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DATE: May 27, 2020  
TO: Karen Erickson, Lisa Schultheis & Gillian Schultz, Faculty | Ram Subramanian, PSME Dean  
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FROM: Lisa Ly, Research Analyst  
RE: BIOL 1 Series Throughput, 2014-15 to 2018-19

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### Overview

Biology faculty would like to assess their BIOL 1 series throughput rate and enrollment patterns of students who completed. The following questions were provided to Institutional Research & Planning:

1. [What is the throughput rate for BIOL 1 series?](#)
2. [How long do students take to complete each course and the entire series?](#)
3. [To inform scheduling, which courses, particularly in Chemistry and Physics, are taken concurrently with BIOL 1A/1B/1C?](#)

### Methodology

For question 1, BIOL 1A students were assigned to the academic year in which they first enrolled in the course. First-time BIOL 1A enrollees in 2014-15 through 2018-19 were selected and tracked to BIOL 1A/1B/1C completions. Throughput was examined in two ways. First, throughput was examined more broadly by tracking completions through the most recent end of term (winter 2020). Students who started BIOL 1A in 2014-15 will have more time to complete the series than students who started in 2018-19. Secondly, throughput was examined with the assumption that students completed and persisted to each course in the immediate subsequent term; and therefore, students have up to four terms to complete the series. A four-term cutoff was used since spring BIOL 1A students would need four terms to complete the series as BIOL 1B is not currently offered in the summer term. Any student whose BIOL 1A/1B/1C completions did not follow sequential order were excluded. For this report, 22 students over the five year period were omitted. For question 2, time to completion is tracked through winter 2020 and includes the summer term. For question 3, the concurrent course enrollments of all students who enrolled in BIOL 1A, BIOL 1B and/or BIOL 1C between 2014-15 and 2019-20 were retrieved.

### Summary

- There are about 200 students who enrolled in BIOL 1A for the first time each year. For those who completed the BIOL 1 series within four terms, their throughput rate is 26% (N=57). When completion time is relaxed, for those who completed the series by winter 2020, their throughput rate is 43% (N=87).
- Nearly half of the series completers did so within 3 terms (48%). The remaining students completed in 4 terms (18%), 5 terms (19%) and 6 or more terms (15%). When each of the BIOL 1 series course is examined, the majority of students completed each course in the immediate subsequent term: 92% completed BIOL 1A on their first attempt, 66% completed BIOL 1B one term after passing BIOL 1A, and 78% completed BIOL 1C one term after passing BIOL 1B.

- First-time BIOL 1A students consist of mostly Asians (45%) and Whites (25%), females (57%) and those who are not first-generation college (81%) nor low-income (76%) students. With the exception of female, the aforementioned student groups are more likely than their counterparts to complete the BIOL 1 series.
- The courses frequently enrolled while taking BIOL 1A/1B/1C include the following: CHEM 1B/1C, CHEM 12A/12B, MATH 1A/1B, and NCBS 405 (tutoring). More recently, BIOL 1A/1B students in 2019-20 are also taking MATH 10. The most enrolled courses within Chemistry and Physics departments are CHEM 1B/1C and PHYS 2A/2B.

### Q1: What is the throughput rate for BIOL 1 series?

#### Completion through Winter 2020

Table 1 provides the annual and five-year average throughput rates through winter 2020. Additionally, the persistence and completion rates for each course in the series are provided in order to determine where in the series the most drop-offs are observed.

- **The average throughput rate for BIOL 1A-1B-1C is 43%.**
- Students who started the series in 2017-18 have the highest throughput rate (53%).
- More recently last year, less than one-third have completed the series (31%). The BIOL 1A completion rate (86%) and the persistence rates, particularly from BIOL 1B to 1C (55%), were the lowest rates of the past five years.

