

Status of Women Academics
College of Earth and Mineral Sciences
June 2017

Katherine H. Freeman
Committee Chair
Evan Pugh University Professor, Department of Geosciences

Lorraine Dowler
Associate Professor of Geography and Women's Studies

Tanya Furman
Associate Vice President and Associate Dean for Undergraduate Education
Professor of Geosciences

Brian King
Associate Professor of Geography

Jonathan P. Mathews
Professor of Energy and Mineral Engineering

Raymond Najjar
Professor of Meteorology

Eliza Richardson
Associate Professor of Geosciences
John A. Dutton e-Education Institute

Susan Sinnott
Department Head
Professor of Materials Science and Engineering

John Barlett
Human Resources Manager, College of Earth and Mineral Sciences

Victoria Sanchez
Associate Dean for Educational Equity, College of Earth and Mineral Sciences

Table of Contents

	Page
Glossary of Academic Appointments at Penn State	3
Introduction and Charge to the Committee	4
Summary of Findings and Recommendations	5
EMS Employment Data	8
Hires, Promotions, and Departures of EMS Tenure-line Faculty	15
Symbolic Indicators of Status	20
Gender Equity Survey of EMS Faculty	22
Key Findings of Faculty Perceptions	23
Job Resources and Responsibilities	23
Perceptions of Promotion	25
Perceptions of Fairness and Respect	29
EMS Organization and Professional Climate	32
Sexual Harassment	36
Satisfaction with EMS, Career Choice, and PSU	37
Recommendations	40
References	43
Figures	45
Appendix	54

Glossary of Academic Appointments at Penn State

- *Academic*: appointment defined by teaching and research responsibilities.
- *Standing*: full-time appointment for which no ending date is specified; these can include individuals who are tenured, pre-tenure, or not eligible for tenure.
- *Fixed-Term, Multiyear*: full-time appointment for a minimum of 36 weeks, and has a specified ending date (typically exceeds one year), but no longer than five years on a single appointment.
- *Fixed-Term I*: appointment that is full-time for at least six calendar months and has a specified ending date. Appointments are typically for one year, but may be extended.
- *Fixed-Term II*: academic or exempt staff appointment that is either full-time but less than six calendar months, or less than full-time. This category includes most graduate student appointments.
- *Tenure line*: appointments that include both pre-tenure and tenured faculty. Individuals must have earned the highest degree in their discipline, which is a Ph.D. for the fields represented in the College of EMS.
- *Pre-tenure*: individuals who are candidates for tenure. These typically are appointments at the assistant professor rank. This term is synonymous with *tenure eligible* and *tenure track*.
- *Tenured*: individuals who have been granted tenure by Penn State. These include appointments at the associate professor and professor ranks.

Introduction and Charge to the Committee

In the fall of 2016, Dean William Easterling charged a committee of nine faculty from the college of EMS to assess the status of women employees with faculty appointments. The Dean requested that the committee consider the following questions on the professional opportunities and climate related to gender for EMS faculty:

- 1) What special challenges do women face in the College in achieving their professional goals and balancing those goals with their personal lives?
- 2) How much progress has EMS made in the past ten years toward increasing the impact of women on achieving the college's mission?
- 3) What are the College's strengths in promoting a healthy and productive environment for women to thrive? What are its weaknesses?
- 4) What are some practical and potentially effective ways the College can improve the working condition for women?

The committee gathered employment data for EMS faculty from the College and data on the US Nationals on the EMS faculty from the Affirmative Action office at Penn State. The committee evaluated trends over the past decade in the proportion of women in various faculty appointment categories, within different departments in the College, and for corresponding national data to place EMS in context. The committee evaluated symbolic signs of status such as faculty research and teaching awards, and the proportion of women among invited external speakers. The committee also distributed an on-line survey to the entire faculty population, which had questions on the professional and gender climate in the College, and that also captured faculty views of their opportunities, resources, and responsibilities. From the internal, external, and survey data, the committee assessed the progress and remaining challenges for women, and indeed, all faculty members in EMS.

The report presents employment trends first, followed by employee perceptions of the EMS professional environment, as learned from the survey responses. These provided a rich set of observations to assess the status and challenges of women faculty. The third section of the report draws from these findings, and recommends actionable means to improve the college working environment for women faculty in EMS, with the intention that the recommendations would be of value to all employees.

