate in four years. However, that proportion is closest to one half at UC Davis, and UCSD.

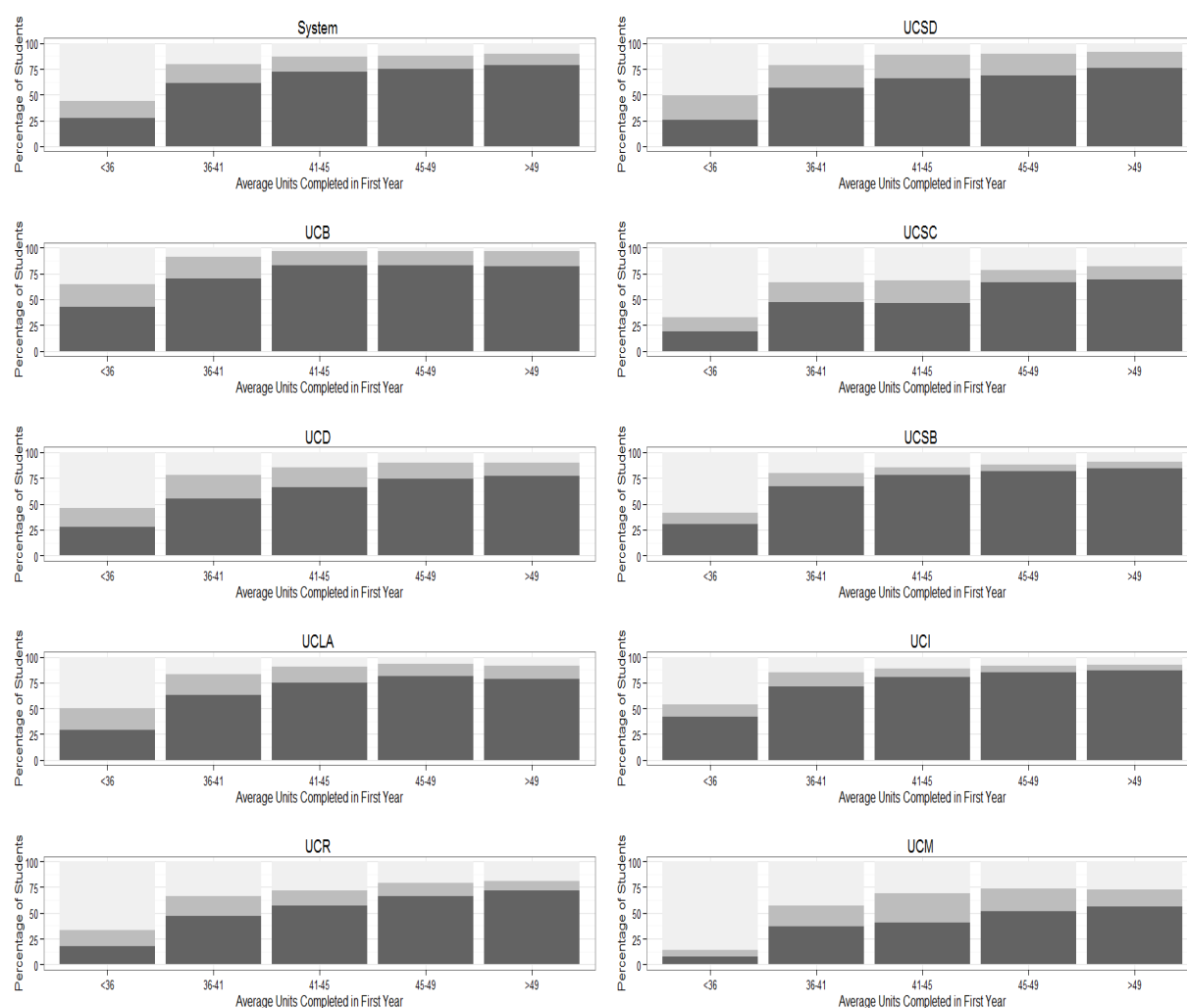
Table 10. Students who Graduate Complete More Units in First Year

Average First Year Units by Graduation Status	Graduated within 4 Years		Graduated within 6 Years	
	No	Yes	No	Yes
UCB	41.82	43.13	33.42	43.52
UCD	40.58	40.15	30.09	42.35
UCLA	42.94	43.83	36.81	44.24
UCR	40.61	38.69	31.47	43.03
UCSD	43.73	44.24	34.86	45.25
UCSC	43.33	42.12	36.92	44.46
UCSB	41.09	41.49	33.41	43.15
UCI	42.08	43.15	34.79	43.94
UCM	43.31	38.09	33.67	44.39
System	42.05	42.09	33.67	43.75

