



COLLEGE OF SOCIAL & BEHAVIORAL SCIENCES

Women in Science  
& Engineering

A black and white photograph of a woman with blonde hair and glasses, wearing a dark sweater over a collared shirt, leaning over a table in a laboratory or workshop. She is looking at a laptop. In the background, there is a large piece of scientific equipment, possibly a microscope or a scale. The scene is brightly lit, and the background is slightly blurred.

THE STATUS OF  
WOMEN IN STEM AT THE  
UNIVERSITY OF ARIZONA

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# TABLE OF CONTENTS

- Introduction ..... 5
- Key Findings ..... 6
- Methods ..... 7
- Analytical Framework ..... 8
- Findings ..... 10
  - College Level Data ..... 10
  - Departmental Level Data ..... 10
    - College of Agriculture and Life Sciences ..... 11
    - College of Engineering ..... 13
    - College of Optical Sciences ..... 14
    - College of Science ..... 15
- Findings Summary and Needs Assessment ..... 17
- Endnotes ..... 19
- References ..... 20
- Appendices ..... 21

## List of Tables

Table 1. Undergraduate College Enrollment in STEM Fields by Gender, Fall 2017.....	10
Table 2. Undergraduate College STEM Field Retention and STEM Field Graduation Rates for Women.....	10
Table 3. Women’s Enrollment Rates in CALS Primary STEM Major Departments, Fall 2017.....	11
Table 4. Women’s Enrollment Rates in COE STEM Primary Major Departments, Fall 2017.....	13
Table 5. Women’s Enrollment Rates in COS STEM Primary Major Departments, Fall 2017.....	15
Table 6: Needs Assessment Ranking of UA STEM Departments.....	18

## List of Figures

Figure 1. UA STEM Department Enrollment, Retention, and Graduation Rate Threshold Assignments.....	8
Figure 2. Departmental Ranking Definitions.....	9
Figure 3. Women's 1st Year STEM Retention Rates in CALS Departments.....	11
Figure 4. Women's 4 Year STEM Graduation Rates in CALS Departments.....	12
Figure 5. Women's 1st Year STEM Retention Rates in COE Departments.....	13
Figure 6. Women's 4 Year STEM Graduation Rates in COE Departments.....	14
Figure 7. Women's 1st Year STEM Retention Rates in COS Departments.....	16
Figure 8: Women's 4 Year STEM Graduation Rates in COE Departments.....	16



# INTRODUCTION

Despite significant strides in the last two decades, women remain under-represented in many STEM (science, technology, engineering, and math) fields, both at the university level and in the workforce. For example, women and minorities comprise 70% of college students, but less than 45% of those awarded STEM degrees (Blackburn, 2017; Office of Science and Technology Policy, 2016). In 2016, women receiving only 19% of undergraduate degrees awarded in Computer Science, 21% in Engineering, and 39% in the Physical Sciences (National Science Foundation, 2019). Ensuring women's access to STEM educational opportunities and supporting their success is important for a number of reasons. First, diversity has been shown to positively impact institutional creativity, innovation, and success (Catalyst, 2018). Second, demand for STEM workers is expected to grow dramatically in the coming years. According to the U.S. Bureau of Labor Statistics, employment in STEM occupations is projected to grow to more than 9 million between 2012 and 2022 (Vilorio, 2014). Meeting these demands hinges on fostering the entry, persistence, and success of all populations in STEM fields, including women. Symbiotically, well-paying STEM field jobs also bolster women's economic empowerment and self-sufficiency thereby contributing to greater gender equity in the U.S. workforce and society at large (US Chamber of Commerce Foundation, 2015).

As a public land grant research university, the University of Arizona (UA) plays a key role in educating the state's population to succeed in the 4<sup>th</sup> industrial revolution and positively impact the culture and economy of the state. Supporting the entry, persistence, and success of women students in STEM fields is a crucial part of achieving our institutional mission. However, supporting women STEM students requires that we develop a comprehensive understanding of how they are currently faring, both where they are thriving and where they are struggling. This report aims to be a first step towards increasing transparency around the status of women students in STEM fields at the University of Arizona through the collection and dissemination of data on enrollment, persistence, and success.

While individual colleges and departments often track (in formal and informal ways) demographic trends among their students, there is yet to be a cross-institutional analysis of women's entry, persistence, and success across STEM fields at UA. This report fills this knowledge gap by providing an overview of enrollment, persistence, and graduation rates of women students in comparison to their men counterparts across STEM colleges and departments. Specifically, this report focuses on the four main UA colleges where students pursue undergraduate STEM degrees: Agriculture and Life Sciences; Engineering; Optical Sciences; and Science. Due to the limitations of existing data sets, this report focuses on the undergraduate student population. This report was made possible with funding from the University of Arizona Office of the Provost.

# KEY FINDINGS

- Women's enrollment across STEM colleges and departments is highly uneven, ranging from 24%-68% of total students at the college-level and 14%-100% of total students at the department-level in 2017.
- There are 7 undergraduate departments across the 4 colleges where women make up less than 25% of enrolled students at the undergraduate level in 2017. They are Aerospace & Mechanical Engineering; Computer & Electrical Engineering; Mining & Geological Engineering; Civil Engineering & Mechanics; Computer Science; and Physics
- Despite low enrollment of women students, women tend to outperform their male counterparts in the majority of departments in the Colleges of Engineering and Optical Sciences based on four year graduation rates.
- While the College of Agriculture and Life Science sees high rates of women's undergraduate enrollment in all but 3 of the 10 STEM departments, women's retention and graduation rates remain relatively low across the college.
- The College of Science sees mixed rates of women's undergraduate enrollment across 14 departments, but women's retention and graduation rates are the lowest among the four colleges.
- Two departments stand out in terms of their ability to attract and support women students: Biomedical Engineering and Soil, Water, and Environmental Science.
- Based on enrollment, retention, and graduation rates among women students, the areas of highest concern across the STEM colleges are the following undergraduate departments: Computer Science and Computer & Electrical Engineering.



# METHODS

This report is based on analyses of two databases created by the Assessment and Research Office within Student Affairs and Enrollment Management. These databases include information provided by the UA Office of University Analytics and Institutional Research (UAIR) and are based on student self-reported demographic characteristics and degree plans as documented in the institutional census.

While there is no singular definition of what constitutes a **STEM field**, for the purposes of this report, we adopt a definition of STEM informed by the U.S. National Science Foundation (see Appendix A for a list of UA majors included in this definition).<sup>i</sup> This report focuses on the four colleges that house the large majority of STEM field majors at UA. They are the College of Agriculture and Life Sciences (CALS), College of Engineering (COE), College of Optical Sciences (OSC), and the College of Science (COS).

Understanding the status of women in STEM at UA requires attention to four distinct but interrelated factors: 1) STEM enrollment rates; 2) STEM retention rates; 3) STEM graduation rates; and 4) gender-based disparities within these three rates. For the purpose of this report, we assessed the Fall 2017 undergraduate STEM enrollment rates; first year undergraduate STEM retention rates between Fall 2009 and Fall 2016; four year undergraduate STEM graduation rates between 2009 and 2013; and compared these rates across women and men students. It is important to note that the STEM retention and graduation rates do not necessarily speak to retention at the university as a whole nor to the STEM department of entry, only to retention and graduation within a UA STEM major of any kind.

First year retention rates are used as a proxy for retention at large because research has shown that women's attrition from STEM often occurs early on, within the first two years of the college career (Dennehy & Gasgupta, 2017). In turn, we assume that if a student is not retained in STEM from year one to year two, it is highly unlikely that they will return to STEM later on in their academic career. All data were analyzed at the college level and at the school/departmental level. In the analysis that follows, retention rate refers to first year retention in any STEM school/department, not within a particular department/major. Graduation rate refers to four year graduation in any STEM department not within a particular department/major.

A few issues limit the scope of this analysis. First, because the status of departments and majors are often in flux with historical ones being retired and new ones being created, time series analyses are somewhat limited. Second, because some majors and departments are small and enroll so few women, the sample size cannot give a clear sense of systemic influences versus individual level factors. Lastly, there are existing logistical limitations to the centralized and consistent tracking of enrollment and retention at the UA. Some discrepancies exist between UAccess Analytics, the public facing UA Factbook (<https://factbook.arizona.edu/>), and the UAIR dashboards we relied upon for this analysis. We have tried to ensure data accuracy to the best of our ability by consulting on-campus experts in enrollment management and institutional analytics.

Given the above limitations, this report generates preliminary insights and highlights some areas where further investigation could be helpful to elucidate the barriers, strengths, and opportunities for increasing the entry, persistence, and success of women in STEM at the UA.



# ANALYTICAL FRAMEWORK

We adopted thresholds for what constitutes low, adequate, or high rates of women’s STEM enrollment, retention, and graduation using ranges based on trends seen in both UA-wide and STEM college averages. As of Fall 2017, the UA as a whole enrolled 51.5% women undergraduate students across all majors (STEM and non-STEM). UA’s most recently reported overall undergraduate full time first year retention for men and women across all majors is 81.2% (Fall 2017 entry cohort) and the overall undergraduate four-year graduation rate for men and women across all majors is 49.0% (Fall 2014 entry cohort).<sup>ii</sup> Across the four STEM colleges in STEM fields only, the Fall 2017 undergraduate women’s enrollment rate was 42.2%. The first year average retention rate for men and women within STEM fields in these four colleges was 69.1% (Fall 2009-Fall 2016 entry cohorts) and the four-year average graduation rate for men and women within STEM fields was 35.3% (Fall 2009-Fall 2013 entry cohorts). We determined that rate differences in excess of 10% difference between men and women could signal possible gender-based disparity.

Using these insights on normative rates for UA in general as well as UA’s STEM college averages, we designated percent ranges for what constitutes low, adequate, or high rates of women’s enrollment, retention and graduation in STEM departments (see Figure 1). These threshold cutoffs are intended to provide an initial schema that can be later modified to identify further gradients of difference between departments.

