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# NSF SEA STEM GRANT Research Brief #221

## **College of the Canyons**

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Institutional Research, Planning, and  
Institutional Effectiveness

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## Introduction

At the request of the Faculty leads for the “Equity in STEM Alliance”, the office of Institutional Research, Planning and Institutional Effectiveness conducted analyses on data pertaining to STEM majors.

In the Spring of 2021, the faculty leads for the Equity in STEM Alliance decided to apply for an NSF STEM grant. In order to apply for this grant, they required data regarding general sizes of STEM majors and the demographics of these students, as this grant focuses on serving and supporting under-represented students within STEM.

The research questions guiding the analyses included:

- What is the average size of STEM majors?
- What is the size of the STEM majors disaggregated within each of the departments?
- What are the demographics of STEM majors, and how do they differ from the general student population?

## Method

- Referential enrollment files such as the 320 and usx were used. Informer reports were pulled from datatel/MIS to retrieve special population and demographics information.
- The above data were limited to first-time students for the recruitment pool portion of the request.
- For Cohort and outcomes analyses pertaining to persistence data sets low-income was defined as students receiving PELL.
- STEM majors were coded as those Programs the student had declared as a major on file belonging to the following departments: Biology, Engineering, Physics, Math, Geology, and Geography.
- Analyses were completed among a cohort of “first-time” students, this was discussed as a possible pool of students to target for the programs proposed within the grant.
- Last, cohort data was assessed for persistence, retention, and graduation outcomes among STEM vs. non-STEM and under-represented students to better provide an estimation for what outcomes this grant aims to target.

## Research Results

### Fall 2019 STEM Majors

In the fall of 2019 there were 15,439 students enrolled (excluding ISAs). Of those students 76% were non-STEM majors and 24% were STEM majors (See Table 1).

Table 1. Proportion of Fall 2019 STEM vs. Non-STEM Majors

Majors	N	%
Non-STEM	11,794	76%
STEM	3,645	24%

An analysis of demographics, specifically; ethnicity, gender, first-generation college student, low-income, Disabled Needs, EOP&S, Foster Youth, and an overall “underrepresented minority<sup>1</sup>” indicator was assessed. With regards to Ethnicity, African-American/Black, Native American and Hispanic/Latinx students comprise a smaller proportion of the STEM majors than they do among non-STEM and “All First Time” (See Table 2). Students who identify as female also comprise a smaller proportion of the STEM majors as compared to non-STEM or “All First Time”. Similarly, first-generation and low-income students (PELL grant) comprise smaller proportions among STEM majors compared to non-STEM and the general population of first-time students for that term (Table 2).

Table 2. Demographics of STEM vs. Non-STEM for Fall 2019

	Non-STEM (N=11,794)		STEM (N=3645)		ALL FALL 19 (N = 15,439)	
	N	%	N	%	N	%
Asian	1216	10.0%	613	16.8%	1829	11.8%
African-Amer./Black	548	5.0%	134	<b>3.7%</b>	682	4.4%
Hispanic/Latinx	5951	51.0%	1681	<b>46.1%</b>	7632	49.4%
Native American	47	0.4%	12	<b>0.3%</b>	59	0.4%
Pacific Islander	28	0.2%	3	0.1%	31	0.2%
Two or more races	289	2.5%	105	2.9%	394	2.6%
White	3394	28.8%	1022	28.0%	4416	28.6%
Unknown	321	2.7%	75	2.1%	396	2.6%
<b>Gender</b>						
Male	5109	43.0%	1937	53%	7046	46%
Female	6595	56.0%	1681	<b>46%</b>	8276	54%
Unknown	90	1%	27	1%	117	1%
<b>Other</b>						
First Generation	3626	30.7%	920	<b>25.0%</b>	4546	29.4%
Low Income (PELL)	2569	21.8%	711	<b>19.5%</b>	3280	21.2%
EOPS	273	2.3%	72	2.0%	345	2.2%
DSPS	273	2.3%	59	1.6%	332	2.2%
Foster	32	0.3%	1	0.0%	33	0.2%

While the coding of this Underrepresented minority captures more students the proportion of these underrepresented is smaller within STEM majors (79%) than non-STEM (85%) (See Table 3).

<sup>1</sup> A category named “underrepresented minority” was coded as those students who identified as either female, low-income, first-generation, and/or non-White/ non-Asian; ethnic groups not historically underrepresented nor who underperform within the academic outcomes research.

Table 3. Proportion of Underrepresented within STEM vs. Non-STEM

	<b>Non-STEM</b>	<b>STEM</b>	<b>Total</b>
Non-Underrepresented	1748	769	2514
	15%	21%	16%
Underrepresented*	10046	2876	12922
	85%	<b>79%</b>	84%
<b>Total</b>	11794	3645	15436

### First-Time Fall 2019 STEM Majors

In the fall of 2019 there were 4,249 first-time students (excluding ISAs). Of those students there was a total of 3,395 students for whom there was complete data regarding Program Majors, and demographics etc. This 3,395 is the denominator used in the forthcoming results unless otherwise specified. Among these students 78% were non-STEM majors and 22% were STEM majors (*See Table 4*).

