

# Student Academic Characteristics Associated with 4-Year Graduation

Oct. 2019

Andrea Hall-Cuccia

IRDS conducted an analysis to examine common academic characteristics for graduates from the fall 2012 frosh cohort who graduated within 4 years; demographic characteristics were not considered. For the analysis, the three largest majors, one from each academic School<sup>1</sup>, were selected – Biological Sciences (BIOS), Computer Science & Engineering (CSE), and Psychology (PSY). Students from the 2012 Fall cohort who graduated with a degree in one of the above majors were examined. Students who graduated with a major in PSY were the most likely to have graduated in 4 years (80%), followed by CSE majors (55%), and BIOS majors (42%). Characteristics associated with on-time graduation varied by major but there were some general patterns. The following factors were associated with time to graduation:

- Changed majors
- Enrolled in the Writing I (academic writing) and/or Math 5 (pre-calculus) course
- Took summer courses
- Received at least one D or F grade or withdrew (W) from any course (DFW grade)

Students who graduated in PSY were both most likely to have changed their major and to have graduated in 4 years (vs. BIOS and CSE graduates). These are counterintuitive findings that may warrant further investigation.

BIOS majors graduating in 4 years were the least likely to take Writing I, and CSE majors who graduated in 4 years were least likely to take Math 5. A high percentage of graduates across all majors who took Writing I and/or Math 5 also took summer courses, which may have helped them get back on track for a 4-year graduation. The majority of graduates in all majors took summer courses, and these courses were most frequently required in their major. This may have helped them progress through major requirements in a timely manner.

Graduates in these three majors also differed in the percentage who received at least one DFW grade. Few students who graduated with a major in CSE received a DFW grade. PSY graduates were the most likely to receive a DFW grade in at least one course and the least likely to repeat one. These findings may also warrant further analysis, particularly as the major that a student graduates with is not necessarily the major that a student had when they started at UC Merced.

---

## Background

The research question for this analysis was as follows: what academic characteristics were associated with graduation within 4 years. The analysis sample included BIOS (n = 241), CSE (n = 49), and PSY (n = 158) students from the 2012 frosh cohort who graduated within 4 years (N = 448). We considered the academic characteristics of major changing, non-college-level courses taken, timing of course-taking, and course performance. Importantly, the analysis was based on all students who graduated within 4 years in one of these majors, including students who started at UC Merced in other majors. These majors were chosen as they represent the most popular majors at UC Merced in each of the academic Schools. Student demographic/background characteristics were not considered. While these characteristics may influence time to graduation, this analysis focuses on academic characteristics. In addition, the population size may lead to small cell sizes for demographic and background characteristics, thus limiting the usefulness of such analysis. This analysis did not consider the characteristics of students who did not graduate such that it cannot speak to whether the characteristics of students who did and did not graduate in 4 years might differ.

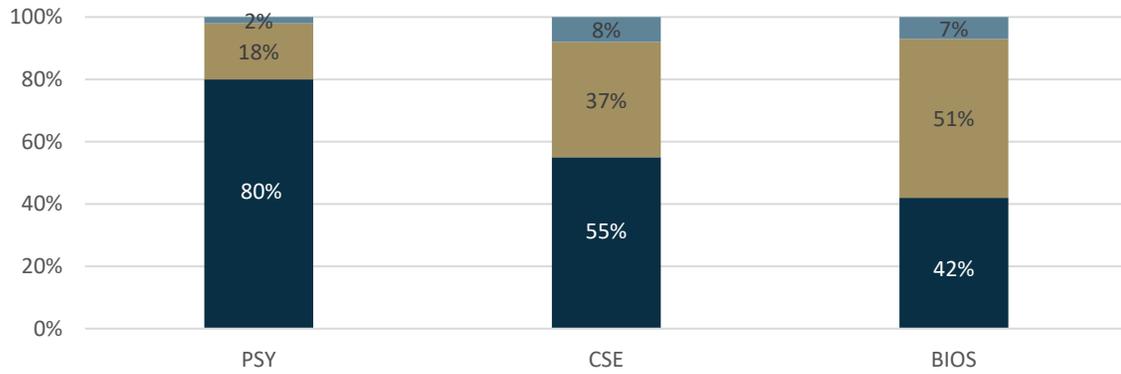
## On-time Graduation

PSY students were most likely to graduate in 4 years (80%), and BIOS graduates were least likely (42%). Figure 1 shows the percentage of students who graduated within 6 years by major.