**Figure 1. UA STEM Department Enrollment, Retention, and Graduation Rate Threshold Assignments**

UA Women’s STEM Enrollment Rates	UA Women’s STEM Retention Rates	UA Women’s STEM Graduation Rates
Low Enrollment: under 40%	Low 1st Year Retention: under 70%	Low 4 Year Graduation: under 40%
Adequate Enrollment: 40-60%	Adequate 1st Year Retention: 70-80%	Adequate 4 Year Graduation: 40- 50%
High Enrollment: over 60%	High 1st Year Retention: over 80%	High 4 year Graduation: over 50%

Based on the above thresholds, we have developed a ranking scale for the severity of need for support. In this ranking system, departments are assigned a score between 1 and 5 (see Figure 2).

A departmental score of 1 indicates women students are faring well overall with high or adequate enrollment, retention, and graduation rates. At the other end of the scale, a score of 5 indicates departments of significant concern as demonstrated by low enrollment, retention, and graduation rates for women, as well as significant gender-based disparities (see Figure 2). A department ranking score of 4 indicates low enrollment, retention, and graduation rates for women but no significant gender-based disparities in these rates. A departmental ranking score of 2 indicates the



presence of low enrollment rates but adequate or high retention and graduation rates for women whereas a score of 3 indicates the presence of adequate or high enrollment rates but low retention and graduation rates for women.

For various reasons, we determined that retention is a more pressing area of concern for the campus than enrollment and one that the university and department administration are well-positioned to address. This determination is reflected in the scale gradations. For more detail on each department's score and their associated enrollment, retention, and graduation rates, see Appendix B.

**Figure 2. Departmental Ranking Definitions**

Rank	Definition
1	High or Adequate Enrollment Rate for Women High or Adequate Retention/Graduation Rates for Women Gender Parity in Retention/Graduation Rates
2	Low Enrollment Rate for Women High or Adequate Retention/Graduation Rates for Women Gender Parity in Retention/Graduation Rates
3	High or Adequate Enrollment Rate for Women Low Retention/Graduation Rates for Women Gender Parity in Retention/Graduation Rates
4	Low Enrollment Rate for Women Low Retention/Graduation Rates for Women Gender Parity in Retention/Graduation Rates
5	Low Enrollment Rate for Women Low Retention/Graduation Rate for Women Gender Disparity in Retention/ Graduation Rates

# FINDINGS

## College Level Data

Table 1 highlights **STEM field enrollment** by gender for full time undergraduate students at the college level. Undergraduate STEM field enrollment varies greatly between STEM colleges.

**Table 1. Undergraduate College Enrollment in STEM Fields by Gender, Fall 2017<sup>iii</sup>**

College	# Women	# Men	% Women
College of Agriculture and Life Sciences (CALS)	1322	506	72.3%
College of Engineering (COE)	677	1980	25.5%
College of Optical Sciences (OSC)	34	85	28.6%
College of Science (COS)	2299	2828	44.8%

Table 2 presents the average **STEM field retention** and **STEM field graduation** rates of full time undergraduate women students from across the four colleges.

**Table 2. Undergraduate College STEM Field Retention and STEM Field Graduation Rates for Women<sup>iv</sup>**

College	Women's 1 Year Retention %	Women's 4 Year Graduation %
College of Agriculture and Life Sciences (CALS)	66.1%	32.9%
College of Engineering (COE)	80.0%	47.7%
College of Optical Sciences (OSC)	100.0%	61.5%
College of Science (COS)	61.4%	31.3%

## Departmental Level Data

While these college-level data provide useful insight, understanding the variance between departments within colleges helps elucidate which fields have the greatest need for targeted strategies to increase enrollment as well as to improve retention and graduation. As is documented below, women's enrollment, retention, and graduation rates within STEM colleges is highly variable across departments. In addition to examining overall 2017 enrollment rates, we also provide information on the distribution of women across departments in the various colleges in Appendix G. We also present average STEM retention and graduation rates for women by department.

*College of Agriculture and Life Sciences*

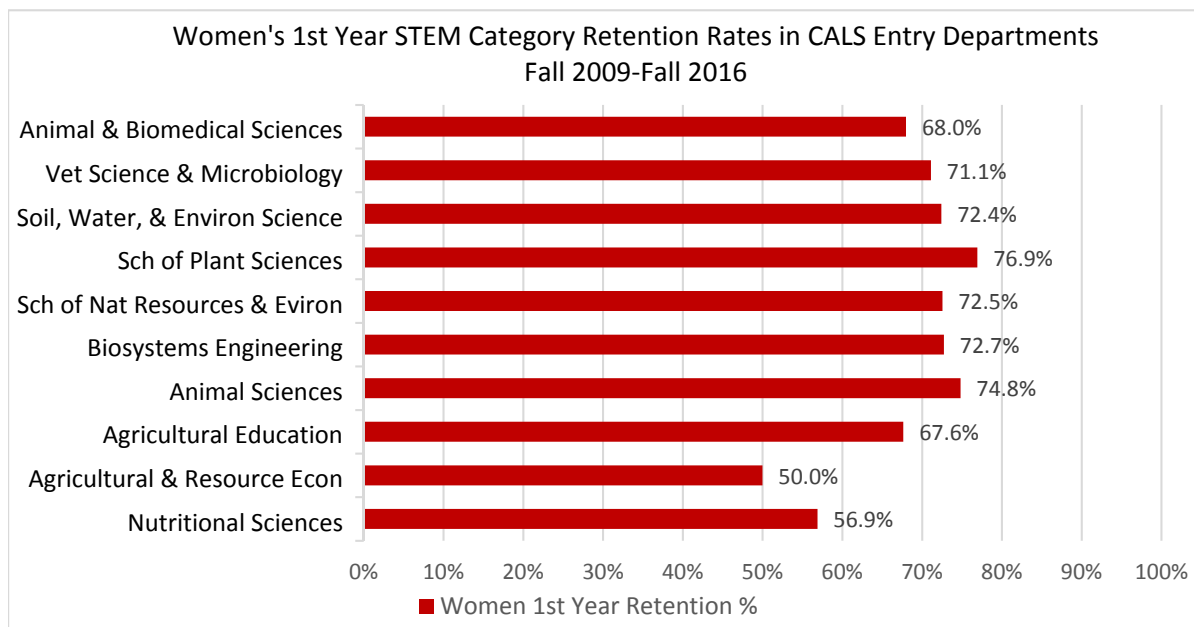
As shown in Table 3, overall, low STEM enrollment of women is not an issue throughout the College of Agriculture and Life Sciences (CALs). Only the School of Plant Sciences (31.3% women) has a low enrollment rate for women. Throughout the rest of the college, women have higher enrollment rates than men.

**Table 3. Women’s Enrollment Rates in CALs Primary STEM Major Departments, Fall 2017**

CALS Department/School Fall 2017	Women #	Men#	Women%
Agricultural & Resource Economics	1	0	100.0%
Institute of Animal & Biomedical Sciences	618	184	77.1%
School of Natural Resources & the Environment	135	56	70.7%
Nutritional Sciences	451	153	74.7%
School of Plant Sciences	26	57	31.3%
Retailing & Consumer Sciences	1	0	100.0%
Soil, Water, & Environmental Science	90	56	61.6%
<b>Total</b>	<b>1322</b>	<b>506</b>	<b>72.3%</b>

Despite largely adequate or high enrollment rates for women (see Table 3), first year STEM retention rates for women vary but remain at the low end of adequate(70-80%) or low (under 70%) across departments (see Figure 3).

**Figure 3. Women's 1st Year STEM Retention Rates in CALs Departments**

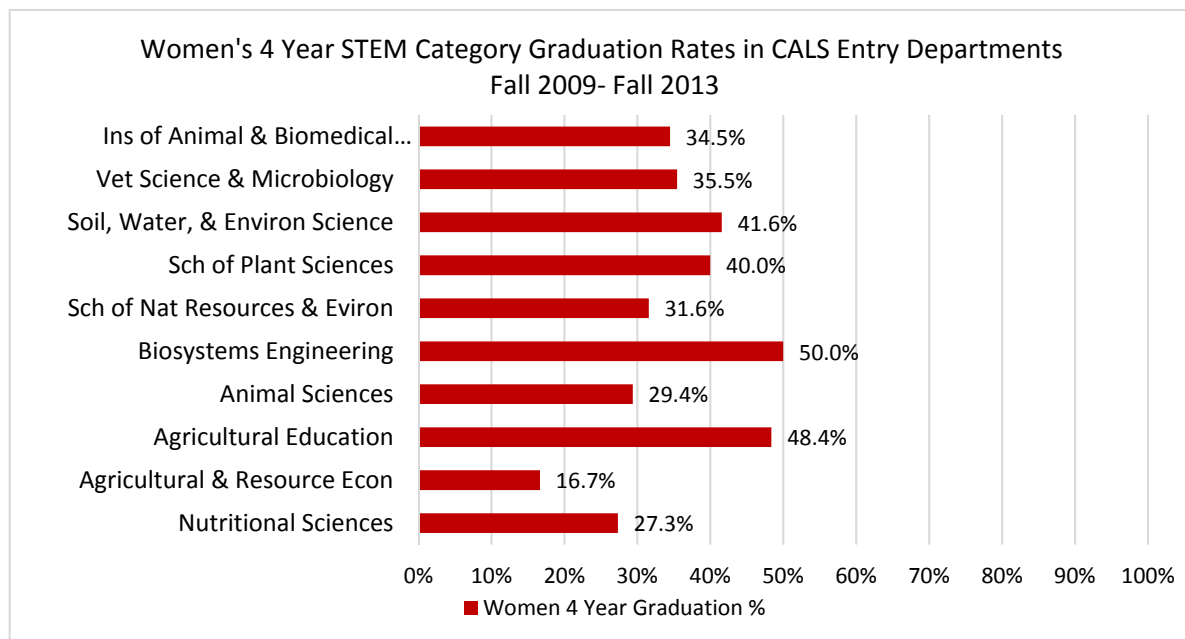


The School of Plant Sciences (76.9%) saw the highest rate first year STEM retention rate for women among CALS departments. The Department of Agricultural & Resource Economics saw the lowest women's first year retention rate (50.0%). After entering in Agricultural & Resource Economics, men were retained in STEM at a rate of 82.4% while women students were only retained at a rate of 50.0%, a stark 32.4% difference. For more comparison on men's and women's rates, see Appendix D.