Little difference is present in the first year unit-completing behavior of students who ended up graduating within four years and the students who did not end up graduating in four years. The reason for the similar average units completed in the first year among these groups is that the students who graduated in 5 or 6 years are included with the students who did not end up graduating at all. The next two columns present the average units completed for students who either graduated or did not. Students who did not end up graduating within 6 years completed, on average, fewer units at all campuses. The system-wide average units completed in the first year in the UC system for a student who graduated

was 43.75 units versus 33.67 units for a student who did not end up graduating. While both numbers fall below the 45 unit average needed for a student to graduate in 4 years, the fact that a non-graduating student completed on average ten fewer units than a student who did graduate raises questions about how the first-year courseload is associated with the student's eventual graduation.

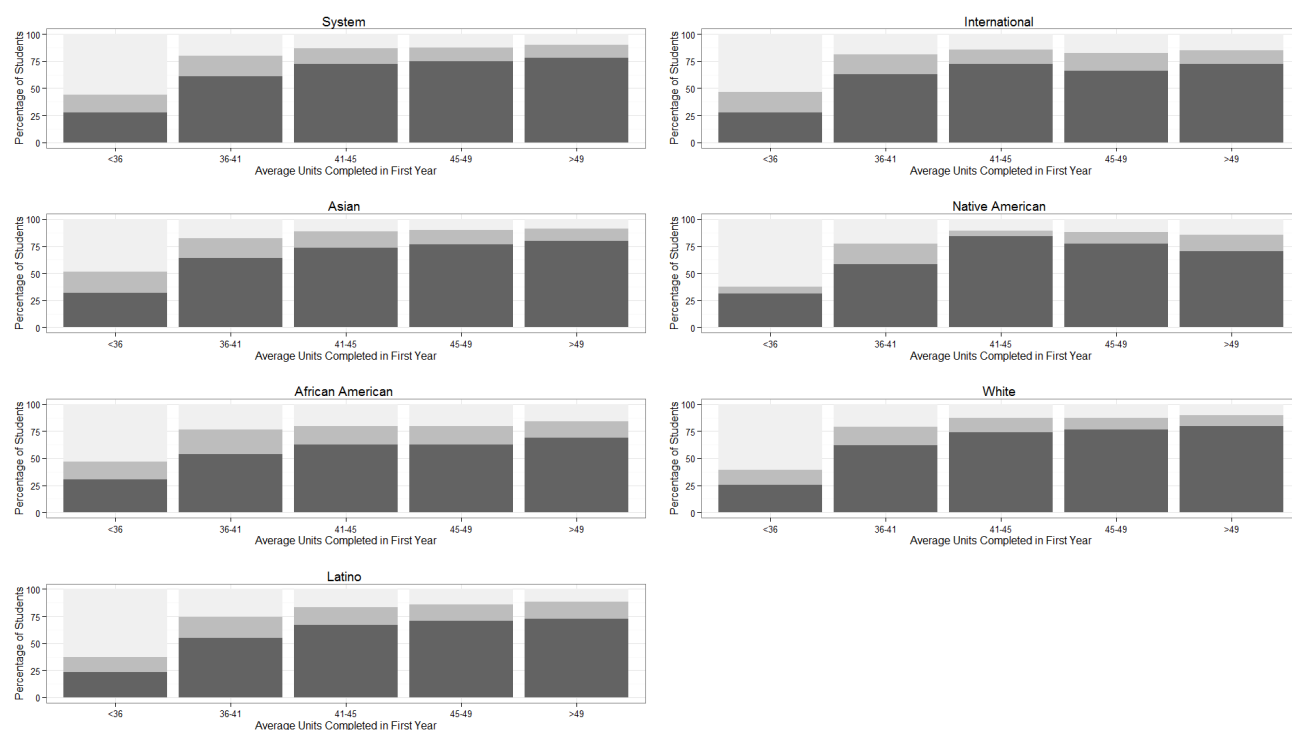
**Figure 4. Certain Campuses Have Significantly Lower Graduate for Lower Buckets**



## Demographic Factors

African-American and Latino students follow the same descending staircase model as UC Riverside. All other ethnic categories more closely resemble the wave model with the majority of students falling in the 40-45 or 45-50 categories. The concentration of students who do not graduate is greatest for all ethnic groups in the under 40 unit bucket.