---

<sup>1</sup> UC Merced is organized into three schools: School of Natural Sciences, School of Engineering, and Social Sciences, Humanities, and Arts.

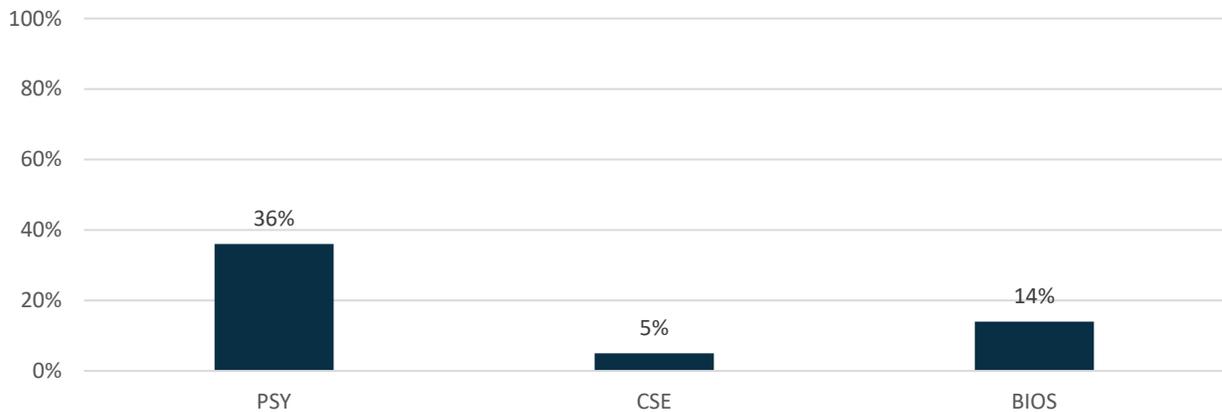
Fig. 1: Percentage of Graduates Who Graduated in 4, 5, or 6 Years by Major at Graduation



### Major Changing Behaviors

Thirty-six percent of PSY, 14% of BIOS, and 5% of CSE 4-year graduates changed majors at least once prior to graduating (Figure 2). For this analysis we included a change from an undeclared major to a declared major, and the reverse, as a major change. Of the BIOS students who changed majors, 15% started with an undeclared major or with an undeclared major in the School of Natural Sciences (6%). Of the PSY students who changed major, 34% changed from BIOS to PSY. One might expect major changing behavior to negatively impact a student's ability to graduate in 4 years; however, that conclusion is not supported by this analysis, as students who graduated in PSY were both most likely to have changed their major and to have graduated in 4 years. It is likely that some major transitions are more challenging than others for meeting major requirements in a timely manner.<sup>2</sup>

Fig. 2: Percentage of Students Graduating in 4 Years Who Ever Changed Majors by Major at Graduation

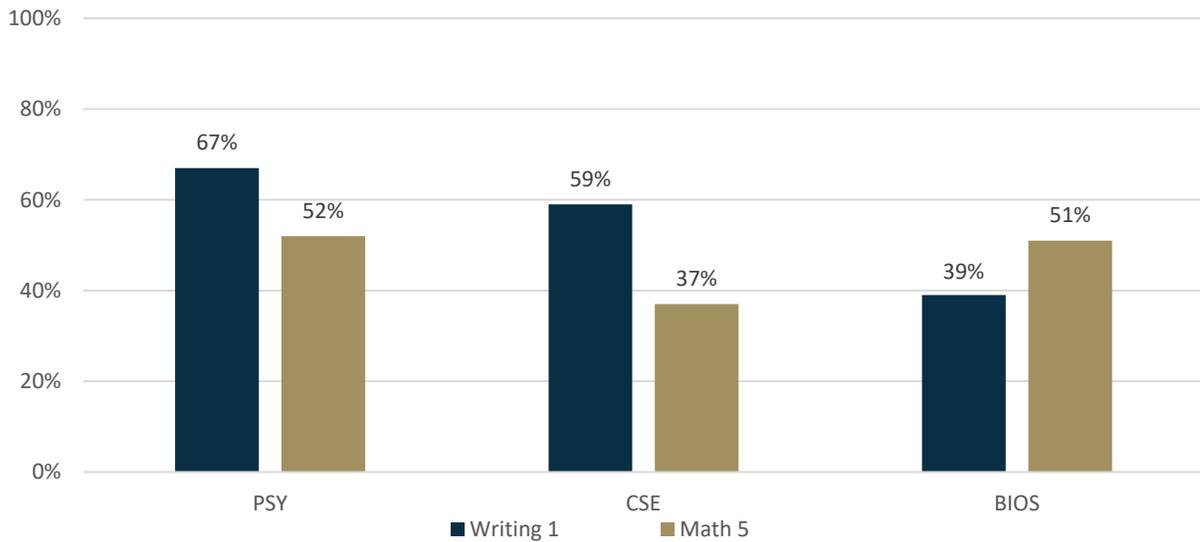


<sup>2</sup> IRDS has created a major-switching dashboard. Contact [irds@ucmerced.edu](mailto:irds@ucmerced.edu) for more information.