As shown in Figure 4, four-year STEM graduation rates for women rates remain pervasively low (under 40%) throughout CALS, with the highest performing department, Biosystems Engineering<sup>v</sup>, reporting a 50.0% STEM graduation rate for women and the lowest performing department, Agricultural & Resource Economics averaging only 16.7% .

While Biosystems Engineering sees the highest average rates for women's four year STEM graduation and Agricultural and Resource Economics sees the lowest average rates of women's four year STEM graduation, both of these departments showed sizeable disparity between men's and women's four year STEM graduation rates (see Appendix D).

**Figure 4. Women's 4 Year STEM Graduation Rates in CALS Departments**



*College of Engineering*

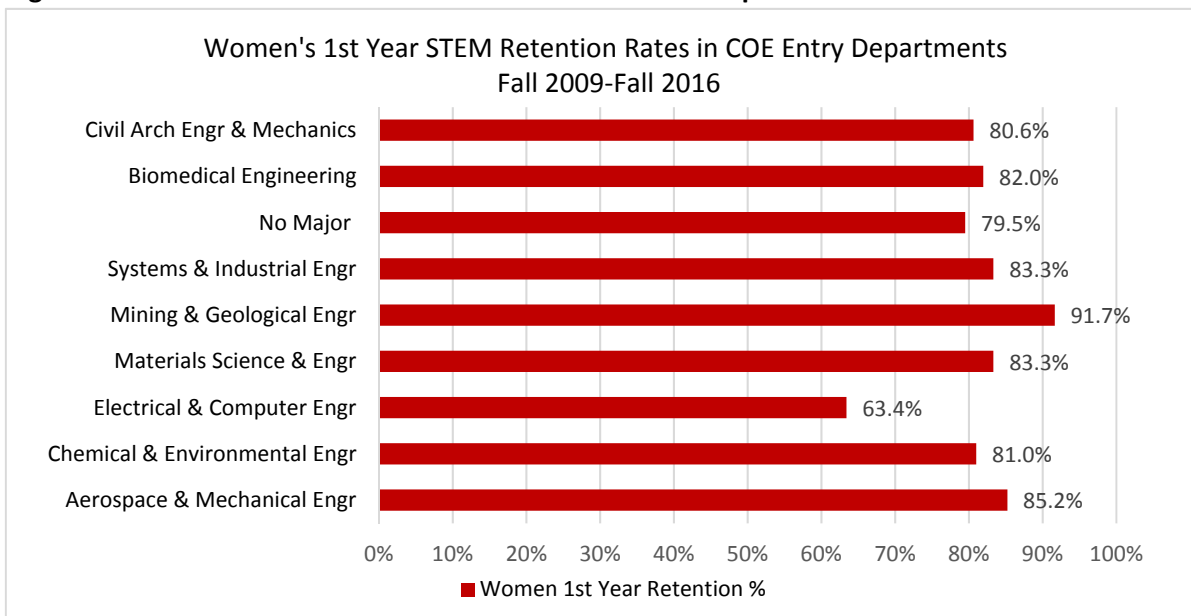
Low women’s enrollment is an issue throughout the College of Engineering (COE) with the exception of only two areas, Biomedical Engineering and Biosystems Engineering (see table 4). COE contains four of the six lowest STEM enrolling departments at the UA, all of which enroll under 25% women.

**Table 4. Women’s Enrollment Rates in COE STEM Primary Major Departments, Fall 2017**

COE Department Fall 2017	Women #	Men #	Women %
Aerospace & Mechanical Engr	87	494	15.0%
Biomedical Engineering	93	85	52.2%
Chemical & Environmental Engr	84	168	33.3%
Civil Arch Engr & Mechanics	28	109	20.4%
College of Engineering (Comp & Elec Engr)	80	358	18.3%
Engineering Admin (No Major)	169	463	26.7%
Engineering Admin (Biosystems Engr)	39	26	60.0%
Materials Science & Engr	14	31	31.1%
Mining & Geological Engr	10	53	15.9%
Systems & Industrial Engr	76	193	28.3%
<b>Total</b>	<b>677</b>	<b>1980</b>	<b>25.5%</b>

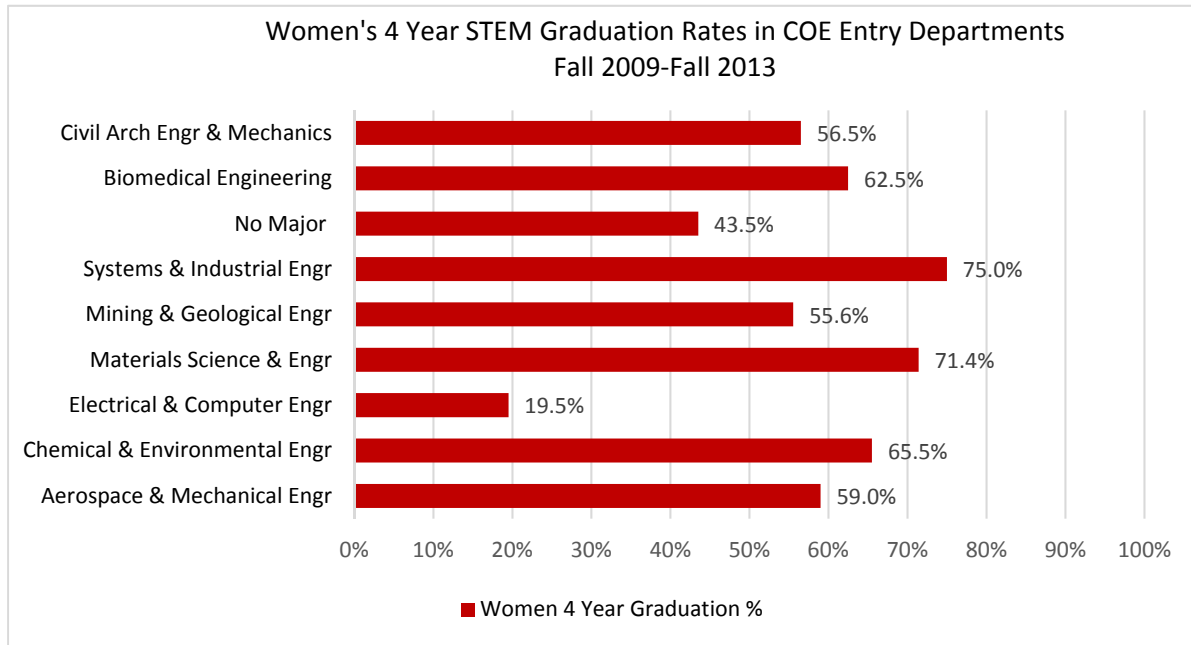
Despite low women’s STEM enrollment, first year STEM retention rates for women in each COE department, as shown in Figure 5, are relatively high (above 80%). In addition, women remain on par or surpass men in terms of average first year STEM retention rates) in all Engineering departments except Electrical & Computer Engineering (see Appendix E).

**Figure 5. Women's 1st Year STEM Retention Rates in COE Departments**



Similar to trends seen in retention data, many departments experience high four year graduation (above 50%) rates for women (see Figure 6). The only exceptions to this pattern are women in Electrical & Computer Engineering and women who enter COE with no declared major.

**Figure 6. Women's Four Year STEM Graduation Rates in COE Departments**



Throughout College of Engineering, men and women experience similar average graduation rates (see Appendix E). However, women experience significantly lower four year STEM graduation rates than men in two departments: Civil Architectural Engineering and Mechanics (men = 78.6%, women = 56.5%), and Electrical and Computer Engineering (men = 28.3%, women = 19.5%).

*College of Optical Sciences*

The College of Optical Sciences (OSC) houses only one undergraduate department. Women's STEM enrollment is only 28.6% (34 of 119 undergraduate students). Despite low enrollment, according to Fall 2017 data, 100% of women students were retained in STEM fields after the first year. The average four year graduation rate for women is 61.5%. Women's average retention and graduation rates outperform men's rates in the college (men's first year retention = 86.2%, men's four year graduation = 56.3%).

### College of Science

Women's enrollment rates vary throughout the College of Science (COS) and range between 13.9% and 95.2% (see table 5). Women are under-enrolled in six of the fourteen COS STEM departments, with Computer Science seeing the lowest enrollment of women students throughout the entire university with only 14.4% women, or 163 out of 1,170 students.

**Table 5. Women's Enrollment Rates in COS STEM Primary Major Departments, Fall 2017**

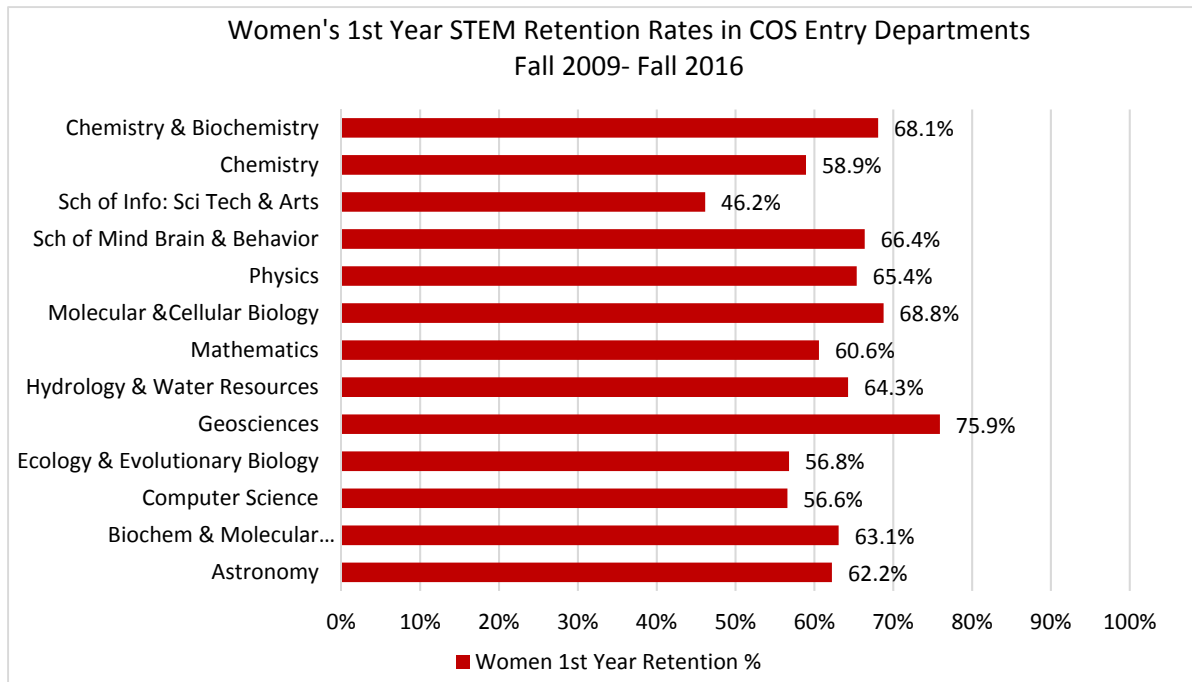
COS Department Fall 2017	Women #	Men #	Women %
Astronomy	60	92	39.5%
Chemistry	91	176	34.1%
Chemistry & Biochemistry	238	222	51.7%
Computer Science	163	1007	13.9%
Ecology & Evolutionary Biology	536	320	62.6%
Geosciences	70	156	31.0%
Hydrology & Atmospheric Sci	11	12	47.8%
Mathematics	114	259	30.6%
Molecular and Cellular Biology	191	125	60.4%
Physics	44	138	24.2%
Psychology	189	68	73.5%
Sch of Mind Brain & Behavior	318	165	65.8%
Science Administration	55	77	41.7%
Speech Language Hearing Sciences	219	11	95.2%
<b>Total</b>	<b>2299</b>	<b>2828</b>	<b>44.8%</b>