Summary of Findings and Recommendations

Summary of Findings from College and Employee Data

- Women are overrepresented relative to national availability in fixed-term appointments, and are underrepresented in tenure-line appointments. Representation of women within departments is generally consistent with respective disciplines; most units have increased the proportion of women faculty over the decade.
- Pre-tenure women earned promotion to tenured ranks at high rates over the review period. Tenured women disproportionately left EMS via resignation and men disproportionately were hired with tenure. These factors kept the percentage of tenured women below 20% in 2016, and reduced the net gain of tenured women to less than 3% through the decade.
- A significant segment of associate professors remained in rank longer than the recommended 6 years before promotion to professor.
- EMS has successfully increased the number of women in positions of college leadership.
- Both men and women are recognized as top contributors to the college mission of excellence in research, teaching, and service.
- The number of women invited to speak in college seminars has increased over the last several years. Gender representation among speakers generally matches and, in some venues, exceeds national availability data for disciplinary fields within EMS.

Summary of Findings from Survey Responses

- Faculty as a whole were positive about facilities for research and teaching, although tenured women were less satisfied with their research facilities than their male peers, and pre-tenure women were less likely to indicate teaching facilities were suitable. A third of tenure-line women indicated their service responsibilities did not match job expectations. In contrast, over 90% of men in all ranks agreed their service responsibilities matched job expectations. All faculty, but especially pre-tenure ranks, perceived limited availability and access to resources for professional development and mentoring.

- Faculty members across the College hold moderate to negative perceptions about the promotion process. Associate professors indicate a lack of clarity about promotion expectations and a lack of constructive and promotion-relevant feedback. Pre-tenure faculty have received better information and indicated a stronger sense of fairness about the promotion process.
- Faculty who are not on the tenure track have generally less positive perceptions about clarity and fairness of promotion expectations, or the usefulness of feedback.
- One third of tenured women and two thirds of pre-tenure women perceived service responsibilities were unfair. Tenure-line faculty of both genders indicated the institution fails to value mentoring efforts.
- There is generally a culture of respect in EMS, although men were more positive than women about their experience of respect in the College.
- Men (1 in 4) and women (1 in 2) experience isolation at high rates. Isolation corresponds by rank, gender, and department with insufficient access to networks, professional development, and mentoring, and with perceived transparency and opportunities in governance. This significant finding raises concern that respondents experienced subtle behaviors or incivility that are known to cause social exclusion and isolation within organizations. The committee strongly urges the College to address factors that contribute to feelings of isolation by all faculty.
- Sexual harassment is a reality in the lives of women faculty through their own experience and through their awareness of the experiences of others. The proportion who have experienced sexual harassment is lower than estimates for all women in the workforce.
- Most faculty women, especially tenured women, have seriously considered leaving EMS. This finding reinforces findings about higher rates of departures for tenured women, and survey results that suggest women have lower perceptions of respect, lower rates of satisfaction with the institution, greater feelings of isolation, and lower perceptions of fairness in service and teaching responsibilities and in the promotion process.

Summary of Committee Recommendations

- Continue efforts to hire pre-tenure women; strive for gender balance among faculty hired with tenure.
- Focus resources on professional development measures to support the success of all faculty, and to help retain tenured women.
- Clarify promotion expectations and provide more promotion-relevant feedback for associate professors and for non-tenure-line faculty who are eligible for promotion.
- Foster faculty citizenship by formally valuing mentoring and other efforts that enable the success of others.
- Foster faculty citizenship by making transparency and diversity a priority in EMS governance and policy.
- Ensure there are effective reporting, investigation, education, and enforcement policies for sexual harassment. Penn State has zero tolerance for any form of sexual harassment.
- Support and enforce efforts for inclusion and diversity by visible and frequent communication of priorities and data.

EMS Employment Data

Sources of Data

The committee documented trends in the proportion of women faculty in the College of Earth and Mineral Sciences for the period from 2006 to 2016. The following report uses both employment data provided by the College of EMS and the University. National gender trends in STEM fields were documented using data from professional societies and government sources. Because scholarship and the academic programs in our departments are diverse, the committee drew from a number of sources of data to represent fields in EMS; even so, departments in the College do not always map perfectly on to disciplinary groupings used by national sources.

Personnel data from both the University and the College of EMS were used to compare rank and appointment types, distributions in departments, and trends in hiring, promotion, and departures for both men and women faculty. Data from the College comprised all individuals with academic appointments, regardless of nationality, while data from the Penn State Affirmative Action office was only for U.S. nationals (*i.e.*, citizens and permanent residents). The Affirmative Action office is responsible for assessing compliance with Title IX regulations, which exclusively address fairness and opportunities for U.S. workers. The two entities present data for employment status slightly differently. The Affirmative Action data set separated tenure-line and fixed-term (I and multiyear) appointments. Data provided by the College tracked employees in standing appointments and those in fixed-term positions (I and multiyear). Because EMS has an internationally diverse population, the two sources of data report different absolute numbers, and show slightly different percentages, but they also show generally similar trends of modestly rising proportions of women over the review period (2006-2016). Data for all EMS academic appointments are listed in Table 1 and trends are illustrated in Figures 1 and 2.