Table 1: BIOL 1 Series Throughput Rate by Year



Academic Year Started BIOL 1A	BIOL 1A			BIOL 1B				BIOL 1C				BIOL 1A/1B/1C Throughput	
	Starting HC	Completion		Persistence		Completion		Persistence		Completion		HC	Rate
		HC	Rate	HC	Rate	HC	Rate	HC	Rate	HC	Rate		
2014-15	188	165	88%	116	70%	107	92%	82	77%	80	98%	80	43%
2015-16	205	186	91%	122	66%	119	98%	92	77%	88	96%	88	43%
2016-17	225	205	91%	146	71%	136	93%	103	76%	102	99%	102	45%
2017-18	206	194	94%	141	73%	134	95%	112	84%	109	97%	109	53%
2018-19	175	151	86%	99	66%	98	99%	54	55%	54	100%	54	31%
Total	999	901	90%	624	69%	594	95%	443	75%	433	98%	433	43%

- While not completing a course will result in some students not continuing, in general, the biggest drop-offs are observed in persistence and not course completions.
  - Nearly 33% of BIOL 1A completers (N=55 each year) did not persist to BIOL 1B.
  - Among those who completed BIOL 1B, 25% (N=30 each year) did not persist to BIOL 1C.
  - The reason why students did not persist was not examined for this report. However, the majors at the time of their BIOL 1A and BIOL 1B completions indicate about half of those who did not persist had biology as their major.

## Completion within Four Terms

Table 2 provides the annual and five-year average throughput rates of students who completed the BIOL 1 series within four terms of their first BIOL 1A enrollment.

- The average throughput rate within four terms of starting BIOL 1A is 29%.
- For the most recent academic year (2018-19), the throughput rate is 26%.

Table 2: BIOL 1 Series Throughput Rate by Year, Completed BIOL 1A-1B-1C within Four Terms

Academic Year Started BIOL 1A		Completed BIOL 1A-1B-1C within 4 terms	
Year	HC	HC	Rate
2014-15	188	53	28%
2015-16	205	48	23%
2016-17	225	61	27%
2017-18	206	77	37%
2018-19	175	46	26%
Total	999	285	29%

## Q2: How long does it take for students to complete each course and the entire series?

### Time to Series Completion

- Nearly half of the BIOL 1 series completers completed BIOL 1C within three terms (48%). The remaining students completed in 4 terms (18%), 5 terms (19%) and 6 or more terms (15%).

Table 3: BIOL 1 Series Time to Completion

Academic Year Started BIOL 1A	First BIOL 1A Enrollment >> BIOL 1B Completion >> BIOL 1C Completion											
	3 terms		4 terms		5 terms		6 terms		7+ terms		Total	
	HC	Percent	HC	Percent	HC	Percent	HC	Percent	HC	Percent	HC	Percent
2014-15	37	46%	16	20%	14	18%	6	8%	7	9%	80	100%
2015-16	34	39%	14	16%	19	22%	16	18%	5	6%	88	100%
2016-17	48	47%	13	13%	22	22%	8	8%	11	11%	102	100%
2017-18	60	55%	17	16%	19	17%	7	6%	6	6%	109	100%
2018-19	29	54%	17	31%	7	13%	1	2%	0	0%	54	100%
Total	208	48%	77	18%	81	19%	38	9%	29	7%	433	100%

- Students who took four or more terms to complete the series were likely to enroll in BIOL 1A for the first time in spring (50%) or winter (36%) quarter. For those who started and completed BIOL 1A in the spring quarter, they had to wait until the fall quarter of the following academic year to continue the series since BIOL 1B is not offered in the summer.
  - Results indicate there are about 56 students each year who started BIOL 1A in the spring quarter and 44 completed in the same term (79% completion rate).
  - Of the completers, 26 of them continued onto BIOL 1B (59% persistence rate).
  - Among those who persisted, 20 enrolled in the fall quarter and 6 enrolled in the winter or spring quarter of the following academic year.

