Student Behaviors Associated with Degree Completion in Four Years or Less

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This is the second in a four part series about improving UC Merced's four-year graduation rate. The first report modeled UC sister campus policies about undergraduate enrollment and progression and compared the proportions of UC Merced's undergraduates that would have satisfied the sister campus policies and the resulting graduation rates for those students. The report concluded that UCM's nine semester limit has the potential to yield a 50% four-year graduation rate. This second report focuses on behaviors within the control of students that can substantially improve their likelihood of graduating in four years and that therefore can substantially improve the campus's four-year graduation rate. Because course registration is one of the first decisions to be made by the student and because it is typically made with professional advice during an orientation session, student credit hours in the first term will be examined in some detail. This report will then propose a series of steps that new freshmen can take to significantly improve the likelihood of graduating in four years. Among post-admission variables associated with undergraduate student success, that are reasonably within students' control, four were found that were strongly associated with graduation in four years:

1. Take more than 15 credit hours in the first term,
2. earn a first semester grade point average of 2.0 or higher,
3. declare a major, and
4. earn a grade of C or higher in Core 001.

The required performance standards are certainly doable and would substantially increase likelihood of graduating in four years.

Student Credit Hour Load in the First Term

One of the first decisions to be made by new matriculants is which courses and how many units to take their first semester. Table 1 presents the distribution of credit hour enrollment for new UC Merced freshmen in 2006, 2007, and 2008 along with the four-year graduation rates for students by hours enrolled and school of major. Focusing first on hours enrolled by school of first major, there are clear differences among the three Schools. As shown in Figure 1, most (81%) of Social Sciences, Humanities and Art (SSHA) students enrolled in 16 SCHs, the mode for Engineering students was 15 SCHs and 82% enrolled in 14, 15, or 16 SCHs, while Natural Sciences students produced a bimodal distribution with peaks at 12 and 16 SCHs and a substantial number at 15 SCHs. Very few UCM students enrolled for 17 or more SCHs in the first semester.

The subsequent four-year graduation rates for these freshman cohorts are shown in Figure 2 as cumulative distributions. The cumulative graph shows the four-year graduation rate for students with at least the number of hours on the horizontal, or X, axis. In other words, the leftmost position, 12 SCHs, displays the four-year graduation rate for students with at least 12 SCHs (typically 12-17 SCHs), essentially everyone. The value at 16 SCHs is the four-year graduation rate for those taking at least 16 SCHs (typically 16 or 17 SCHs). The relationship between graduation rate and cumulative credit hours for Natural Sciences is remarkably flat with an uptick at 16 student credit hours, suggesting that the distribution peak seen at 12 hours is largely ameliorated over time by an offsetting heavier load in a future term. Engineering students exhibited an increasing graduation rate across the entire range. Of course, few Engineering students took

17 or more SCHs in the first term. The pattern for SSHA students showed a modestly increasing graduation rate to 15 SCHs and a sharper increase to 16 SCHs. Both SSHA students and Natural Sciences students enrolling for at least 17 SCHs were less likely to graduate in four years than were students taking 16 SCHs. Overall, it can be concluded that students taking 15 or 16 SCHs were more likely to graduate in four years and that there was some advantage to 16 SCHs enrollment.

The critical reader will raise several questions at this point because students advised to take more hours and students confident enough to enroll in more hours tend to be better prepared and more academically able than students overall. That is a fair criticism and is addressed in the remainder of the report by limiting analysis to "average" students. Because this report targeted behaviors that the large majority of students can control, it was limited to students who were in the middle 75% on ALL quantitative admissions measures: high school grade point average, SAT Mathematics, SAT Reading, and SAT Writing. In other words, the "average girl or guy" had no area of special talent and had no area that was an exceptional problem for them. These "average" UCM students were between roughly the 13th and the 87% percentiles on all measures and therefore exhibited balanced knowledge, skills, and prior academic performance.

Table 2 reports the graduation rate outcome found by applying five alternative behavioral models to the "average" student records by school of first major. Four of the models are combinations of three of four critical behaviors and the fifth combines all four critical behaviors. The cutoff scores for the four critical behaviors were discovered by trial and error. They are: over 15 SCHs in the first term, a first semester GPA of 2.0 or higher, a declared major (any declared major including "pre" majors), and a grade in CORE 001 of C or higher. From the University's website, CORE 001, *The World at Home*, provides a "foundation for UC Merced's general education program with a strong emphasis on writing, quantitative reasoning, critical thinking, and understanding events in their historical and cultural contexts. CORE 001 is a first year course designed to introduce students to UC Merced's faculty, our research, and the academic fields in which we work. A grade of C- or better is required to pass CORE 001." As a universally required course, earning at least a C in the freshman year was important.