Table 1. Employment data for the College of EMS for 2006-2016. In each entry, the top value is the number of women and the lower value is the total number of employees for each appointment type and given year.

Year:	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Standing	21 131	22 132	25 132	24 130	25 133	25 135	26 130	25 123	26 129	28 136	28 135
Tenured ranks	14 102	15 106	15 105	17 107	17 109	16 105	20 105	18 98	19 104	19 106	17 103
Pre-tenure	7 26	7 22	9 22	7 19	7 23	9 26	5 21	6 21	6 21	8 26	10 28
Fixed-term (I + multiyear)	25 102	25 103	34 115	38 118	31 107	30 101	31 107	36 110	41 116	35 105	36 105
Fixed-term (II)	87 265	81 320	85 307	92 297	96 323	106 318	104 301	85 273	93 295	79 271	na

College Trends

From 2006 to 2016, the size of the total EMS faculty (i.e., standing + fixed-term I, and multiyear appointments) increased by 3%, from 233 to 240 individuals. There was a gain of 4 standing appointments (from 131 to 135), also an increase of about 3%. The number of fixed-term faculty increased at a slightly lower rate (<2%), from 103 to 105 individuals. Fixed-term II appointments are typically held by graduate students, so there is significantly more variability in this category, and this population is not reviewed in this report.

The number of women in the combined standing and fixed-term EMS faculty appointments steadily rose from 46 to 64 between 2006 and 2016, an increase of 39%. The proportion of women in the total faculty population increased from 19.7% to 26.7%. During this period, the proportion of women in standing appointments increased from 16.0% to 20.7%, reflecting an increase from 21 to 28 individuals. For fixed-term faculty, the proportion of women increased from 24.5% to 34%, an increase from 25 to 36 individuals. Overall, the College added a net of 18 women to the faculty in ten years, including 7 with standing appointments and 11 in fixed-term positions. These trends are shown in Figure 1.

Tenure-Track Faculty Trends

Assistant professors include a higher proportion of women than the associate professors and professors. Among the tenured faculty, women increased slightly from 14 to 17 (a gain of 3 individuals), a proportional increase of 13.7 to 16.5%. This population is relatively large (103 individuals) and is generally comprised of an older demographic. Compared to the tenured faculty, the assistant professor pool is smaller, more variable in size, and subject to a 6-year timetable for promotion. The pre-tenure population ranged between 19 to 28 individuals, and the number of women in this rank ranged between 5 to 10 individuals, and averaged about 8. The percentage of women among the pre-tenure faculty varied from a high of 41% (2008) to a low of 23.8% (2012). The proportion of women in this rank did not display a directional trend over the entire decade, although more recently, there was steady increase following a low point in 2012 to current levels of pre-tenure women, rising from 5 to 10 individuals, and from 23.8% to 35.7%. These trends are shown in Figure 2.

Given the high proportion of women among assistant professors in EMS (typically more than 25%), it is tempting to expect their promotion would steadily shift the demographics of tenured women between 2006 and 2016. Promotion of one woman per year (reasonable for a candidate population averaging 7-8 women for the decade) would have increased the proportion of women in tenured ranks by about 10% over time. In reality, this expectation is confirmed by the promotion of 9 women from assistant professor into the tenure ranks between 2006 and 2016. Even so, the proportion of women in the tenured ranks grew only 2.8% (a net gain of three individuals) between 2006 and 2016. The discrepancy illustrates other factors are at play, including attrition of women faculty, and the disproportionate hiring of men into tenured ranks. These factors and trends in hiring, promotion, and departures are discussed further in a later section of this document.

Department Trends

Trends in the proportion of women among faculty in individual departments are more varied than the College as a whole. Each unit's population is relatively small, such that the gain or loss of one or two individuals significantly impacted reported percentages. The following discussion is based on the number of standing faculty appointments in each unit, excluding faculty who serve as administrators.