## Time to Completion at Each Course in Series

- When each of the BIOL 1 series course is examined, the majority of students completed each course in the immediate subsequent term.
  - 92% of students completed BIOL 1A on their first attempt (refer to Table 4).
  - 66% of students completed BIOL 1B one term after passing BIOL 1A (refer to Table 5).
  - 78% of students completed BIOL 1C one term after passing BIOL 1B (refer to Table 6).

Table 4: Time to BIOL 1A Completion

Academic Year Started BIOL 1A	First BIOL 1A Enrollment >> BIOL 1A Completion									
	1 term		2 terms		3 terms		4+ terms		Total	
	HC	Percent	HC	Percent	HC	Percent	HC	Percent	HC	Percent
2014-15	148	90%	6	4%	4	2%	7	4%	165	100%
2015-16	169	91%	4	2%	5	3%	8	4%	186	100%
2016-17	188	92%	1	0%	6	3%	10	5%	205	100%
2017-18	179	92%	10	5%	1	1%	4	2%	194	100%
2018-19	141	93%	2	1%	2	1%	6	4%	151	100%
Total	825	92%	23	3%	18	2%	35	4%	901	100%

Table 5: Time to BIOL 1B Completion

Academic Year Started BIOL 1A	BIOL 1A Completion >> BIOL 1B Completion									
	Same Term as BIOL 1A Compl.		1 Term After BIOL 1A Compl.		2 Terms After BIOL 1A Compl.		3+ Terms After BIOL 1A Compl.		Total	
	HC	Percent	HC	Percent	HC	Percent	HC	Percent	HC	Percent
2014-15	1	1%	74	69%	23	21%	9	8%	107	100%
2015-16	1	1%	77	65%	19	16%	22	18%	119	100%
2016-17	0	0%	86	63%	22	16%	28	21%	136	100%
2017-18	1	1%	82	61%	28	21%	23	17%	134	100%
2018-19	0	0%	72	73%	22	22%	4	4%	98	100%
Total	3	1%	391	66%	114	19%	86	14%	594	100%

Table 6: Time to BIOL 1C Completion

Academic Year Started BIOL 1A	BIOL 1B Completion >> BIOL 1C Completion									
	Same Term as BIOL 1B Compl.		1 Term After BIOL 1B Compl.		2 Terms After BIOL 1B Compl.		3+ Terms After BIOL 1B Compl.		Total	
	HC	Percent	HC	Percent	HC	Percent	HC	Percent	HC	Percent
2014-15	1	1%	57	71%	4	5%	18	23%	80	100%
2015-16	0	0%	63	72%	7	8%	18	20%	88	100%
2016-17	0	0%	81	79%	5	5%	16	16%	102	100%
2017-18	0	0%	93	85%	5	5%	11	10%	109	100%
2018-19	0	0%	45	83%	1	2%	8	15%	54	100%
Total	1	0.2%	339	78%	22	5%	71	16%	433	100%

## Students Likely to Complete BIOL 1 Series

Table 7 provides the demographics of BIOL 1A students and which student groups are more likely to persist and complete BIOL 1B and BIOL 1C. Completions are tracked through winter 2020.

- Over the past five years, first-time BIOL 1A students consist of mostly Asians (45%) and Whites (25%), females (57%) and those who are not first-generation college<sup>1</sup> (81%) nor low-income<sup>2</sup> (76%) students.
- Student groups who are more likely than their counterparts to complete the BIOL 1 series (i.e. throughput rates are above 43%) are Asian, White, male and those who are not first-generation college nor low income.