Women's first year STEM retention rates remain low throughout COS with a few notable exceptions (see figure 7).<sup>vi</sup> Of all departments, only Geosciences (75.9%) has an adequate (between 70% and 80%) first year STEM retention rate for women students.

On average, women are retained in STEM through the first year at higher rates than men in Astronomy (62.2% vs 51.8%), Geosciences (75.9% vs. 71.7%), and Chemistry and Biochemistry (68.1% vs. 63.9%), but retained in STEM through the first year at lower rates than men in all the other departments (see Appendix F).

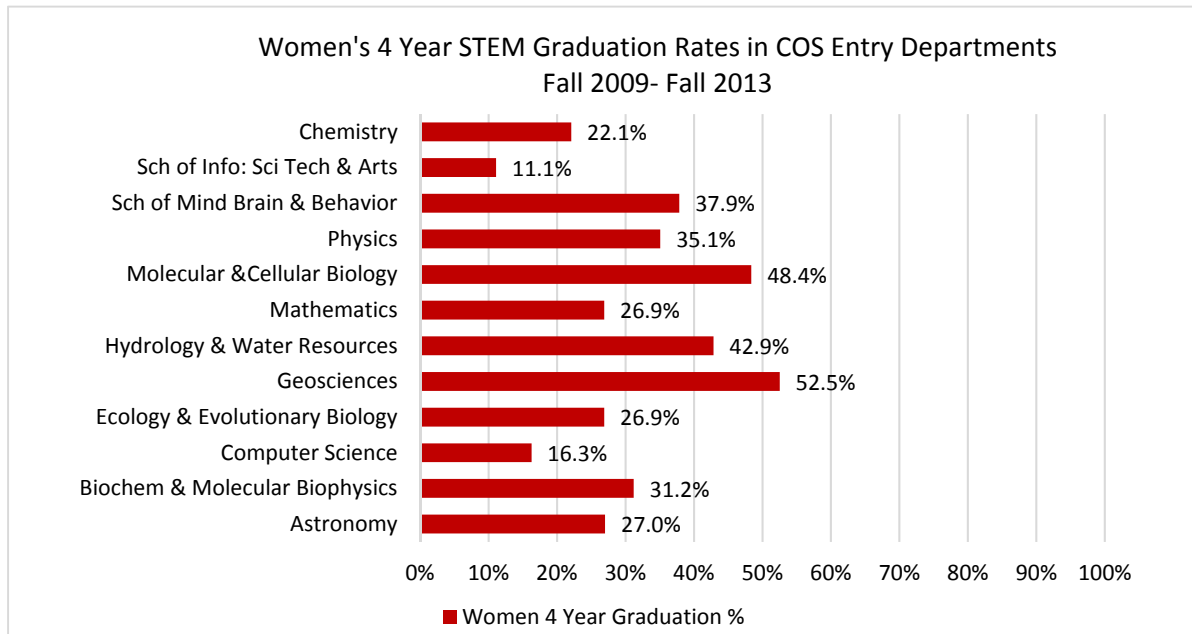


**Figure 7. Women's 1st Year STEM Retention Rates in COS Departments<sup>vii</sup>**



Overall, low (under 40%) four year STEM graduation rates are pervasive throughout COS with only 3 departments, Molecular & Cellular Biology, Hydrology & Water Resources, and Geosciences, having adequate (40%-50%) or high (above 50%) four year graduation rates (see figure 8).

**Figure 8. Women's Four Year STEM Graduation Rates in COE Departments**



Two current departments experience disparity between average graduation rates wherein men graduate at rates around 10% higher than women (see Appendix F). These include Mathematics (men = 36.5%, women = 26.9%), Computer Science (men = 30.1%, women = 16.3%). Interestingly, women in Astronomy experience four year STEM graduation rates 10.5% higher than men in Astronomy.

# FINDINGS SUMMARY AND NEEDS ASSESSMENT

The Colleges of Engineering and Optical Sciences, in general, suffer from low women's enrollment but experience adequate or high STEM retention and STEM graduation rates. Here, women often outperform men with respect to STEM retention and STEM graduation rates. The College of Agricultural and Life Sciences, in general, sees high STEM enrollment rates for women. However, STEM retention and STEM graduation rates are low throughout most of this college. The College of Science (the college with the most students, most women students, and most STEM departments among the four colleges) sees a mix of low and adequate to high STEM enrollment rates across departments but experiences low STEM retention and the lowest four year STEM graduation rates for women in all four colleges examined.

Based on the aggregated analysis of enrollment, retention, graduation rates, and gender-based disparities, we have ranked STEM departments based on how women students appear to be faring compared to their men counterparts (see Figure 6).

This analysis of institutional data suggests that the departments of Biomedical Engineering and Soil, Water and Environmental Science are promising examples to look to for practices that encourage women's STEM enrollment, retention, and success.

While there is not evidence of disparity in STEM retention and STEM graduation for women in the departments of Astronomy, Chemistry, Mathematics, and Physics, these four departments could perhaps look to strategies employed by Engineering and Optical Science departments for how to better support women and men students even in the context of lower women's STEM enrollment.

Finally, this analysis suggests that the departments of Computer Science, Electrical and Computer Engineering, and Agriculture and Resource Economics are areas where additional attention should be paid in order to ensure that women are welcomed, included, and supported. Given the disparity between men and women students in these departments, greater investigation into departmental culture around gender issues could prove helpful. Specifically, Computer Science is the lowest performing department on campus with respect to women's enrollment and retention rates. It is also the biggest STEM department on campus with over 1000 undergraduate students. It could, therefore, be an effective department in which to focus initial efforts.



Table 6. Needs Assessment Ranking of UA STEM Departments

Rank	Definition	Department
1	High or Adequate Enrollment Rate  High or Adequate Retention/Graduation Rates	CALS: Soil, Water, & Environmental Science  COE: Biomedical Engineering
2	Low Enrollment Rate  High or Adequate Retention/Graduation Rates	CALS: Plant Sciences  COE: Aerospace & Mechanical Engineering, Chemical & Environmental Engineering, Materials Science & Engineering, Mining & Geological Engineering, Systems and Industrial Engineering, Civil Architectural Engineering & Mechanics (graduation disparity)  OSC: Optical Sciences  COS: Geosciences
3	High or Adequate Enrollment Rate  Low Retention/Graduation Rates	CALS: Animal & Biomedical Sciences, Biosystems Engineering (adequate rates but disparity), Natural Resources & Environmental Sciences (adequate retention), Nutritional Sciences  COS: Astronomy, Ecology & Evolutionary Biology, School of Mind, Brain and Behavior, Chemistry & Biochemistry (no graduation data available), Hydrology & Atmospheric Sciences(adequate graduation), Molecular & Cellular Biology (retention disparity, adequate graduation)
4	Low Enrollment Rate  Low Retention/Graduation Rates	COS: Chemistry, Mathematics, Physics
5	Low Enrollment Rate  Low Retention/Graduation Rates  Gender Disparate Rates	CALS: Agricultural & Resource Economics <sup>viii</sup>  COE: Computer & Electrical Engineering  COS: Computer Science

# ENDNOTES

<sup>1</sup> The databases we used were initially created to inform NSF grant proposals and, thus, the STEM definitions reflect the needs of those proposals. It is worthwhile noting that there are many definitions of STEM used across NSF programs.

<sup>2</sup> <https://uair.arizona.edu/content/retention-and-graduation>

<sup>3</sup> All references to enrollment rates in this report are taken from Fall 2017 enrollment demographics. Both the College of Agriculture and Life Sciences and College of Science include majors/departments that fall outside of the STEM definition used for this report. In turn, the enrollment figures listed here are not of the full enrollment of these colleges; rather they are reflective of enrollment in STEM majors/departments within each college.

<sup>4</sup> All references to first year retention averages in this report are taken from Fall 2009-Fall 2016 STEM entry cohorts. All references to four year graduation averages are taken from Fall 2009-Fall 2013 STEM entry cohorts.

<sup>5</sup> Biosystems Engineering is administered by the College of Engineering but was historically associated with College of Agriculture and Life Sciences. In the retention database was classified within College of Agriculture and Life Sciences, but in the enrollment database it was classified within College of Engineering. This report follows this pattern.

<sup>6</sup> The Psychology and Speech Language, and Hearing Science departments have been precluded from the retention and graduation analysis due to unavailability of data at the time of the analysis.

<sup>7</sup> The School of Information is now housed in the College of Social and Behavioral Sciences.

<sup>8</sup> Data indicated that Agriculture and Resource Economics had high women's enrollment, however, this was based on an incredibly small sample size. Since there were significant gender-based disparities in graduation and retention rates, we chose to categorize this department in the highest need category.