## Writing I and Math 5

Writing I (academic writing) and Math 5 (pre-calculus) are non-college level courses for students who test into them based on their academic preparation - they may have taken one or both courses. Students who take these courses are automatically off track to graduate in 4 years. Figure 3 shows the percentage of students in the study who took Writing I or Math 5 by major at graduation. BIOS graduates (39%) were least likely to have taken Writing I compared to PSY (67%) and CSE (59%) graduates. CSE graduates (37%) were less likely to take Math 5 compared to PSY (52%) and BIOS graduates (51%). It is clear that students who take Writing I and Math 5 are still able to graduate in 4 years, though it is possible that some took summer courses to get back on track (see Figure 5 and “Summer Courses” for further discussion). However, the data may suggest that overall it is harder for students who take Math 5 to graduate in 4 years, particularly if they graduated with a major in CSE. Similarly, it was harder for students who took Writing I to graduate in 4 years, particularly if they graduated with a major in BIOS.

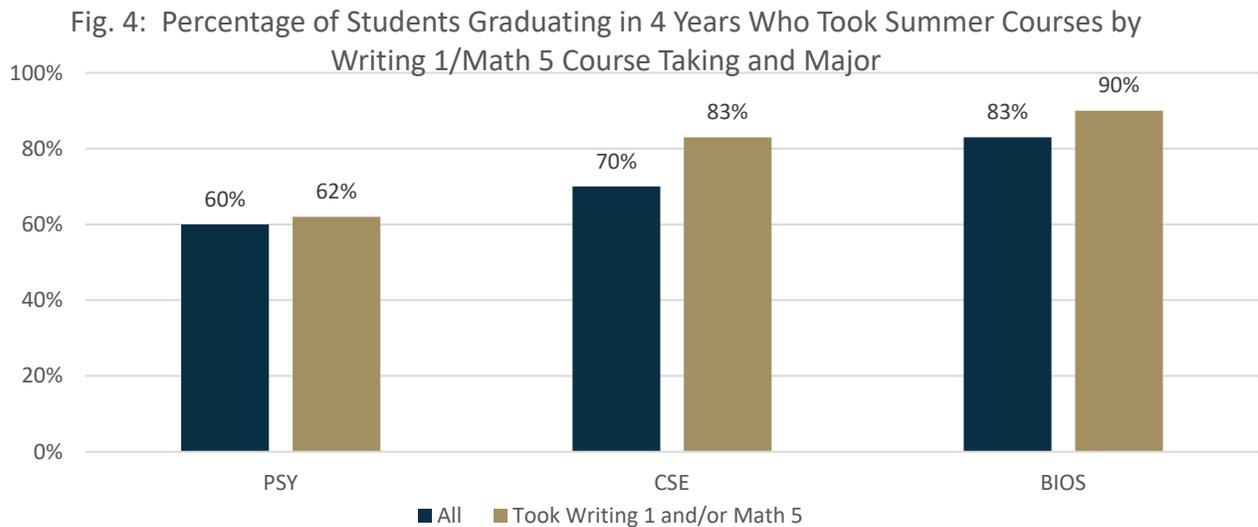
Fig. 3: Percentage of Students Graduating in 4 Years Who Took Writing 1 or Math 5 by Major at Graduation