Table 7: BIOL 1 Series Completers by Demographics, 2014-15 to 2018-19



	BIOL 1A			BIOL 1B				BIOL 1C				BIOL 1A/1B/1C	
	Starting	Completion		Persistence		Completion		Persistence		Completion		Throughput	
	HC	HC	Rate	HC	Rate	HC	Rate	HC	Rate	HC	Rate	HC	Rate
African American	28	24	86%	16	67%	15	94%	11	73%	11	100%	11	39%
Asian	454	417	92%	289	69%	276	96%	208	75%	204	98%	204	45%
Filipinx	52	45	87%	30	67%	29	97%	22	76%	21	95%	21	40%
Latinx	144	120	83%	87	73%	79	91%	57	72%	55	96%	55	38%
Native American	4	4	100%	2	50%	2	100%	1	50%	1	100%	1	25%
Pacific Islander	9	7	78%	5	71%	4	80%	3	75%	3	100%	3	33%
White	246	225	91%	154	68%	150	97%	113	75%	111	98%	111	45%
Decline to State	62	59	95%	41	69%	39	95%	28	72%	27	96%	27	44%
Female	574	519	90%	359	69%	344	96%	250	73%	243	97%	243	42%
Male	420	377	90%	261	69%	246	94%	190	77%	188	99%	188	45%
Unknown	5	5	100%	4	80%	4	100%	3	75%	2	67%	2	40%
First-Gen. College	166	140	84%	93	66%	87	94%	62	71%	62	100%	62	37%
Not First-Gen. College	807	739	92%	516	70%	492	95%	371	75%	361	97%	361	45%
Unknown	26	22	85%	15	68%	15	100%	10	67%	10	100%	10	38%
Low Income	242	207	86%	146	71%	133	91%	98	74%	96	98%	96	40%
Not Low Income	757	694	92%	478	69%	461	96%	345	75%	337	98%	337	45%
Total	999	901	90%	624	69%	594	95%	443	75%	433	98%	433	43%

- The student groups who are less likely to complete the series are denoted in red font in Table 7. In order for each group to achieve a 43% throughput rate, they needed no more than one or two additional students per year. Where these student groups are likely to *not continue* in the series are as follows:
  - Not Completing BIOL 1A:** African American, Filipinx, Latinx, Pacific Islander, first-generation college and low-income student's BIOL 1A completion rates are below the average rate of 90%.
  - Not Persisting to BIOL 1B:** One-third of African American, Filipinx and first-generation college students who completed BIOL 1A did not persist to BIOL 1B.

<sup>1</sup> First-generation college students are those who indicated their parent/guardian's highest educational attainment is high school or less.

<sup>2</sup> Low-income students are those whose household income is less than \$25,000.

- **Not Persisting to BIOL 1C:** One-quarter of African American, Latinx, female and first-generation college students who completed BIOL 1B did not persist to BIOL 1C.

**Q3: What courses, particularly in Chemistry and Physics, are taken concurrently with BIOL 1A/1B/1C?**

This section focuses on the top 10 courses students enrolled in while taking BIOL 1A/1B/1C. To account for any effects of AB705 Math and English state legislation or recent changes to enrollment patterns, the enrollments for 2014-15 through 2018-19 is compared to 2019-20 (when AB705 compliance went into effect). The concurrent enrollments for all Chemistry and Physics courses are provided as well.

- **BIOL 1A Concurrently Enrolled Courses:** BIOL 1A students concurrently enrolled in CHEM 1B, CHEM 12A, MATH 1A, MATH 1B, MATH 48C as well as NCBS 405 and NCLA 406B (tutoring). More recently in 2019-20, BIOL 1A students are also enrolling in MATH 10 and ENGL 1B. For Chemistry and Physics, the most enrolled courses are CHEM 1B, CHEM 1C, PHYS 2A and PHYS 4A (refer to Table 8B).