Geography had the highest proportion of women, which increased over the decade from 27% to 36%, or from 6 to 8 women. Material Science and Engineering currently has the second highest proportion of women, and had the largest increase of all the units, rising from 13.8% to 25% with an increase from 4 to 7 women. Geosciences increased the proportion of women from 13.8% to 20%, an increase from 4 to 6 women with standing appointments. Energy and Mineral Engineering increased the number of women from 2 to 3 over the decade, although it had as many as 4 for several years. Although the size of the EME department has been the most variable of all the units, over 2006-2016, it grew from 24 to 29 total faculty, via a net addition of 1 woman and 4 men. The proportional of women increased from 8.3% to 10.3%. The number of women faculty in Meteorology held steady at 4 (18.2 %) through 2012, but declined to 2 by 2016, cutting the proportion of women in half (to 9.5%).

National Trends in STEM Faculty

Data for women faculty in STEM fields (science, technology, engineering, and math) provided by the National Science Foundation's National Center for Science and Engineering Statistics (<https://www.nsf.gov/statistics/2017/nsf17310/data.cfm>). These data covered the period 2003 to 2010, and generally showed steady increases in the proportion of women in all fields (Table 2). For the EMS faculty (the sum of standing and fixed-term I and multiyear appointments), the proportion of women during 2006-2010 rose from slightly less than 20% to just over 23%, exceeding the proportion of women nationally in physical science and engineering fields, but well below gender representation in the life sciences.

EMS assistant professors currently include 35.7% women (10 of 38, Table 1), which exceeds most recent national data for physical sciences and engineering, but less than the nearly 50% proportions of women today as assistant professors in the life and social sciences. In 2016, EMS had 16.5% women among its tenured ranks (17 out of 103), which is comparable to data for physical sciences, exceeds data for engineering, and below the proportions in life and social sciences, both of which consistently have more than 25% women as tenured faculty.

Table 2. The representation of women on U.S. faculty in STEM fields. Data are from the National Center for Science and Engineering Statistics (NSF) for 2003–2010. Values listed are the number of women/ total individuals, and the percentage of women. Values for EMS faculty are from Table 1.

U.S. Women in Science (women/total individuals, % women)			
Year	2006	2008	2010
Physical Science (thousands)	7.3/39.6 18.4%	7.8/39.9 19.5%	9.3/43.7 21.3%
Engineering (thousands)	3.6/29.6 12.2%	4.1/30.4 13.5%	5.5/32.8 16.8%
Life Sciences (thousands)	37.6/95.5 39.4%	38.7/94.2 41.1%	43.3/102 42.5%
Social Sciences (thousands)	18.2/50.1 36.3%	19.5/52.6 37.1%	21.5/54.9 39.2%
EMS (standing + fixed term)	46/233 19.7%	59/247 23.9%	56/240 23.3%

National Trends in EMS Disciplines

The committee gathered data from several sources to compare data for departments with their corresponding disciplines nationally. The national data sources were Yoder (2015) for Energy and Mineral Engineering and for Material Science and Engineering, Wilson (2016) for Geosciences and for Meteorology and Atmospheric Science, and Lunn (2016) for Geography. Data for Penn State are weighted averages for 2014–16 (based on standing appointments), and national data are for the most recent year available: 2016 for Geosciences and 2015 for all other departments. The national data from Yoder (2015) are based the sum of assistant professors, associate professors, and full professors; the data from Wilson (2016) are based on the sum of assistant professors, associate professors, full professors, emeritus professors, instructors, lecturers, and adjuncts; and the data from Lunn (2016) are based on the sum of assistant professors, associate professors, full professors, emeritus professors, instructors, and adjuncts (Revell, 2017). These data are illustrated in Figure 4.

The different bases of the data sets make comparisons less than rigorous, but, on the whole, EMS departments are not dramatically different from their national averages in terms of the proportion of women faculty. Material Science and Engineering has a proportion of women faculty that is substantially greater than corresponding national data, though some of this difference may be due to the different bases of the data sets. Both Energy and Mineral Engineering and Geosciences are slightly above availability of women in their respective fields. Although Geography has the highest proportion of women faculty in the colleges, its proportion of women faculty falls slightly below national data. The proportion of women faculty in Meteorology and Atmospheric Science exceeded national data (15%) in the first half of the decade, but the current three-year average is now slightly below the national data.

College and Department Trends Relevant to Affirmative Action Plans

The committee collected a decade of annual reports provided by Penn State's Affirmative Action Office. The committee also met with Vice Provost for Affirmative Action, Kenneth F. Lehrman, III, to discuss these data and their use by the university. The reports are part of Penn State's Affirmative Action Plan that "sets forth programs and goals for increasing the representation of historically excluded groups" in accordance with federal Affirmative Action policy (<http://www.affirmativeaction.psu.edu/>).