Table 4. Proportion of STEM vs. Non-STEM Among First-Time Fall 2019 Students

<b>Majors</b>	<b>N</b>	<b>%</b>
STEM	752	22%
Non-STEM	2643	78%

Native American and Hispanic/Latinx students comprise a smaller proportion of the STEM majors than they do among non-STEM and “All First Time” (*See Table 5*). Students who identify as female also comprise a smaller proportion of the STEM majors as compared to non-STEM or “All First Time”. Similarly, first-generation and low-income students (PELL grant) comprise smaller proportions among STEM majors compared to non-STEM and the general population of first-time students for that term (*Table 5*).

Table 5. Demographics of STEM vs. Non-STEM Majors Among First-Time Students

	Non-STEM (N=2,643)		STEM (N=752)		ALL First-Time Students (N=3,395)	
	N	%	N	%	N	%
Asian	259	10%	117	16%	376	11%
African-Amer./Black	126	5%	36	5%	162	5%
Hispanic/Latinx	1459	55%	373	<b>50%</b>	1832	54%
Native American	13	<1%	1	<b>&lt;1%</b>	14	<1%
Pacific Islander	8	0%	3	0%	11	0%
Two or more races	30	1%	8	<1%	38	1%
White	621	23%	190	25%	811	24%
Unknown	127	5%	24	3%	151	4%
<b>Gender</b>						
Male	1256	48%	414	55%	1670	49%
Female	1360	52%	329	<b>43%</b>	1689	50%
Unknown	22	1%	14	2%	36	1%
<b>Financial</b>						
First Generation	826	33%	205	<b>28%</b>	1031	30%
Low Income (PELL)	836	32%	224	<b>29%</b>	1060	31%
DSPS	222	8%	51	7%	273	8%
EOPS	108	4%	30	4%	138	4%
Foster	7	<1%	1	<1%	8	<1%

The “underrepresented” was again coded as those students who identified as either female, low-income, first-generation, and/or non-White/non-Asian. While the coding of this underrepresented minority captures more students overall, the proportion of these underrepresented students is smaller within STEM majors (82%) than non-STEM (87%) (See Table 6).

Table 6. Underrepresented Distributions Within STEM vs. Non-STEM

	Non-STEM	STEM	Total
Non-Underrepresented	349	138	926
	13%	18%	14%
Underrepresented	2294	614	2469
	87%	<b>82%</b>	86%
<b>Total</b>	2643	752	3395

### Recruitment Pool Estimation

To ascertain the possible size of the recruitment pool from a given fall term of first-time students the following were applied as selection criteria (filters) to the above presented sample of data. Criteria included:

- First-Time Status
- Full Time (12+ Units)
- 2.7 GPA or greater
- Pell eligible/recipient (low-income)

After these criteria the total pool of students was reduced to 509 with 24% (122 students) identified as STEM majors. Similar demographics of students comprised smaller proportions among STEM majors than non-STEM majors, importantly African American/Black students emerged less represented among STEM majors within this possible pool of students (*See Table 7*).

Table 7. Recruitment Pool Disaggregated by Student Populations

	Non-STEM (N=387)		STEM (N=122)		First-Time, Full-Time, GPA, & Pell (N= 509)	
	n	%	n	%	n	%
Asian	32	8%	12	10%	44	9%
African-Amer./Black	24	6%	4	<b>3%</b>	28	6%
Hispanic/Latinx	243	63%	74	<b>61%</b>	317	62%
Native American	4	1%	0	<b>0%</b>	4	1%
Pacific Islander	1	0%	0	<b>0%</b>	1	0%
Two or more races	2	1%	0	<b>0%</b>	2	0%
White	68	18%	31	25%	99	19%
Unknown	13	3%	1	1%	14	3%
<b>Gender</b>						
Male	229	59%	61	50%	290	57%
Female	156	40%	59	48%	215	42%
Unknown	2	1%	2	2%	4	1%
<b>First Generation</b>						
First Generation.	173	45%	48	<b>39%</b>	221	43%
DSPS	20	5%	10	8%	30	6%
EOPS	35	9%	17	14%	52	10%
Foster	1	0%	0	0%	1	0%
<b>Underrepresented*</b>	<b>346</b>	<b>89%</b>	<b>96</b>	<b>79%</b>	<b>509</b>	<b>100%</b>

### STEM Headcounts by Program Majors

There were 3,645 unduplicated students with a declared STEM major in the fall of 2019. There were 4,314 duplicated counts of STEM majors, as one student could have multiple declared majors on file. The faculty leads were interested in the distribution of program majors within the larger umbrella of STEM. Among the fall 2019 term, the most popular program majors in descending order are Biological & Environmental Sciences (2,294), followed by Engineering & Physics (N = 858), then Computer Science (N = 844), Mathematics (N = 286), and last Earth Sciences; Geology/Geography (N = 32) *See Table 8*. First generation students and Latinx students were underrepresented across all program majors compared to the general fall 2019 population. Low income, female, and the underrepresented minority group were represented at rates lower within all the STEM majors as compared to their representation in the fall 2019 population except for within Biological & Environmental Sciences.