**Figure 5. Certain Ethnic Groups Have Significantly Lower Graduate for Lower Buckets**



## Combing Race/Ethnicity Data with Campus Data

The fact that unit-taking behavior appears similar for particular ethnic groups and campuses, it is important to go from looking between campuses and ethnic groups to looking within campuses and ethnic groups. This raises the question whether differences in graduation rates are associated with particular campuses, ethnic groups, or some other difference.

### Latino Students

UC Riverside and UC Merced both have significant proportions of Latino students. Students who do not take over 40 units are at a distinct disadvantage when it comes to graduation. At UC Riverside, of the over 12% of cohort who identified as Latino and took under 45 units, over half did not graduate. This same trend is observed at UC Merced as well.

Another important comparison is between campuses within the same ethnic category. 8% of Latino students in the system are at UC Riverside taking fewer than 40 units in their first year. 5% of Latino students in the system are at UC Riverside taking fewer than 40 units in their first year and not graduating. At many campuses, the proportion of students who graduate is roughly half across all unit taking categories. At many campuses, of those that do graduate, half graduate in four years and the other half graduate in five or six years.

## African-American Students

Approximately 50% of African-American students who took less than forty units in their first-year graduated. Among those students who did graduate, the majority graduated in five or six years rather than four.

## White and Asian Students

The overall trend for white and Asian students is that if you are in a higher unit bucket, you are more likely to graduate.

## International Students

International students are concentrated at high-graduation rate campuses. It is difficult to extrapolate patterns for international students at the campus level because their population remains small at many of the UC institutions.

## “15-to-Finish”

The University of Hawai'i compared groups of students completing 15 or more units per term with students who were completing less than 15 units per term. Students who completed 15 or more units were associated with higher academic performance even after controlling for background characteristics. This section replicates some of their analysis using this cohort of UC students.

Students who completed 15 or more units had, on average, higher high school GPAs, were less likely to be from schools with API deciles below 8, and had higher SAT scores. This level of academic preparation is associated with higher academic performance in college, as students who completed 15 or more units also had higher GPAs in the first year.

Differences also appear in the background characteristics of the two groups. Students who completed 15 or more units in the first year came from families with higher average income and were less likely to receive Pell grants, come from first-generation families, or be from an underrepresented ethnic group.

Certain campuses have higher proportions of students from particular background groups, who may feel more or less comfortable when they set foot on a UC campus. Students who may be receiving advice about the units they need may be the more proactive students with the study skills that allow them to perform at higher levels.

## Completion vs. Attempted

At most campuses, the vast majority of students complete all of the units they attempt. The distribution resembles a person standing at the bottom of the Grand Canyon looking up. However, at some campuses, and for some ethnic groups, the picture appears more like an

escalator. This is particularly the case for the low-graduation rate campuses and Latino/African-American students.

For African-American students, even if they complete all their classes they still are not as likely to graduate as some of their peers.

Students at high-graduation rate campuses are more likely to complete the units they attempt. Students at lower-graduation rate campuses experience more variance in the number of units completed ratio. There are many potential explanations for this phenomenon. One of the most notable includes the idea that students who enter high graduation rates are more prepared for college and their particular field, while also have developed the study skills needed to succeed in college. It is also possible that the campuses with higher graduation rates are better resources for student success because of the flagship nature of those campuses, which may lead to a greater influx of money from various sources.

At some campuses, half of graduating students take five or six years despite the fact that their unit completion ratio is 1, meaning they completed all the units they attempted. One hypothesis is that particular campuses see more students pursuing disciplines in the STEM fields that require five or six years to complete. This is most visible at UCSD. Understanding how disciplines feature in this story is valuable in discerning whether or not disciplines matter.

## **Discipline Analysis**

The top six disciplines represented in the cohort are: 1) Biological Sciences, 2) Social Sciences, 3) Interdisciplinary Studies, 4) Engineering, 5) Psychology, and 6) Business. The unit-taking characteristics of students in these fields can provide some insight as to how much particular disciplines are driving campus unit-taking behavior. Many STEM programs have significant training that requires more units to be completed than some of the other fields.

One of the easiest ways to distinguish between disciplines is grouping them by STEM and non-STEM fields. A smaller proportion of STEM students take under 40 units compared to non-STEM majors. The largest proportion of STEM students is in the 45-50 category, while the largest proportion of non-STEM students falls in the 40-45 unit category. It is also evident that STEM majors who do not take at least 40 units are less likely to graduate in four years. While the same is true for non-STEM students, the share of students who graduate in four years is greater than for STEM students.