Table 8A: Top 10 Courses Enrolled While Taking BIOL 1A

		2014-15 to 2018-19 (Average)					2019-20		
Subject_Course No		Enrl	Percent	Cumulative Percent	Subject_Course No	Enrl	Percent	Cumulative Percent	
1	NCBS_F405.	105	20%	20%	1	CHEM_F001B	40	16%	16%
2	CHEM_F001B	68	13%	32%	2	NCBS_F405.	30	12%	28%
3	MATH_F001A	20	4%	36%	3	CHEM_F012A	9	4%	31%
4	NCLA_F406B	20	4%	40%	4	MATH_F001B	9	4%	35%
5	MATH_F001B	18	3%	43%	5	MATH_F048C	9	4%	38%
6	CHEM_F001C	17	3%	46%	6	CHEM_F12AL	8	3%	42%
7	CHEM_F012A	15	3%	49%	7	ENGL_F001B	8	3%	45%
8	MATH_F048C	14	3%	52%	8	MATH_F001A	7	3%	47%
9	CHEM_F001A	12	2%	54%	9	MATH_F010.	5	2%	49%
10	NCBH_F400.	12	2%	56%	10	NCLA_F406B	5	2%	51%

Note: Yellow highlights denote courses that appear in both time periods.

Table 8B: All Chemistry and Physics Courses Enrolled While Taking BIOL 1A

	2014-15 to 2019-20 (Average)			2014-15 to 2019-20 (Average)	
Chemistry Courses	Enrl	Percent	Physics Courses	Enrl	Percent
CHEM_F001B	64	57%	PHYS_F002A	6	36%
CHEM_F001C	15	13%	PHYS_F004A	4	21%
CHEM_F012A	14	12%	PHYS_F002B	2	12%
CHEM_F001A	11	9%	PHYS_F02AM	2	9%
CHEM_F12AL	5	5%	PHYS_F004B	1	7%
CHEM_F012B	2	2%	PHYS_F004C	1	5%
CHEM_F12BL	1	1%	PHYS_F002C	1	3%
CHEM_F012C	0.3	0.3%	PHYS_F006.	0.3	2%
CHEM_F025.	0.3	0.3%	PHYS_F012.	0.2	1%
CHEM_F030B	0.3	0.3%	PHYS_F02BM	0.2	1%
CHEM_F030A	0.2	0.1%	PHYS_F02CM	0.2	1%
CHEM_F13AH	0.2	0.1%	PHYS_F070R	0.2	1%
Total	113	100%	Total	16	100%

**BIOL 1B Concurrently Enrolled Courses:** BIOL 1B students concurrently enrolled in CHEM 1B, CHEM 1C, CHEM 12A, CHEM 12B, MATH 1A, MATH 1B and NCBS 405 (tutoring). More recently in 2019-20, they are also enrolling in MATH 10. The most enrolled Chemistry and Physics courses are CHEM 1B, CHEM 1C, PHYS 2A and PHYS 2B.

Table 9A: Top 10 Courses Enrolled While Taking BIOL 1B

		2014-15 to 2018-19 (Average)					2019-20		
Subject_Course No		Enrl	Percent	Cumulative Percent	Subject_Course No	Enrl	Percent	Cumulative Percent	
1	NCBS_F405.	79	20%	20%	1	NCBS_F405.	20	12%	12%
2	CHEM_F001C	27	7%	27%	2	CHEM_F001C	15	9%	21%
3	CHEM_F001B	18	5%	32%	3	CHEM_F012A	9	5%	26%
4	CHEM_F012A	18	5%	36%	4	CHEM_F12AL	9	5%	32%
5	NCLA_F406B	16	4%	40%	5	CHEM_F001B	8	5%	36%
6	MATH_F001B	14	4%	44%	6	MATH_F001A	7	4%	40%
7	MATH_F001A	14	4%	48%	7	CHEM_F012B	4	2%	43%
8	CHEM_F012B	12	3%	51%	8	CHEM_F12BL	4	2%	45%
9	NCBH_F400.	10	3%	53%	9	MATH_F001B	4	2%	48%
10	MATH_F001C	9	2%	56%	10	MATH_F010.	4	2%	50%

Note: Yellow highlights denote courses that appear in both time periods.