The principal assumption of the analysis was that any admitted freshman student can manage to accomplish at least three of these four goals (with the white space indicating the goal that is left out of each model): Model 1 excused enrolling in over 15 SCHs, Model 2 excused earning a GPA of 2.0 or higher, Model 3 excused declaration of any major, and Model 4 excused earning a C or better in CORE 001 when first taken. The fifth and final model allowed no critical behavior to be excused, all four were required.

As shown in Table 2, any three of the four behaviors yielded a higher, often a substantially higher, four-year graduation rate. The greatest improvements were for SSHA students, majors in the largest UC Merced School. By school of major, a GPA of 2.0 or better in the first term was the least critical factor for Engineering majors. In fact, dropping the requirement produced the largest improvement. The graduation rate difference in Engineering for most of the models was modest but any increase produced a large improvement because the four-year graduation rate in Engineering was low overall. Improvement in four-year graduation rates was nearly uniform across all five models for Natural Sciences. A declared major was the least important critical factor for SSHA students. Dropping the requirement produced the greatest gain among the partial models. For SSHA students, earning a C or better in CORE 001 was the most important critical behavior. The model that excluded the C or better grade showed the least improvement over the base rate for all SSHA students. Because all but one model required a declared major, students without a declared major were limited to Model 3 and Model 3 was associated with significant improvement in four-year graduation rate.

Conclusion

As freshmen matriculate, they could focus on a simple message about four goals, four steps to graduating in four years. They are of course not all that a student will need to accomplish but they collectively yield a strong start. The standards and at least one reason why the standard might be effective appears as follows.

Steps:

Take more than 15 SCHs in the first term – focus time on academics.
Earn at least a 2.0 grade point average – go to class, work hard, get decent grades to start.
Declare a major – be committed to an academic goal.
Earn a C or better in CORE 001 – embrace general education and the associated skills required.

Not all students will accomplish all four goals or be allowed to do so, but accomplishing three of the four would substantially increase the probability of individual students completing a bachelor's degree in four years and would thereby substantially improve UCM's four-year graduation rate.

Table 1: Relationship Between Credit Hours in First Semester and Completion in Four Years (Cohorts 2006, 2007 and 2008)

	Graduated in Four Years					Cumulative Distributions Graduated in Four Years			
SCH	No	Yes	Sum	Distribution	**Yes**	No	Yes		**Yes**
Overall									
< 12	3	0	3	0%	**0%**	1,304	585	1,889	**31%**
12	217	95	312	17%	**30%**	1,301	585	1,886	**31%**
13	79	13	92	5%	**14%**	1,084	490	1,574	**31%**
14	143	28	171	9%	**16%**	1,005	477	1,482	**32%**
15	277	84	361	19%	**23%**	862	449	1,311	**34%**
16	559	354	913	48%	**39%**	585	365	950	**38%**
17	12	5	17	1%	**29%**	26	11	37	**30%**
>17	14	6	20	1%	**30%**	14	6	20	**30%**
Engineering									
< 12	1	0	1	0%	**0%**	307	63	370	**17%**
12	15	0	15	4%	**0%**	306	63	369	**17%**
13	39	0	39	11%	**0%**	291	63	354	**18%**
14	82	11	93	25%	**12%**	252	63	315	**20%**
15	112	29	141	38%	**21%**	170	52	222	**23%**
16	52	17	69	19%	**25%**	58	23	81	**28%**
17	3	2	5	1%	**40%**	6	6	12	**50%**
>17	3	4	7	2%	**57%**	3	4	7	**57%**
Natural Sciences									
< 12	2	0	2	0%	**0%**	390	166	556	**30%**
12	104	49	153	28%	**32%**	388	166	554	**30%**
13	23	9	32	6%	**28%**	284	117	401	**29%**
14	39	12	51	9%	**24%**	261	108	369	**29%**
15	96	34	130	23%	**26%**	222	96	318	**30%**
16	117	59	176	32%	**34%**	126	62	188	**33%**
17	2	1	3	1%	**33%**	9	3	12	**25%**
>17	7	2	9	2%	**22%**	7	2	9	**22%**
Social Sciences, Humanities and Arts									
< 12	0	0	0	0%		302	232	534	**43%**
12	45	27	72	13%	**38%**	302	232	534	**43%**
13	4	1	5	1%	**20%**	257	205	462	**44%**
14	5	1	6	1%	**17%**	253	204	457	**45%**
15	12	3	15	3%	**20%**	248	203	451	**45%**
16	234	200	434	81%	**46%**	236	200	436	**46%**
17	1	0	1	0%	**0%**	2	0	2	**0%**
>17	1	0	1	0%	**0%**	1	0	1	**0%**