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# APPENDICES



## Appendix A: List of UA STEM Field Majors

Aerospace Engineering	Chemical Engineering	Immunobiology	Physiological Sciences
Agricultural & Biosystems Engr	Chemistry	Information	Physiology
Agricultural & Biosystems Tech	Civil Engineering	Information Science & Arts	Planetary Sciences
Agricultural Engineering	Civil Engr & Engr Mechanics	Information Science & Tech	Plant Pathology
Agronomy & Plant Genetics	Computer Engineering	Insect Science	Pre-Computer Science, BA
Anatomy	Computer Science	Management Info Systems	Pre-Computer Science, BS
Animal & Biomedical Industries	Ecology & Evolutionary Bio	Materials Science & Engr	Pre-Engineering
Animal Health Science	Economic Geology	Mathematical Sciences	Pre-Optical Engineering
Animal Husbandry	Electrical & Computer Engr	Mathematics	Reliability & Quality Engr
Animal Physiology	Electrical Engineering	Mechanical Engineering	Reliability Engineering
Animal Sciences	Energy Engineering	Medical Pharmacology	Renewable Natural Res. Std
Applied & Industrial Physics	Engineering	Metallurgical Engineering	Soil & Water Science
Applied Biosciences	Engineering Mathematics	Metallurgy	Soil, Water & Environ Sci
Applied Mathematics	Engineering Mechanics	Microbiology	Statistics
Applied Nutrition	Engineering Physics	Microbiology & Immunology	Statistics and Data Science
Architectural Engineering	Entomology	Microbiology & Pathobiology	Sustainable Plant Systems
Architecture	Entomology & Insect Science	Mining Engineering	Systems & Industrial Engr
Arid Lands Resource Sciences	Environ Hydrology & Water Res	Mining Geol/Geophys Engr	Systems Engineering
Astronomy	Environmental Engineering	Molecular & Cellular Biology	Toxicology
Astronomy and Astrophysics	Environmental Sciences	Molecular Biology	Veterinary Science
AZ Bio/BioMed Sci Doctoral Prg	Environmental Studies	Natural Resources	Water Resources Admin
Bioc & Molecular Biophysics	Epidemiology	Natural Sciences & Mathematics	Water, Society & Policy
Biochemistry	Fisheries Science	Neuroscience	Watershed Management
Biology	Food Safety	Neuroscience & Cognitive Sci	Wildlife & Fisheries Science
Biomedical Engineering	Food Science	Nuclear Engineering	Wildlife Biology
Bio-Prep	Food Studies	Nutritional Sciences	Wildlife Ecology
Biostatistics	General Biology	Optical Engineering	Wildlife, Watershed, Range Res
Biosystems Engineering	Genetics	Optical Sciences	Statistics
Botany	Geological & Geophys. Engr	Optical Sciences & Engineering	Statistics and Data Science
Cancer Biology	Geological Engineering	Optics	Speech, Lang. & Hearing Sci*
Cell Biology & Anatomy	Geology	Pathobiology	Speech & Hearing Sciences*
Cellular & Developmental Biol	Geosciences	Pharmacology	Psychology*
Cellular & Molecular Medicine	Hydrology	Photonic Communications Engr	Pre-Psychological Science*
Chemical Engineering	Hydrology and Atmospheric Sci	Physics	Psychological Science*

An asterisk (\*) indicates that major was precluded from the retention analysis due unavailability of data at the time of analysis.





## Appendix B: Department Ranking Determination Table

Department/Institute/School	2017 Enroll % Women	1 yr Retain % Women	1 yr Retain % Men	1 yr Retain % Disparat e	4 yr Grad % Women	4 yr Grad % Men	4 yr Grad % Disparat e	Rank
Agricultural & Res Econ+	100%	50.0%	82.4%	32.4%	16.7%	72.7%	56.1%	<b>5</b>
Animal & Biomedical Sciences	77.1%	68.0%	71.6%	3.6%	34.5%	39.5%	5.0%	<b>3</b>
Nat Resources & Eviron	70.7%	72.5%	66.7%	-5.9%	31.6%	39.2%	7.6%	<b>3</b>
Nutritional Sciences	74.7%	56.9%	56.2%	-0.7%	27.3%	19.3%	-8.0%	<b>3</b>
Plant Sciences	31.3%	76.9%	64.4%	-12.5%	40.0%	25.0%	-15.0%	<b>2</b>
Soil, Water, & Environ Sc	61.6%	72.4%	63.8%	-8.6%	41.6%	26.3%	-15.3%	<b>1</b>
Biosystems Engineering	60.0%	72.7%	86.7%	13.9%	50.0%	75.0%	25.0%	<b>3</b>
<hr/>								
Aerospace & Mech Engr	15.0%	85.2%	83.3%	-1.9%	59.0%	50.4%	-8.6%	<b>2</b>
Biomedical Engineering	52.2%	82.0%	83.3%	1.4%	62.5%	54.5%	-8.0%	<b>1</b>
Chemical & Environ Engr	33.3%	81.0%	83.0%	2.0%	65.5%	57.6%	-7.9%	<b>2</b>
Computer & Electrical Engr~	18.3%	62.0%	74.6%	12.6%	22.0%	33.2%	11.2%	<b>5</b>
Materials Science & Engr	31.1%	83.3%	72.0%	-11.3%	71.4%	55.6%	-15.9%	<b>2</b>
Mining & Geological Engr	15.9%	91.7%	89.4%	-2.3%	55.6%	54.5%	-1.0%	<b>2</b>
Systems & Industrial Engr	28.3%	83.3%	83.3%	0.0%	75.0%	80.0%	5.0%	<b>2</b>
Civil Arch Engr & Mechanics	20.4%	80.6%	82.1%	1.5%	56.5%	78.6%	22.0%	<b>2</b>
<hr/>								
College of Optical Sciences	28.5%	100.0%	86.2%	-13.8%	61.5%	56.3%	-5.2%	<b>2</b>
<hr/>								
Astronomy	39.5%	62.2%	51.8%	-10.5%	27.0%	16.5%	-10.5%	<b>3</b>
Chemistry	34.1%	58.9%	64.5%	5.6%	22.1%	24.8%	2.7%	<b>4</b>
Chemistry & Biochemistry	51.7%	68.1%	63.9%	-4.2%	NA	NA	NA	<b>3</b>
Computer Science	13.9%	56.6%	66.8%	10.2%	16.3%	30.1%	13.8%	<b>5</b>
Ecology & Evolutionary Bio	62.6%	56.8%	62.2%	5.4%	26.9%	28.2%	1.3%	<b>3</b>
Geosciences	31.0%	75.9%	71.7%	-4.2%	52.5%	47.1%	-5.5%	<b>2</b>
Hydrology & Atmosph Sci^	47.8%	64.3%	71.4%	7.1%	42.9%	50.0%	7.1%	<b>3</b>
Mathematics	30.6%	60.6%	66.1%	5.5%	26.9%	36.5%	9.6%	<b>4</b>
Molecular and Cellular Bi	60.4%	68.8%	84.1%	15.3%	48.4%	48.9%	0.5%	<b>3</b>
Physics	24.2%	65.4%	67.7%	2.3%	35.1%	27.6%	-7.5%	<b>4</b>
Mind Brain & Behavior	65.8%	66.4%	75.2%	8.8%	37.9%	40.0%	2.1%	<b>3</b>
+Extremely small 2017 enrollment sample size (n=1). *New department, data from Fall 2016 no graduation data available yet. ^New department, data from Fall 2016 no graduation data available, used historical department (Hydrology & Water Resources) data as proxy. ~College of Engineering took over administration of this department's major in 2012, but rates from Fall 2012-Fall 2016 are included here.								

All current departments include entry cohorts 2009-2016 except the following: Animal and Biomedical Sciences: Fall 2013-Fall 2016, Biochemistry and Molecular Biophysics: Fall 2009-Fall 2015, School of Mind, Brain, and Behavior: Fall 2010-Fall 2017, Chemistry: Fall 2012-Fall 2017, Chemistry and Biochemistry: Fall 2016-Fall 2017, Hydrology and Atmospheric Science: Fall 2016-Fall 2017.

**Appendix C: Total Headcounts for STEM Departmental Entry Cohorts 2009-2016 Used to Determine Retention and Graduation Rates**