Table 8. STEM Headcounts Disaggregated by Program Majors

	Biological & Environ Sciences (N=2294)		Computer Science (N=844)		Engineering and Physics (N=858)		ESS Geol./Geog. (N=32)		Mathematics (N=286)		FALL 2019 Students (N=15,439)
	n	%	n	%	n	%	n	%	n	%	%
Asian	381	17%	179	21%	126	15%	2	6%	52	18%	12%
African-Amer./Black	107	5%	36	4%	23	3%	0	0%	4	1%	4%
Hispanic/Latinx	1106	48%	321	38%	390	45%	8	25%	127	44%	49%
Two or more races	69	3%	30	4%	27	3%	0	0%	10	3%	3%
White	596	26%	254	30%	258	30%	22	69%	83	29%	29%
Unknown	13	1%	19	2%	28	3%	0	0%	10	3%	3%
Male	710	31%	696	82%	692	81%	20	63%	179	63%	46%
Female	1571	68%	141	17%	159	19%	12	38%	107	37%	54%
Unknown	13	1%	7	1%	7	1%	0	0%	0	0%	1%
First Generation	613	27%	187	21%	204	24%	7	22%	70	24%	29%
Low Income (PELL)	494	22%	162	18%	146	17%	6	19%	33	12%	21%
DSPS	36	2%	21	2%	13	2%	0	0%	6	2%	2%
EOPS	64	3%	17	2%	17	2%	0	0%	3	1%	2%
Underrepresented*	2021	88%	557	63%	600	70%	21	66%	202	71%	84%

This table excludes Native American and Pacific Islander as their combined total size was less than 20 students.

### Completion Snapshot

A comparison of the rate of students pursuing STEM and those who complete with a STEM degree illustrate that nearly twice as many are pursuing STEM (21%) as compared to completing with a STEM degree (11%); proportionally. This is a snapshot and does not follow or track the same students rather is comparing different students during a close comparable snapshot in time (2-16/17 time period) thus, a cohort analysis was completed.

Table 9. Pursuing vs. Completing in STEM

Students Pursuing vs. Completing in STEM	STEM	Non-STEM
Fall 2017 enrolled/pursuing (N= 16,530)	21%	79%
Degree completers in 2016-17 (N=1,759)	11%	89%

### Cohort Analyses

The faculty also needed to ascertain and provide evidence within the grant proposal on current outcomes for STEM majors and their plans to improve those outcomes especially among underserved populations. To ascertain persistence, and completion over time (such as degree completion within 3 years and 5 years) a first-time 2016/17 cohort of students was assessed. Of this cohort, 912 students were STEM majors and 2,570 were Non-STEM

majors. STEM majors have a 1- year retention rate of 70%, compared to 60% of Non-STEM majors. Further, about 4% of STEM students graduate within 3 years (*See Table 10*). African-American/Black, Hispanic/Latinx, First-generation, and male students had rates lower than the overall 70% rate for 1-year retention. African-American/Black had half the rate of students graduating in 3-years as the overall rate of STEM students (*See Table 10*).

Table 10. Retention & Graduation Rates for 2016/17 Cohort of STEM Students

	<b>Enrollment in STEM 2016-17 Cohort</b>	<b>Retention 1 year<sup>2</sup></b>	<b>Graduation within 3 years<sup>3</sup></b>
All STEM students	912	<b>70.0%</b>	<b>4%</b>
Underrepresented	740	81.1%	<b>3%</b>
Asian	104	79%	7%
White	252	74%	6%
African Amer./Black	55	<b>62%</b>	<b>2%</b>
Hispanic/Latinx	472	<b>68%</b>	<b>3%</b>
First Generation	300	<b>68%</b>	<b>3%</b>
Female	372	73%	4%
Male	530	<b>68%</b>	4%
Low Income/Financial Aid	270	73%	<b>3%</b>

## Recommendations

Upon review of the data and results for STEM majors and students in response to the above request, the following recommendations should be taken into consideration:

- Continue the targeted support and mentorship of disproportionately impacted students pursuing STEM (as is being doing via the STEM Equity Alliance and MESA) and continuously explore ways to increase these supports.
- Consider tracking the effectiveness of the STEM Equity Alliance in assisting success rates, retention, and completion among disproportionately impacted groups.

<sup>2</sup> Retention is defined as being enrolled in subsequent academic year and having an active STEM program major.

<sup>3</sup> Graduation is defined as degree completion in a STEM field.

For more detailed information on this research brief or for a copy of the survey instruments, frequencies, percentages or open-ended comments stop by the Institutional Research, Planning, and Institutional Effectiveness office located in BONH-224, or contact [Vida M. Manzo](#), Ph.D., Senior Research Analyst at 661.362.5871, or [Preeti Saxena](#), Ph.D., Director of Institutional Research, Planning and Institutional Effectiveness at 661.362.5329.