These patterns in unit-taking behavior for STEM and non-STEM students are not necessarily troubling. If students are well-informed about how their major selection could impact their time-to-degree from the beginning then this may not be an issue. However, at some campuses a significant portion of STEM students are taking below 40 units, which leads to five or six year graduation or no graduation at all. Further analysis of students who started

their UC career as a STEM student but switched out of STEM would add another dimension to this analysis.

## Transferred Units

One hypothesis for why some students do better than others is their academic preparation. One measure of academic preparation is test scores or high school GPA, but those may not be correlated with curricular rigor in high school. It is possible that a better indicator may be the number of units a student brings with them to a UC campus. This data is hard to wrap your head around because it is not possible to piece apart different subjects, scores on related exams, etc. However, adding transferred units in three categories to the model is a helpful exercise (AP, IB, and community college). At the system level, including transferred units does not significantly help the explanatory value of the model. As far as their relation to graduation term is concerned, AP units and IB units are statistically significant and reduce the term graduated in the model. At the campus level, all campuses had at least one category of transferred units that was statistically related to graduation term except UC Berkeley. At Berkeley, no type of transferred units was significantly related to the term that student graduated.

Including transferred units into the model for college GPA can also be informative. AP and IB units are statistically significant for the system and many of the campuses and help improve first year GPA. Community college transferred units are significant, but are correlated with decreases in GPA. Again, Berkeley did not see any significant results in terms of transferred units and first year college GPA.

These results lead to a couple interesting insights. Perhaps, AP unit completion is a signal for curricular rigor, which may be a better predictor for student success in college than weighted GPA or test scores. Also, the negative coefficient on community college units may raise questions about whether those units were taken for remedial purposes, to fill in curricular gaps, or for courses outside of core academic disciplines. It would be valuable to know what kinds of schools students who are taking advantage of different types of units go to.

## Correlation and Regression Models

Three primary models that help tell this story: graduation term regression, logistic regression for likelihood of graduation, and college gpa regression.

While the descriptive information above is useful in framing the association between unit-taking and graduation, it is important to explain the mechanism behind this relationship. First, a fairly strong correlation exists between the number of units completed in the first year and graduation. If the number of units a student completed is known, 42% of the time that explains whether or not a student graduated. If the first-year college is known, 32% of the time whether that student graduated can be predicted. These are the two factors that a student has control over when they arrive on campus. Various background factors may play into these decisions, but these two variables are the two with the strongest opportunity for students to control.

In order to provide more robust estimates of the impact unit-taking behavior on graduation, three different sets of models are used. First, a regression model is used to estimate the time to degree for a student. Second, a logit regression model is used to predict whether or not students will graduate. Finally, a different regression model is used to determine how unit-taking behavior impacts college performance for students in their first year.

The academic preparation factors for this report include: a student's weighted high school GPA, the highest SAT and highest ACT score. The demographic factors include a vector of Pell eligibility, whether a student identifies as a first-generation college student, and whether they identify with an underrepresented minority group.

Table 11. Despite Controls, Completed Units Remain Significant in Determining Graduation Term

Variable	Coefficient (std. err)
Intercept	15.24 (0.20) ***
Completed Units	-0.055 (0.002) ***
High School GPA	0.41 (0.044) ***
SAT/ACT	-0.026 (0.008) **
First Generation	0.07 (0.035) ***

Gender Female	-0.037 (0.028) ***
URM Group	0.067 (0.038)*
Pell	0.415 (0.032) ***
AP Transferred Units	-0.006 (0.001) ***
<b>R-squared</b>	<b>0.0896</b>

Number of Observations: 25,419

Standard errors are reported in parentheses.

\*, \*\*, \*\*\* indicates significance at the 90%, 95%, and 99% level, respectively

Source: UCOP Corporate Data System

The system level regression is only able to estimate 8.96% of the variation in the graduation term. However, valuable information can be gained from understanding which variables pushed graduation earlier rather than later. The four variables with a significant in terms of having students graduate sooner were High School GPA, SAT, and number of units completed. Whether a student identified as an underrepresented minority, a first-generation student, and if the student was Pell eligible significantly increased the time it takes a student to earn a degree.