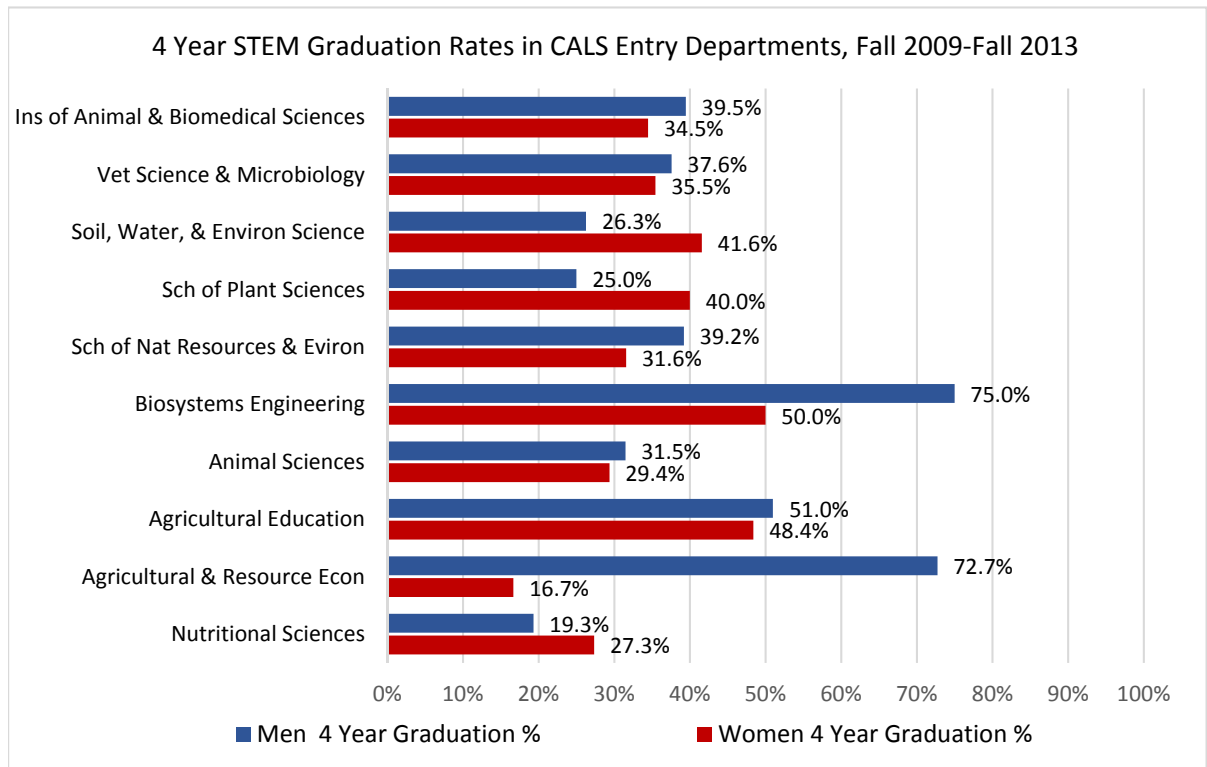
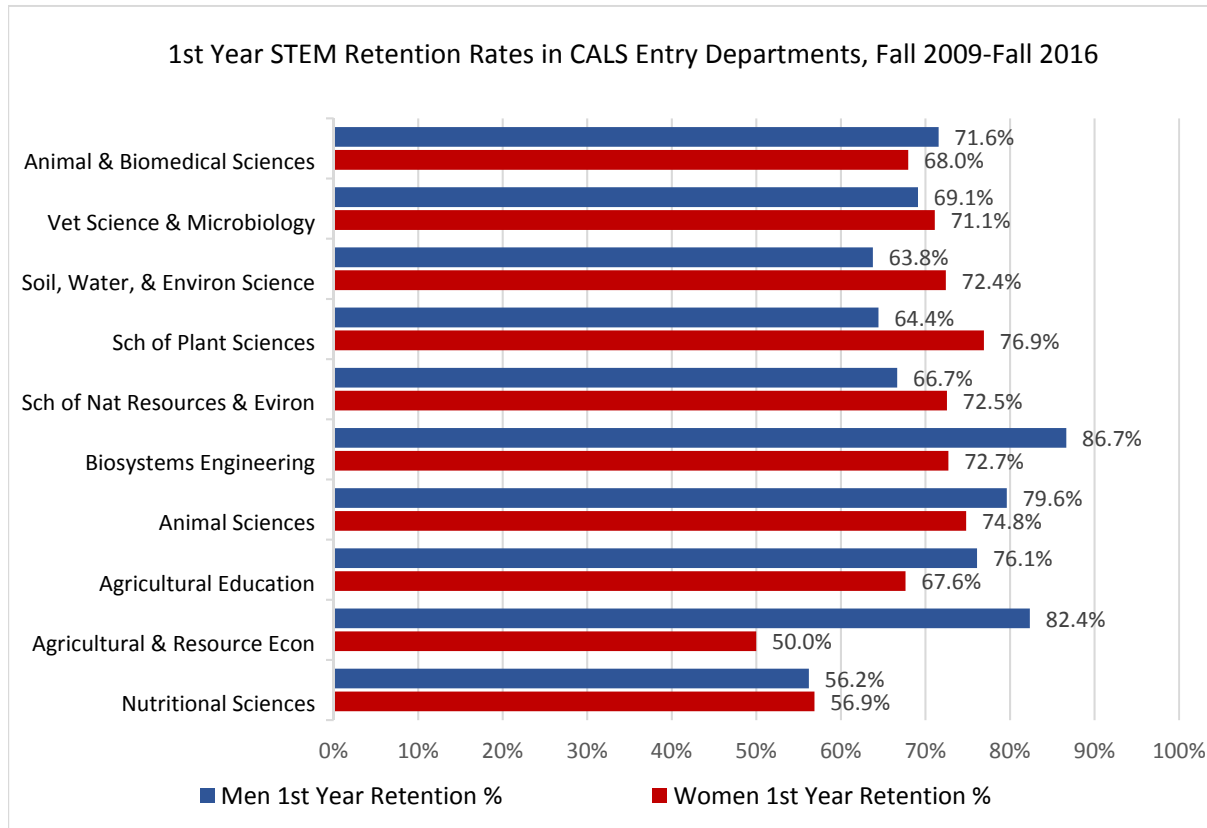
<b>CALS Departmental Entry Cohort</b>	<b>Women</b>	<b>Men</b>
Nutritional Sciences	893	242
Agricultural & Resource Econ	8	20
Agricultural Education	81	127
Animal Sciences*	143	54
Biosystems Engineering*	14	21
Sch of Nat Resources & Environ	128	103
Sch of Plant Sciences	47	60
Soil, Water, & Environ Science	199	188
Vet Science & Microbiology*	488	149
Animal & Biomedical Sciences	989	271

<b>COS Departmental Entry Cohort</b>	<b>Women</b>	<b>Men</b>
Astronomy	178	291
Biochem & Molecular Biophysics*	596	637
Computer Science	272	1836
Ecology & Evolutionary Biology	1790	1048
Geosciences	130	291
Hydrology & Water Resources*	14	28
Mathematics	267	488
Molecular & Cellular Biology	423	241
Physics	125	511
Sch of Mind Brain & Behavior	583	278
Sch of Info: Sci Tech & Arts*	13	48
Chemistry	243	326
Chemistry & Biochemistry	192	143
Hydrology & Atmospheric Sci	2	10

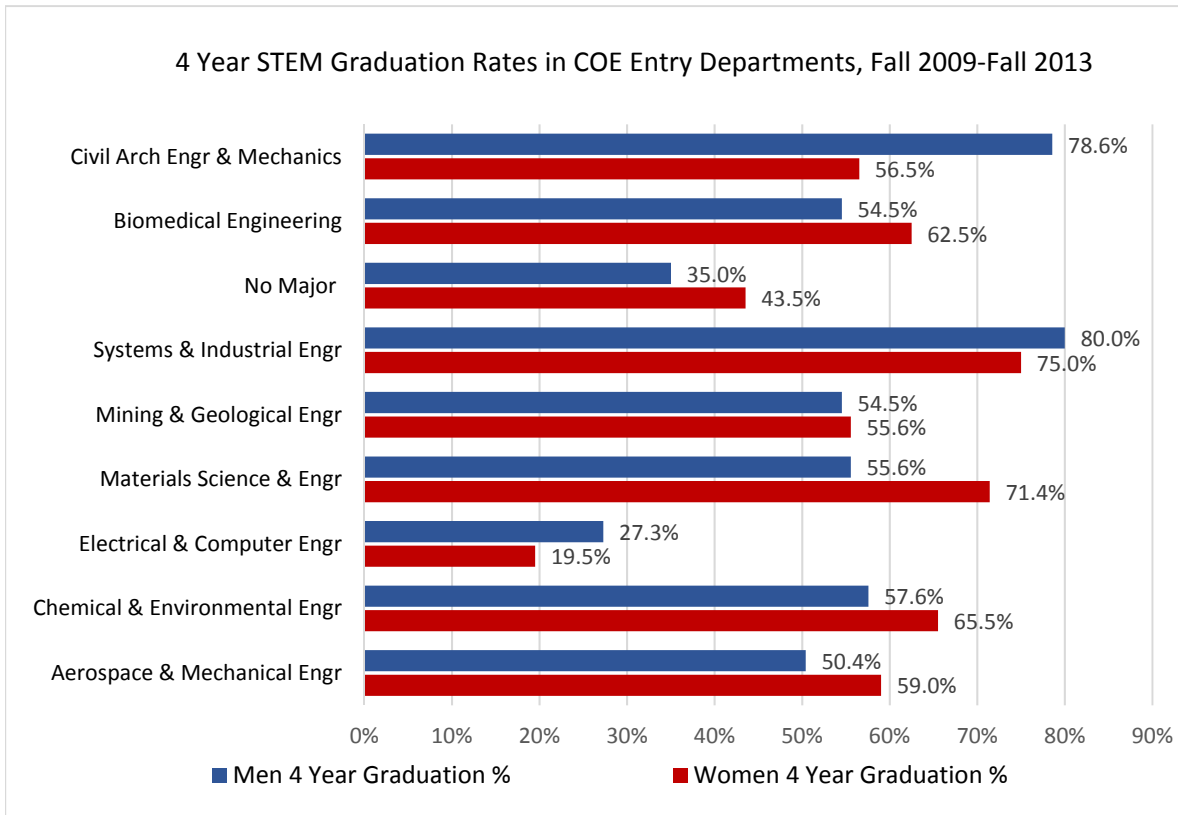
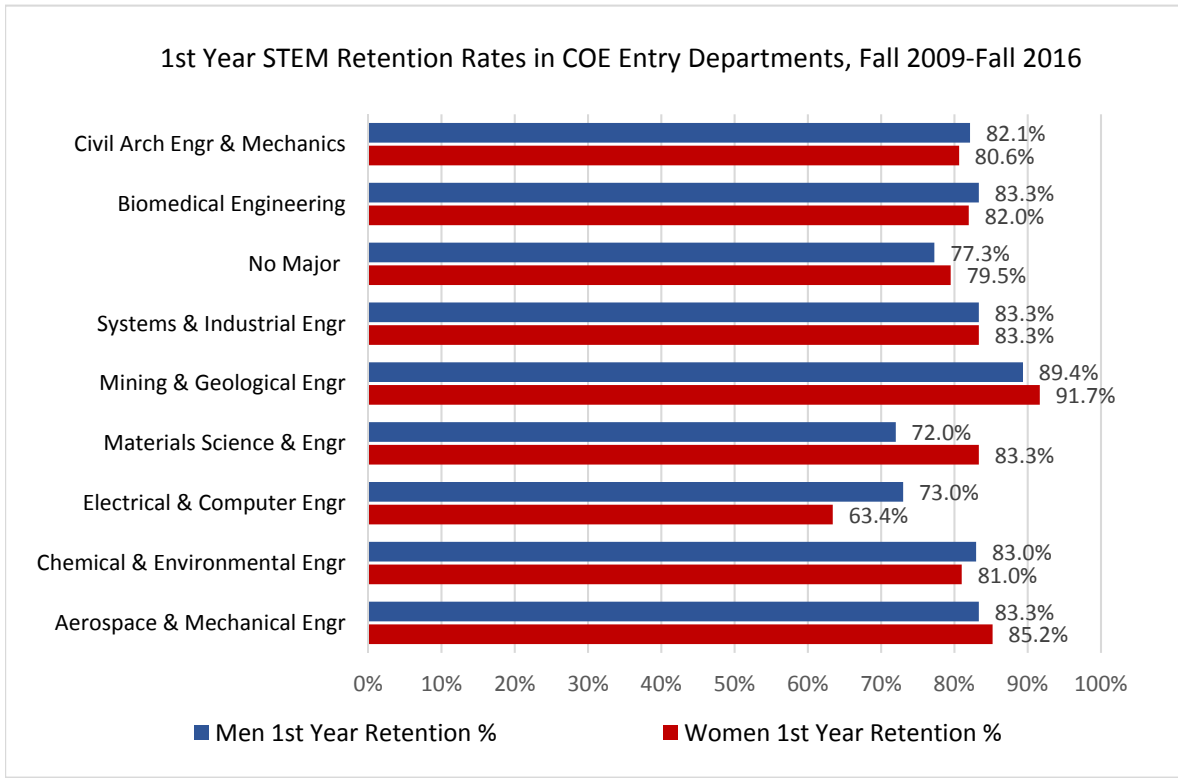
<b>COE Departmental Entry Cohort</b>	<b>Women</b>	<b>Men</b>
Aerospace & Mechanical Engr	102	546
Chemical & Environmental Engr	88	158
Electrical & Computer Engr	41	315
Materials Science & Engr	15	29
Mining & Geological Engr	14	60
Systems & Industrial Engr	28	86
No Major Selected	1023	2853
Biomedical Engineering	85	60
Civil Arch Engr & Mechanics	34	97