Table 9B: All Chemistry and Physics Courses Enrolled While Taking BIOL 1B

		2014-15 to 2019-20 (Average)				2014-15 to 2019-20 (Average)	
Chemistry Courses		Enrl	Percent	Physics Courses	Enrl	Percent	
CHEM_F001C		25	30%	PHYS_F002A	5	27%	
CHEM_F001B		17	20%	PHYS_F002B	5	24%	
CHEM_F012A		17	20%	PHYS_F004A	3	13%	
CHEM_F012B		11	13%	PHYS_F004B	2	9%	
CHEM_F12AL		7	8%	PHYS_F02AM	2	8%	
CHEM_F12BL		5	6%	PHYS_F02BM	2	8%	
CHEM_F001A		2	3%	PHYS_F002C	1	4%	
CHEM_F012C		1	1%	PHYS_F004C	1	3%	
CHEM_F12CL		0.3	0.4%	PHYS_F004D	0.2	1%	
CHEM_F025.		0.2	0.2%	PHYS_F070R	0.2	1%	
CHEM_F030A		0.2	0.2%	Total	20	100%	
CHEM_F030B		0.2	0.2%				
Total		84	100%				

- BIOL 1C Concurrently Enrolled Courses:** BIOL 1C students concurrently enrolled in CHEM 1C, CHEM 12B/12BL and NCBS 405 (tutoring). BIOL 1C students in 2019-20 are not concurrently enrolling in Math as frequently as compared to the prior years. They are now enrolling in more Physics courses. CHEM 12B, CHEM 12C, PHYS 2B and PHYS 2C are the most enrolled Chemistry and Physics courses.

Table 10A: Top 10 Courses Enrolled While Taking BIOL 1C

Subject_Course No	2014-15 to 2018-19 (Average)			Subject_Course No	2019-20		
	Enrl	Percent	Cumulative Percent		Enrl	Percent	Cumulative Percent
1 NCBS_F405.	55	21%	21%	1 CHEM_F012B	14	19%	19%
2 CHEM_F012B	13	5%	26%	2 CHEM_F12BL	14	19%	38%
3 CHEM_F012C	10	4%	30%	3 NCBS_F405.	5	7%	45%
4 NCBH_F400.	9	3%	33%	4 PHYS_F002A	5	7%	51%
5 MATH_F001B	8	3%	36%	5 PHYS_F002B	3	4%	55%
6 CHEM_F001C	8	3%	39%	6 CHEM_F001C	2	3%	58%
7 NCLA_F406B	7	3%	42%	7 HUMN_F003.	2	3%	61%
8 CHEM_F12BL	6	2%	44%	8 HUMN_F003H	2	3%	64%
9 MATH_F010.	5	2%	46%	9 PHYS_F004B	2	3%	66%
10 PHYS_F002C	5	2%	48%	10 PHYS_F02BM	2	3%	69%

Note: Yellow highlights denote courses that appear in both time periods.

Table 10B: All Chemistry and Physics Courses Enrolled While Taking BIOL 1C

Chemistry Courses	2014-15 to 2019-20 (Average)		Physics Courses	2014-15 to 2019-20 (Average)	
	Enrl	Percent		Enrl	Percent
CHEM_F012B	14	28%	PHYS_F002B	5	21%
CHEM_F012C	8	17%	PHYS_F002C	5	20%
CHEM_F12BL	7	15%	PHYS_F002A	3	15%
CHEM_F001C	7	14%	PHYS_F02BM	2	10%
CHEM_F12CL	4	7%	PHYS_F004A	2	9%
CHEM_F001B	3	7%	PHYS_F004B	2	7%
CHEM_F012A	3	7%	PHYS_F004C	2	7%
CHEM_F12AL	2	3%	PHYS_F02CM	2	7%
CHEM_F001A	1	1%	PHYS_F012.	1	2%
CHEM_F009.	0.2	0.3%	PHYS_F02AM	0.3	1%
CHEM_F025.	0.2	0.3%	PHYS_F07OR	0.2	1%
CHEM_F030B	0.2	0.3%	Total	23	100%
Total	48	100%			