The level of variation across campuses is relevant because the campuses where the model does not perform well tend to be the high-graduation rate campuses. The fact that so much unobserved variation exists may point to successful interventions that are not captured by student characteristics. Or, it may be simply a matter of chance. For example, UCSB Minimum Cumulative Progress may explain the variation in completed units at that particular campus. The same can be said for UCSC and its five unit courses or having the community college composition course count as transferred units at UC Davis. While it is difficult to drill down to how specific policy changes have informed student behavior in a systematic way, it is possible to look at what variables lost significance at particular campuses. At all campuses, the number of units completed in the first year was a significant explanatory variable for term completed. Whether or not students were Pell recipients was a significant factor at every campus except for UC Riverside. It is possible that the high concentration of Pell eligible students on that campus may render that factor less relevant than at other UC campuses. At every campus, female students were more likely to graduate in an earlier term than male students. This statistical analysis provides support for the idea that how many units a student takes in their first year helps reduce the number of terms it takes that student to graduate. However, even after accounting for various academic preparation and demographic factors, almost 91% of the variation in graduation term that is unexplained by this model.

Now that we know how unit-taking behavior influences the likelihood of graduation and how long it will take, we can turn to whether students who take additional units do perform better or worse. There are two competing hypotheses. First, it could be that students who take more units become more overwhelmed and do not perform as well meaning increased risks of falling behind, failing units, or dropping out altogether. This is particularly thought to be the case for students who work. The competing hypothesis is that students who take additional units are more engaged with their learning which will increase their performance.

One of the results of the Hawai'i "15-to-Finish" project was the students who took more units actually performed better than those who did not. After controlling for similar academic and background factors, the same result appears. The second model does not just look at the term someone graduated, but the probability that student would successfully graduate controlling for particular academic and demographic characteristics. The factors that significantly improve a student's odds of graduating are the number of units they complete in the first year, high school GPA and SAT. At UC Riverside, high school GPA did not prove significant. At UCSC, neither high school GPA nor SAT was significant. At UC Irvine, high school GPA was barely significant. At UC Merced, only the number of units completed was significant.

Table 12. Despite Controls, Completed Units Remain Significant in Determining Likelihood of Graduation

Variable	Odds Ratio	Significance / Std. Error
Intercept		*** / 0.233
Completed Units	1.048	*** / 0.002
High School GPA	1.423	*** / 0.05
SAT/ACT	1.020	** / 0.001
First Generation	0.935	* / 0.04
Gender Female	1.429	*** / 0.032
Pell	0.703	*** / 0.037
Physical Stem Field	0.757	** / 0.113
AP Transferred Units	1.006	*** / 0.001

CCC Transferred Units	0.997	** / 0.001
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Likelihood Ratio (Probability that Model is Better than Zero Model) 1347.4856 (0.001)

Number of Observations: 26,439

Standard errors are reported in parentheses.

\*, \*\*, \*\*\* indicates significance at the 90%, 95%, and 99% level, respectively

Source: UCOP Corporate Data System

Table 13. Despite Controls, Completed Units Remain Significant in Determining College GPA

Variable	Coefficient (std. err)
Intercept	0.131 (0.04) ***
Completed Units	0.014 (0.0003) ***
High School GPA	0.349 (0.009) ***
SAT/ACT	0.053 (0.002) ***
First Generation	-0.054 (0.007) ***
Gender Female	0.054 (0.005) ***
Pell	-0.040 (0.006) ***
PSTEM	0.0329 (0.02) *
AP Transferred Units	0.002 (0.0002) ***
IB Transferred Units	0.003 (0.001) ***
CCC Transferred Units	-0.001 (0.0002) ***
<b>R-squared</b>	<b>0.3429</b>

Number of Observations: 26,313

Standard errors are reported in parentheses.

\*, \*\*, \*\*\* indicates significance at the 90%, 95%, and 99% level, respectively

Source: UCOP Corporate Data System

This model shows that, among other factors like High School GPA, students who take more units tend to have higher first year college GPAs. Even if you control for various background characteristics, the number of units remains a significant explanatory variable for college GPA. It is also important to note that this model explains over 34% of the variation in college GPA.

The model fits certain campuses better than others. For example, the same model explained slightly over 30% of the variation in first year GPAs at Berkeley and 46% of the variation at UC Riverside. Interestingly, the only three variables that were statistically significant at UC Riverside were high school GPA, units completed in first year and SAT score. These same three variables were significant at each UC Campuses. Most notably, the number of units completed in the first year was significantly related to first year college GPA. Students who completed more units had better results in those units. At many campuses, academic preparation variables were also significant like SAT scores and high school GPA. It is hard to piece a part preparation and performance in college.

Despite the fact that there is some evidence to support the hypothesis for students taking more units also performing better, this does not mean we should immediately jump to the conclusion that we should just get all students to take more units which will lead them to graduate, graduate sooner, and with a higher GPA.

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