Penn State's Policy (HR11: *Affirmative Action in Employment at the Pennsylvania State University*; <http://guru.psu.edu/policies/OHR/hr11.html>) states "it is the policy of The Pennsylvania State University to provide equal opportunity in all terms and conditions of employment, for all persons, as described in the University's Affirmative Action Plan and HR01. The intent of this policy is to prohibit discrimination (including sexual harassment) and to promote the full realization of equal employment opportunity through a continuing affirmative program in each administrative unit outlined in the Plan. This policy of equal opportunity applies to, and must be an integral part of, every aspect of personnel policy and practice in the employment, development, advancement, and treatment of employees and applicants for employment at the University."

As part of process, the Affirmative Action Office provides each PSU college with an annual report of "Utilization and Goals, Faculty in College by Division." (Copies of EMS reports from 2005–2014 are in the appendix). To prepare this report, benchmark data were established based largely on PhD data from the National Research Council, in addition to other national sources. These benchmarks are used to assess department gender and race/ethnicity representation in relation to estimated availability of representation in the national pool of potential candidates. Data used in setting the benchmarks are weighted toward recent graduates rather than to senior faculty in order to estimate availability within search pools.

It is important to note Affirmative Action data pertain to federal protected categories for women and race/ethnicity and therefore reflect only U.S. nationals. Thus, only EMS faculty who are US citizens or permanent residents are included in department profiles or estimates of availability. When a profile is below 80% of the estimated availability, the department is deemed to be "underrepresented" for that demographic. The benchmark data provide a reasonable, although perhaps imperfect, estimate of availability and are useful to track how well the faculty reflect national profiles. Reaching the goal is not an obligation, but being underrepresented gives a department extra impetus to aggressively improve representation.

The number of women faculty in EMS who are U.S. nationals increased steadily in absolute and relative terms over the past 10 years. Data are not available for years 2011, 2015, and 2016, so here we compare data from 2006 to 2014. The total faculty increased from 208 to 215, tenure-line appointments stayed flat (at 112 individuals) and the fixed term population rose from 96 to 103 over the period 2006 to 2014. The number of women who are US nationals increased in all categories: 39 to 56 individuals for the total population, 17 to 23 individuals in tenure-line appointments, and from 22 to 33 individuals among the fixed term faculty. As a result, the proportion of women who are U.S. nationals increased from 18.8% to 26% (total), 15.2% to

20.5% (tenure line), and 22.9% to 32% (fixed term). Overall, the College added 17 women who are counted by the Affirmative Action office, including 6 in tenure-line appointments, and 11 in fixed-term appointments. Table 3 shows these data.

Table 3. The availability of women faculty who are U.S. nationals nationally and among the total, tenure-line, and fixed-term EMS faculty. Data were provided by the Penn State Affirmative Action Office.

Year:	2006	2007	2008	2009	2010	2011	2012	2013	2014
Nationally Available	17.7%	17.6%	17.5%	28.2%	28.4%	No Data	28.7%	28.7%	28.1%
80% of National Benchmark	14.2%	14.2%	14%	22.6%	22.7%		23%	23%	22.5%
EMS Total Faculty	39/208 18.8%	44/209 21.1%	49/216 22.7%	51/217 23.5%	53/220 24.1%		51/219 23.3%	57/215 26.5%	56/215 26.0%
EMS Tenure-line	17/112 15.2%	19/115 16.5%	21/115 18.3%	20/113 17.7%	24/119 20.2%		24/115 20.9%	24/112 21.4%	23/112 20.5%
EMS Fixed Term	22/96 22.9%	25/94 26.6%	28/101 27.7%	31/104 29.8%	29/101 28.7%		27/104 26.0%	33/103 32.0%	33/103 32.0%

Starting in 2009, the proportion of women in tenure-line appointments in EMS fell below the 80% benchmark. There was a significant uptick in the national availability data that year, which jumped from 17.5% to 28.2%. National availability has stayed around 28% since 2009. In this same time period, EMS tenure-line faculty wavered around 20.5%, and was consistently below the 80% threshold, which remained near 23%. A net addition of three female tenure-line faculty appointments would bring the tenure-line percentage above the 2014 threshold. If the national benchmark were to increase in the future, the number needed to meet the benchmark would increase accordingly.

The proportion of women has increased among EMS faculty who are US nationals with fixed-term appointments. The proportion of women in this cohort was 22.9% in 2006, and climbed to 32% by 2014. The fixed-term faculty exceeded the 80% benchmark for all reported years between 2006 and 2014. In fact, the fixed term faculty has exceeded the full availability value for all years except in 2012. The most recent data (32% in 2014) puts the proportion of women in tenure-line appointments nearly 10 percentage points above the 80% benchmark (22.5%), and 4 points above full availability (28.1%). These trends are shown in Figure 3.