## Summer Courses

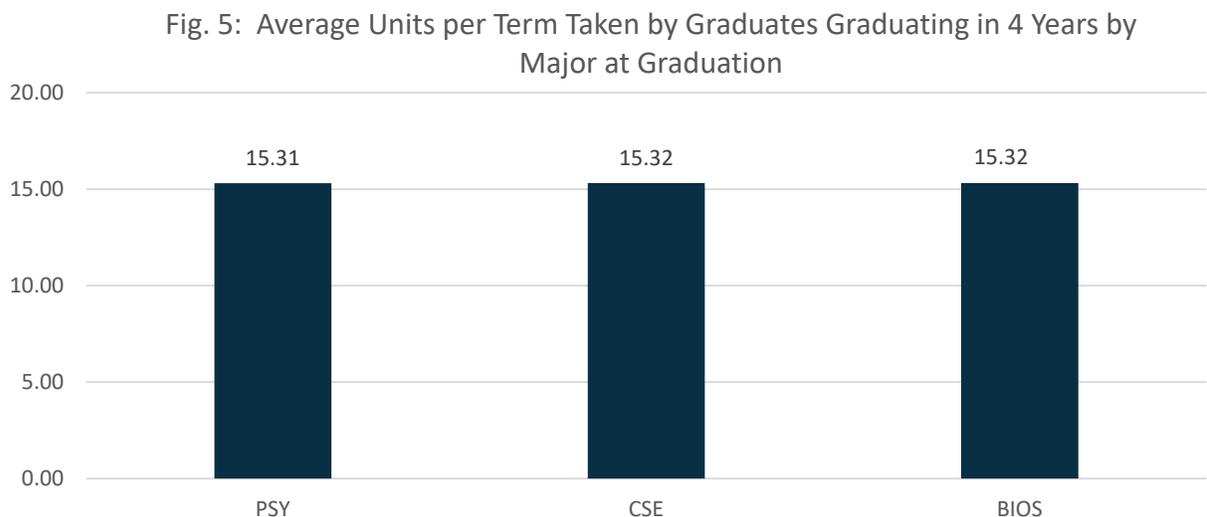
The majority of students who graduated in 4 years took at least one summer course at UC Merced. Figure 5 (blue bar) shows the overall percentage of graduates who took summer courses by major. BIOS graduates (83%) were most likely to take summer courses compared to CSE and PSY graduates. On average, graduates in the sample who took summer courses at UC Merced completed 7 units during the term and typically enrolled in two summer terms. Graduates most commonly took summer courses in their second or third summer at UC Merced. Additionally, graduates who took summer courses generally took courses in their major. Thus, taking summer courses may have helped graduates progress more quickly through major requirements.

Next we consider the proportion of graduates who took Writing 1 or Math 5 who took summer courses (Figure 5; gold bar). BIOS and CSE graduates who took Writing 1 and/or Math 5 were more likely to take summer courses than those who did not take Writing 1 and/or Math 5; PSY graduates were about equally likely to take summer courses whether or not they took Writing 1 and/or Math 5. Thus, for graduates who had to take Writing 1 and/or Math 5, taking summer courses could have compensated for having to take below-college-level courses and helped these graduates graduate in 4 years.



## Course Load

Across all majors, on average, graduates took approximately 15 units per term (Figure 4). Because 120 total units are required for graduation, this is the average number of units that must be completed per term for an on-time graduation in 4 years (8 semesters). This pattern is not surprising given that all of the graduates in our sample graduated in 4 years. It indicates that graduates who fell behind did not compensate by taking a larger load in the spring or fall term; instead, graduates used summer term(s) to take courses required by their major (see below).



### DFW Grades and Course Repeats

Figure 6 shows the percentage of graduates receiving a DFW in at least one course by major at graduation. PSY graduates who graduated in 4 years were most likely to have received a DFW grade in at least one course (59%) compared to 6% of CSE graduates and 33% of BIOS graduates. Typically, graduates who received a DFW grade only failed one course. However, the course may not have been in their major at graduation. Combined with the finding that PSY graduates were most likely to change majors (Figure 2), particularly from BIOS to PSY, this pattern could suggest that PSY majors were most likely to start at UC Merced with a major that was not a good fit for them such that they initially did poorly academically and subsequently switched majors to PSY.

Fig. 6: Percentage of Graduates Graduating in 4 Years Who Received a DFW Grade by Major at Graduation