Figure 1: Distribution of First Semester Student Credit Hours

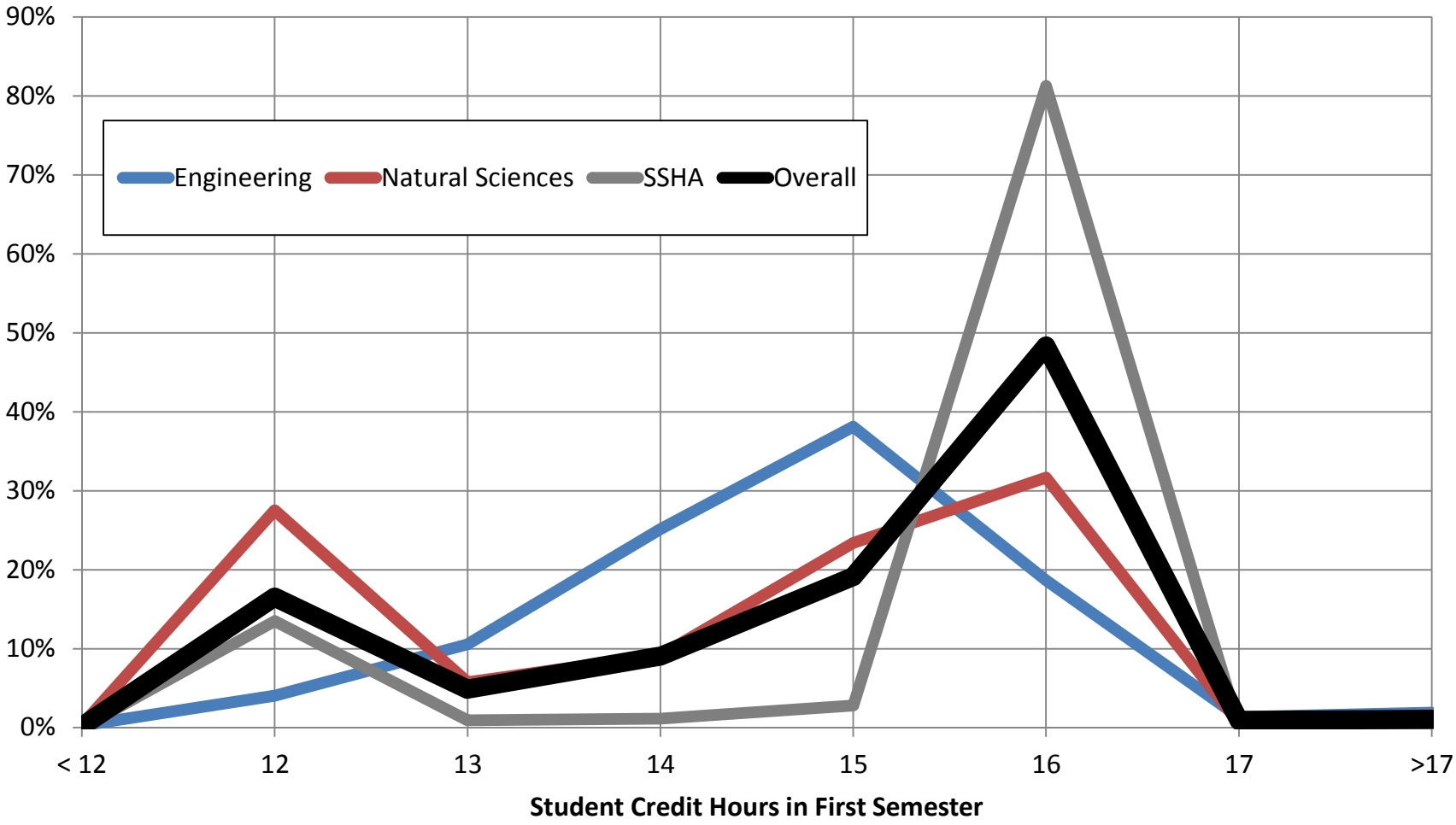

Figure 2: Cumulative Four-Year Graduation Rate By SCHs Enrolled in the First Semester (At or Above SCHs)