The consistent over representation of women in fixed term ranks relative to national availability data and relative to tenure-line appointments is noteworthy. The data suggest disproportionate placement of women in lower stature positions, that is fixed-term rather than tenure-line appointments. It is entirely possible this pattern represents a cumulative result of placement decisions reflect positive choices for and by individuals. However, these decisions have lasting consequences, as it is uncommon for faculty with fixed-term appointments to transition to

tenure-line appointments. Because the type of appointment held early in a career can limit professional options later on, they require sensitivity to individual needs for both the short and the long terms.

In summary, Affirmative Action office metrics and College data show women are consistently overrepresented relative to national availability in the fixed term population, and consistently underrepresented in tenure-line appointments. Representation within departments is generally consistent with their respective disciplines, although some departments fall below national comparative data. Most departments have increased the proportion of women faculty. The Department of Material Science and Engineering is recognized for its substantial gains in the proportion of women. At the College level, a net increase of at least three women in tenure-line appointments within the College would enable EMS to meet the 80% benchmark for 2014. Finally, the College should consider carefully the many-fold reasons and the long-term implications of decisions that lead to over representation of women in fixed-term appointments.

Hires, Promotions, and Departures of EMS Tenure-line Faculty

The committee evaluated College employment data to evaluate trends in faculty hires, promotions, and departures via resignation or retirement. These are presented in Tables 4, 5, and 6; these changes are shown in Figure 5. For the pre-tenure populations, the population increased by hires, and decreased either when individuals left or earned tenure. The number of faculty with tenure increased whenever an individual earned tenure and transferred into the group from the pre-tenure pool, or when a person was hired with tenure. For both pools, the population size decreased when a person resigned or retired. Specific reasons for resignations other than retirement were not tracked, and they could include a move to a different appointment category within EMS, a transfer to another college, or a departure from the university.

A total of 71 tenure-line faculty (53 men and 18 women) were hired from 2006 to 2016. Men hired during this period included 42 assistant professors and 11 who were hired with tenure. The 11 men hired with tenure represented 15.5% of the total hires, and 20.8% of all men hired. Women hired during this period included 17 assistant professors, and 1 individual hired with tenure. The single woman hired with tenure represented 1.4% of total hires, and 5.6% of all women hired. Women represented 28.8% of all assistant professors hired.

Table 4. The number of men and women tenure-line faculty hired by EMS from 2006-2016.

Year	Men Hired		Women Hired	
	Pre-Tenure	Tenured	Pre-tenure	Tenured
2006	3		2	
2007	5	2	2	
2008	6	1		
2009	5	1	1	
2010	2	1	2	
2011	1			
2012	2		2	
2013	7	3	2	
2014	4	1	3	
2015	7	2	3	1
Total	42	11	17	1

Promotions moved a total of 37 pre-tenure faculty into the tenured ranks. These included 9 women, representing 24.3% of all assistant professors promoted between 2006-2016. This rate is four percentage points below the proportion of women hired as assistant professors (28.8%) over the same time period. However, the proportion of women promoted shifted significantly upward over the decade. In the first half of the review period (2006-2010), 15 men and 3 women were promoted (16.7% women). Given the 6-year time line for promotion, the assistant professors promoted prior to 2010 were most likely hired before 2006. In the last 5 years of the review period (2011-2016), 6 women were promoted and 13 men were promoted, a 31.6% proportion of women. These individuals likely joined the EMS faculty in the period 2006-2010, when the proportion of women hired was 25%, and suggests women assistant professors earned promotion

at a higher rate than men. Indeed, 21 pre-tenure men were hired in 2006-2010, and 13 were promoted between 2011-2016, for an approximated success rate of 61.9%; 7 pre-tenure women were hired in 2006-2010, and 6 were promoted between 2011-2016, a success rate of 85.7%.

Inversely to the promotion rates, the resignation rate of pre-tenured men was higher than that for women. During the 2006-2016 review period, a total of 21 individuals resigned from the pre-tenure population, including 15 men and 6 women. The resigned/(resigned + promoted) ratio for pre-tenure men was 15/44 or 34.1%, and for women, it was 6/15, or 40%.