An asterisk (\*) indicates a historical department that is no longer in currently housed in the college.

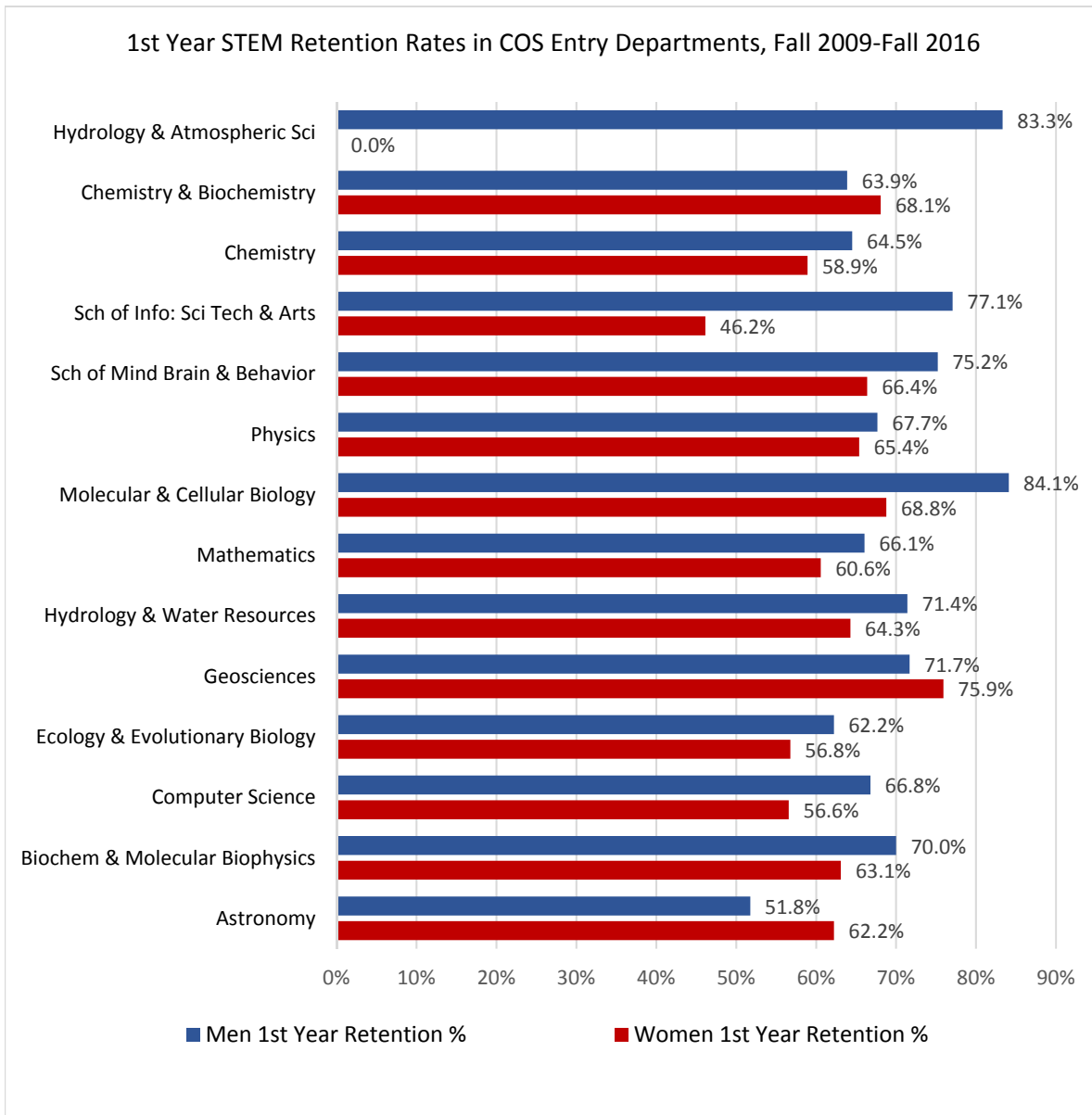
**Appendix D: CALS 1<sup>st</sup> Year STEM Retention and 4 Year STEM Graduation Rate Averages across Cohorts by Gender**



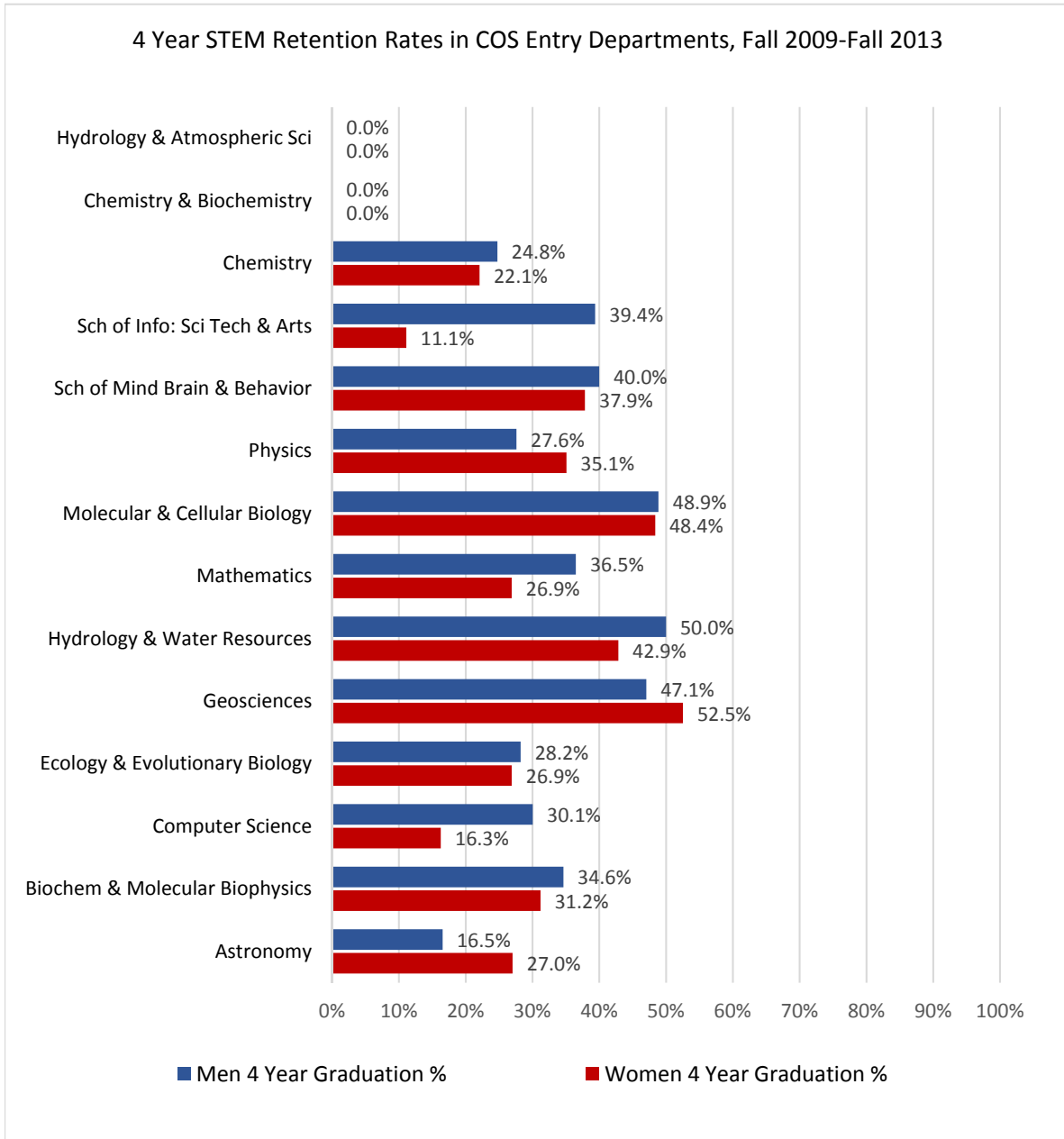
**Appendix E: COE 1<sup>st</sup> Year STEM Retention and 4 Year STEM Graduation Rate Averages across Cohorts by Gender**