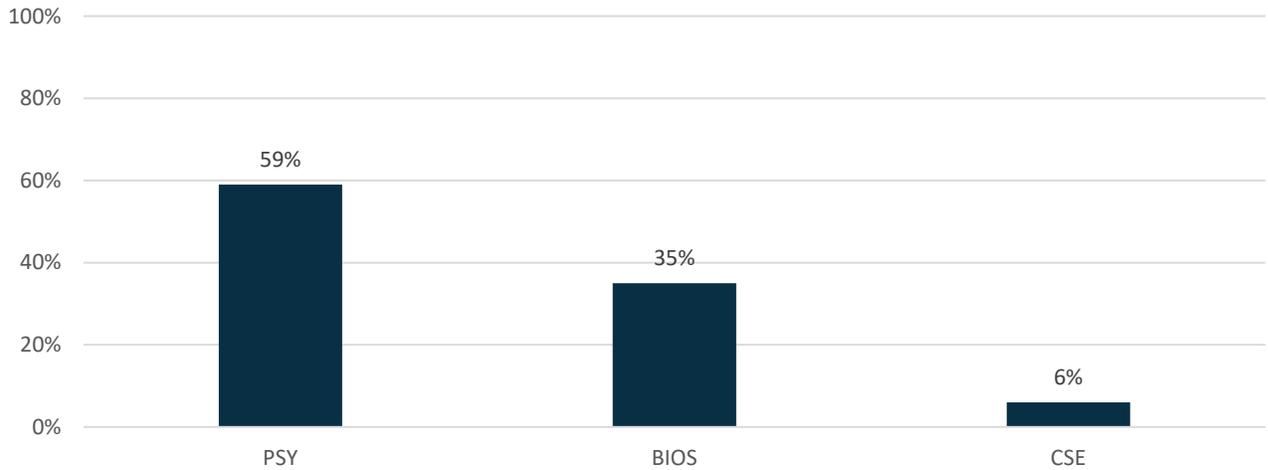


Figure 7 shows the percentage of graduates with at least one course repeat by major. Note that the number of CSE graduates (n=8) receiving a DFW grade was too small to be included in the figure. Students who graduated in BIOS were much more likely to repeat a course (91%) than PSY graduates (62%). Graduates in both majors generally repeated courses during a fall or spring term (not pictured). This pattern seems counterintuitive, as PSY graduates were more likely to receive a DFW grade than BIOS graduates such that we might also expect PSY graduates to repeat courses in which they performed poorly. It could be that the major requirements of BIOS graduates are structured (e.g., fewer electives) such that BIOS graduates would need to repeat courses in which they had performed poorly in order to graduate with a major in BIOS, whereas PSY graduates could instead take a different course and still meet the requirements of the major.

Fig. 7: Percentage of Graduates Graduating in 4 Years Who Received a DFW Grade and Repeated a Course by Major



## Conclusion

Overall, PSY graduates were by far the most likely to graduate in 4 years (80%), followed by CSE (55%) and BIOS (42%) majors. We next explored these patterns based on other academic characteristics.

**Major changing:** Major changing did not appear to negatively impact a student's ability to graduate in 4 years, as graduates who graduated in PSY were both most likely to have changed their major and to have graduated in 4 years (vs. BIOS and CSE graduates). Some major transitions are likely more challenging than others for meeting major requirements in a timely manner.

**Writing I and/or Math 5 enrollment and Summer Courses:** Though students who take Writing I and/or Math 5 automatically start off track to graduate in 4 years, that analysis showed that students can catch up. Overall it may be harder for CSE students who took Math 5 to graduate in 4 years; and it may be harder for BIOS students who took Writing I to graduate in 4 years. However, a high percentage of students across all majors who took Writing I and/or Math 5 also took summer courses required in their major, which may have helped them get back on track for a 4-year graduation.

**DFW grades and course repeats:** Few CSE students received a DFW grade compared to BIOS and PSY students. PSY students were the most likely to receive at least one DFW grade but the least likely to repeat a class.

These findings are a starting point for understanding student major changing patterns, course taking behavior, and course performance impacts on timely graduation. There are several areas where further analysis might be warranted. For example, it might be useful to examine the structure of each major program, particularly how frequently and during which terms required courses are offered. BIOS and CSE are much more rigid in terms of required courses and the sequence in which courses must be taken than PSY, which has more elective course options. If CSE or BIOS graduates fail a required course and the course is only offered once a year, they can become off track to graduate in 4 years. There are several areas for deeper analysis including the number of elective course options available to graduates, the number of course prerequisites each major requires, and recommended course taking sequences.

Another area for further research is timing of major changes. A student who changes majors, for example from BIOS to PSY, after several semesters could have completed requirements towards the BIOS degree that could affect DFW grades, summer course-taking, or overall progress towards degree.

Further research could also examine additional cohorts beyond the fall 2012 cohort to determine whether these patterns are consistent. Additional majors could also be examined, although this must be done selectively due to the potential for small sample sizes for some majors.

This analysis does not compare graduates and non-graduates. Further study could examine those who did not graduate or graduated in more than four years to those who graduated on-time.