During 2006-2016, EMS hired 11 men and 1 women with tenure. When these hires are combined with the promoted population (28 men, 9 women), the women represented 20.4% of those added to the tenured faculty. Thus, the impact of women successfully earning promotion (i.e., over 85% of women hired 2006-2010, women were 24.3% of all promotions 2006-2016) was mitigated by a strongly disproportionate 8.3% of women among all faculty hired with tenure. The 11 men hired with tenure exceeded the entirety of all women added to the tenured faculty, including 9 women via promotion and 1 woman hired with tenure.

During the review period, departures of tenured faculty included 20 retirements (all by men) and 31 resignations (24 men, 7 women). At the same time, the tenured faculty gained 11 men and 1 women by hires who came with tenure, and it gained 28 men and 9 women via promotion. The tenured faculty had a net gain of 3 women (1 hire, 9 promotions, 7 resignations), and a net loss of 5 men (11 hires, 28 promotions, 20 retirements, 24 resignations). Overall, a total of 18 women were hired into tenure-line appointments during the review period, and 13 women resigned, for a total gain of 5 women. A total of 53 men were hired, 39 resigned, and 20 retired from the tenure-line faculty, for a net loss of 6.

Table 5. The number of men and women pre-tenure faculty who earned promotion or resigned from 2006-2016.

Year	Pre-Tenure Men		Pre-Tenure Women	
	Promoted	Resigned	Promoted	Resigned
2006	4	2	1	1
2007	5	1		
2008	5	2	1	1
2009		1	1	
2010	1			
2011		2	4	
2012	2	2	1	1
2013	6	2	1	1
2014	1			1
2015	5	3		1
Total	29	15	9	6

Table 6. The number of men and women with tenure who retired or resigned from 2006-2016.

Year	Tenured Men		Tenured Women	
	Retired	Resigned	Retired	Resigned
2006	1	1		
2007	2	6		
2008	3	3		
2009	3	2		
2010	1	0		2
2011	3	1		
2012	3	3		2
2013	1	2		
2014	1	0		
2015	2	6		3
Total	20	24	0	7

Faculty Departures by Resignation

Between 2006 and 2016, there were a total of 52 departures by resignation. Overall resignations were comprised of 13 women and 39 men, that is 25% of resignations were by women. Resignations by pre-tenure faculty members included 6 women and 15 men, and by tenured faculty, they included 7 women and 24 men. Thus, the percent of resignations by women were 25% for all tenure-line, 28.6% for pre-tenure, and 22.6% for tenured faculty, respectively. The rate of pre-tenure women who resigned was lower than the population as a whole (average of 32% for 2014-2016), consistent with the higher promotion rate for women. In contrast, the proportion of women among resignations by tenured faculty (22.6%) was a full 5% points higher than the proportion of women in the tenured population overall, which averaged 17.5% (for 2014-2016).

In summary, women were promoted successfully from the pre-tenure to tenured ranks over the review period, but the gains were mitigated by a disproportion of tenured women leaving EMS via resignation. Retention of an additional 2 or 3 individual women would have kept the resignation rate proportion to the representation of women in tenured positions. The elevated departure rates for tenured women and the substantially high proportion of men hired with tenure kept the percentage of tenured women below 20% in 2016, and kept the net gain of tenured women to less than 3% through the decade (from 13.7% in 2006 to 16.5% in 2016).

Time-in-Rank for Assistant Professors

The committee was interested if men and women who were associate professors earned promotion to full professor at similar rates. This information is difficult to obtain because university employment record systems do not track this. Instead, we tallied the total number of years associate professors spent in that rank during the 2006-2016 time period (Table 7). There are no clear differences by gender that emerge from the data. However, it is notable

approximately 18% of both men (18.3%) and women (17.7%) spent more than 6 years within the rank. It is also notable that over 11% of both men and women spent the entire decade in the rank of associate professor. This is longer than the six year often stated as the target promotion period.

The timing for promotion to professor from associate professor is suggested in HR 23 to be 6 years, but as shown in Table 7, the duration can be quite a bit longer for a significant number of faculty.

Table 7. The number of men and women faculty by total years spent at the rank of associate professor with tenure within the period of 2006-2016.

Years in Rank	Associate Professors	
	Men	Women
1	3	6
2	15	2
3	6	1
4	9	3
5	6	
6	10	2
7	2	1
8	5	
9	2	2
10	2	
Total	60	17
> 6 years	11	3

College Leadership

The EMS executive council is comprised of the Dean, Associate Deans, Department Heads, and Center Directors. One of the most successful changes in gender representation in EMS is in college leadership. Over the past decade, the number of women on this council increased from 1 of 9 positions (11%) to 6 of 11 positions (54%). The number of women increased substantially in the last couple years (Figure 6; Table 8) via the addition of two women as Associate Deans (Equity, Undergraduate Education), and 2 women department heads (Geography, Material Science and Engineering), and 2 center directorships now held by women. As the trend line in Figure 6 shows, this recent jump followed a number of years with around 20% representation (i.e., 2 women), which was approximately proportional to the representation of women as members of the tenured faculty.