**Appendix F: COS 1<sup>st</sup> Year STEM Retention Rate Averages across Cohorts by Gender**

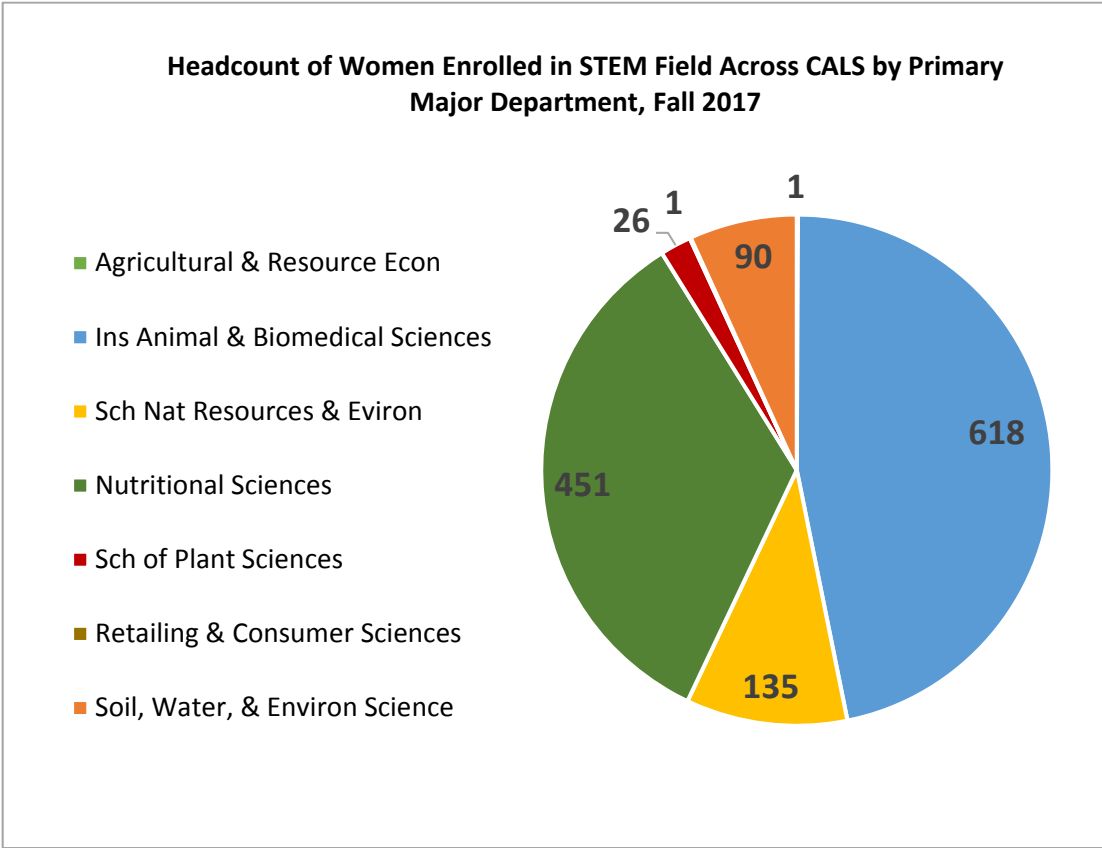


**Appendix G: COS 4 Year STEM Graduation Rate Averages across Cohorts by Gender**



Four year graduation rate data is not yet available for Hydrology and Atmospheric Science or Chemistry and Biochemistry.

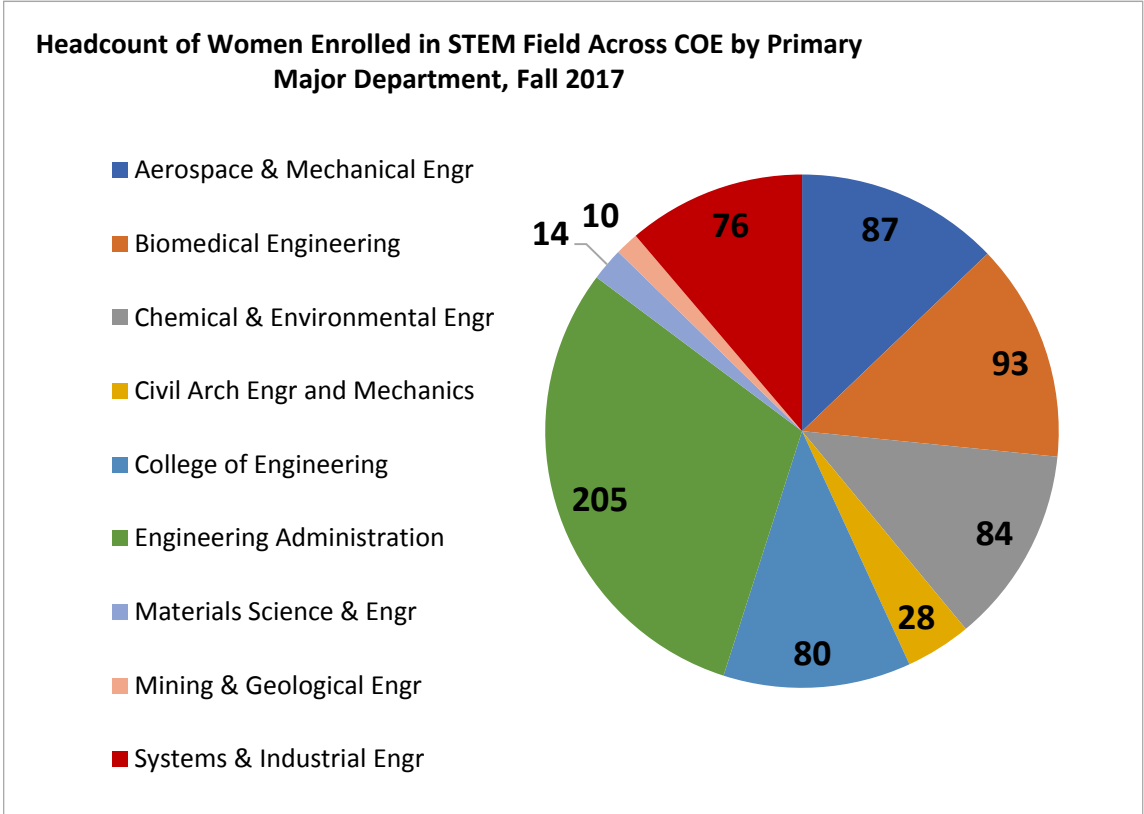
**Appendix H. Distribution of Women Enrolled in CALS, Fall 2017**



Women students in CALS STEM majors tend to cluster in particular departments. Of the 1322 women STEM students in the college, 80.9% are concentrated in two departments: Animal and Biomedical Sciences and Nutritional Sciences.

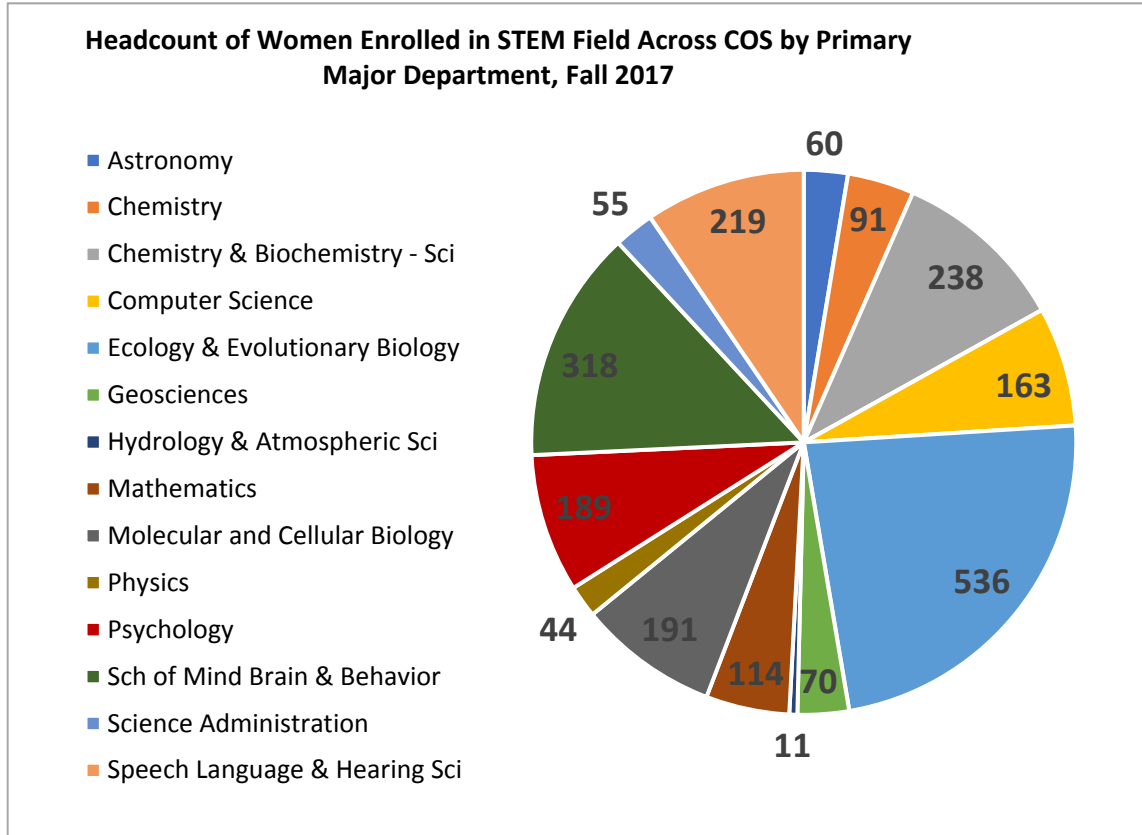


**Appendix I. Distribution of Women Enrolled in COE, Fall 2017**



COE STEM women’s enrollment is spread out more evenly across departments than in other colleges. Note that Engineering Administration is where pre-engineering and no major declared engineering students are housed in the college, resulting in inflated portion of women students.

**Appendix J. Distribution of Women Enrolled in COS, Fall 2017**



In COS, women are spread across a number of departments. Ecology & Evolutionary Biology, the School of Mind, Brain, & Behavior enroll the largest proportion of women in the college. The following departments each contain less than 2% share of the college’s total women students: Astronomy, Science Administration, Hydrology & Atmospheric Science, and Physics.