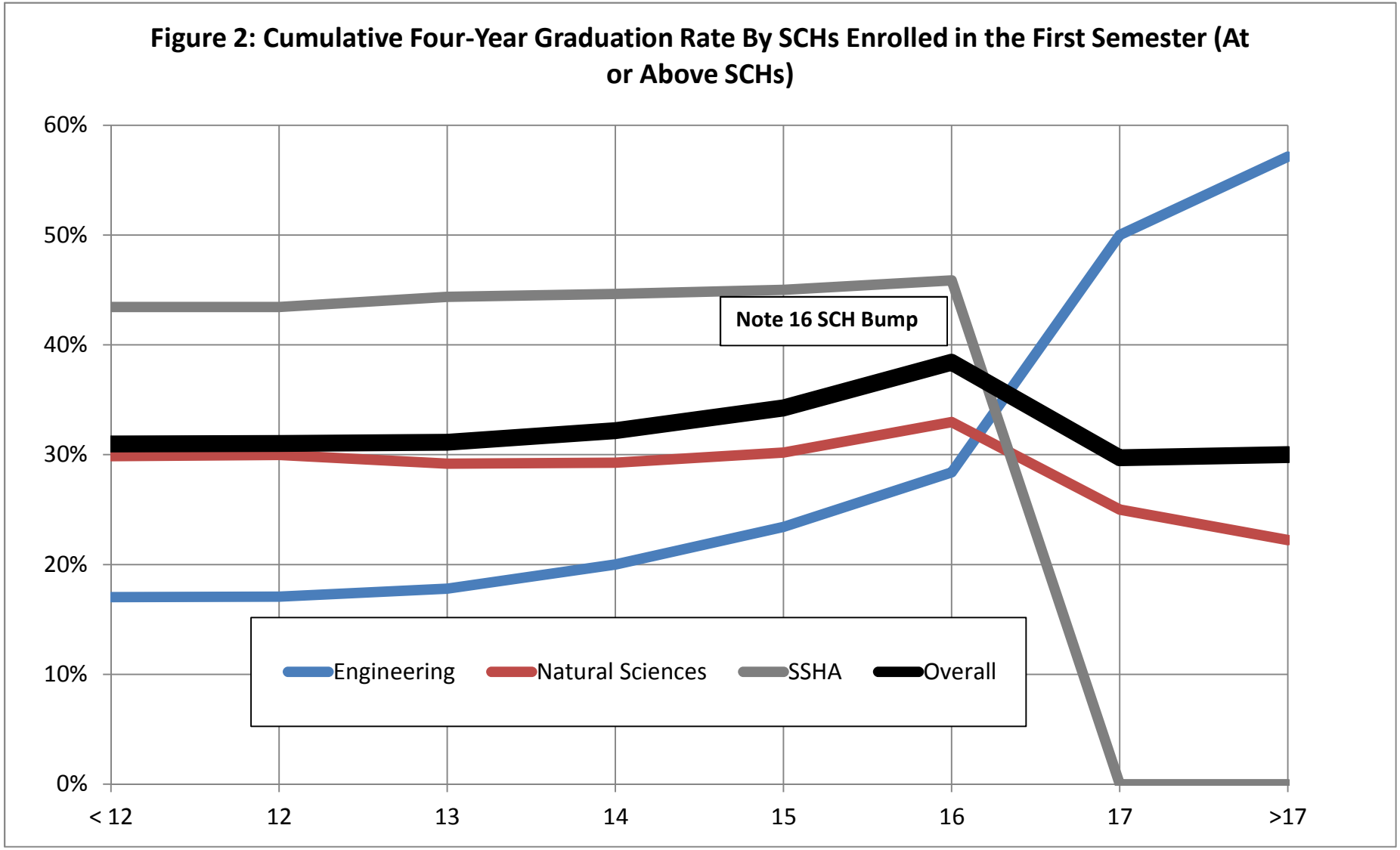

Table 2: "Average Student" Freshman Behaviors and Likelihood of Graduating in Four-Years (Fall Cohorts 2006-2008) by School of Major in First Term

	First Semester					Relative Improvement	
	> 15 SCH at Census	GPA ≥ 2.0	Has Declared Major	Grade in Core 001 of C or Higher	Graduation Rate	As Percent Difference	As Percent Improvement
Engineering							
Originally					14%		
Model One					18%	5%	35%
Model Two					24%	10%	75%
Model Three					18%	4%	29%
Model Four					17%	3%	22%
Summary Model					18%	4%	29%
Natural Sciences							
Originally					30%		
Model One					39%	9%	29%
Model Two					36%	6%	20%
Model Three					40%	9%	32%
Model Four					38%	8%	26%
Summary Model					40%	9%	32%
SSHA							
Originally					45%		
Model One					58%	13%	29%
Model Two					55%	11%	24%
Model Three					60%	15%	33%
Model Four					54%	9%	21%
Summary Model					60%	15%	33%
Undeclared Major							
Originally					30%		
Model Three (Only Relevant)					39%	9%	29%
Summary							
Originally					31%		
Model One					41%	10%	31%
Model Two					48%	16%	51%
Model Three					48%	16%	51%
Model Four					47%	15%	49%
Summary Model					51%	19%	61%