The committee commends the persistent effort which has successfully increased the number of women in these highly visible and influential positions of leadership.

Table 8. The number of women in EMS leadership positions, including Associate Dean, Department Head, and Center Director. The position of Dean has been held by a man throughout the time period. The number of positions in 2006 were: 1 Dean, 2 Associate Deans, 4 Department Heads, 3 Center Directorships. The number of Associate Deans increased to 3 in 2008; the number of Department Heads increased to 5 in 2010.

Year	Leadership Positions Available	Women			
		Assoc. Dean	Dept. Head	Center Director	Total
2006	9			1	1
2007	9			1	1
2008	10	1		1	2
2009	10	1		1	2
2010	11	1		1	2
2011	11			1	1
2012	11			2	2
2013	11			2	2
2014	11			2	2
2015	11		1	2	3
2016	11	2	2	2	6
2017	11	2	2	2	6

Symbolic Indicators of Status

There are other ways to measure the representation status of women in the College beyond employment numbers. To consider stature more broadly, the committee chose to highlight the percentage and type of College awards won by women. These awards are visible and respected symbols of stature for EMS faculty. In addition, the committee evaluated gender representation among speakers invited by individual departments, research centers, and institutes. An invitation to speak is a valued symbol of professional regard and stature, typically reported by faculty for merit and promotion evaluations. A visit by a speaker from another institution also provides an opportunity to expose the EMS community to demographic and gender diversity among scientists, as well as diverse approaches to science and careers pathways. Failure to include adequate representation of women speakers in professional venues is a well-documented sign of gender bias in academic communities.

EMS Awards

The committee tabulated the gender of faculty recognized between 2006 and 2016 for their research, teaching, and service accomplishments. Those recognized for research were recipients of the Wilson Research Award and the EMS Breakthrough of the Year Award. Awards that recognize primarily teaching and service included: the Mitchell Award for Innovative Teaching, The Wilson Teaching Award, the Wilson Service Award, the Faculty Advising Award, and the Faculty Mentoring Award. All rank and appointments of faculty are eligible for all of these awards.

To compare award recognition nationally, the committee used data from the Association of Women in Science (AWIS). AWIS works with 18 different professional societies in STEM fields to “research patterns in awards allocations, engage in discussions of implicit bias in the selection process and pioneer processes aimed at fostering gender equity in awards.” (The Advancing Ways of Awarding Recognition in Disciplinary Societies Project: NSF Grant #0930073). Nationally, in both life sciences and the physical sciences, AWIS data show fewer scholarly awards recognized women compared to the fraction of women in the eligible population. In contrast, nationally, women are significantly overrepresented in the teaching and service awards. This disparity remained even as the total number of women has increased in all categories from 1991-2014 (Figure 7).

In EMS, 6 of 22 research award recipients were women, and 17 of 73 teaching/service award recipients were women. EMS women therefore were recognized by 27.2% of the research awards, and by 23.3% of teaching and service awards. These rates compare well with the proportion of women in the eligible population (Figure 8). Women averaged 23.8% of the EMS faculty (including pre-tenure, tenured and fixed-term-I, multiyear appointments) between 2006 and 2016.

EMS recognized both men and women proportionally with teaching awards over the last decade. Women were over represented in the research awards, but we caution the numbers are small, so the difference of one individual can make a sizable jump in the calculated percentage.

Overall, the culture of faculty recognition in EMS contrasts highly favorably with national trends. The committee commends EMS for recognizing both men and women as top contributors to the College mission of excellence in research, teaching, and service.

Invited Speakers in EMS

The committee gathered data from college units of those invited to speak in the various colloquia and seminar series in the College since 2010. Speaking series evaluated included: Department of Materials Science and Engineering colloquium, Department of Geography Coffee Hour, EarthTalks seminar series, Energy Institute Energy Exchange Seminar Series, Earth Systems Science Center brown bag seminar, Department of Geosciences colloquium, SCRiM seminar series, and Department of Meteorology and Atmospheric Science colloquium.

The proportion of women speakers increased steadily over the decade for all of EMS as a whole, and in many of the individual venues (Figure 8). Representation of women among all invited speakers surpassed the Affirmative Action office availability benchmark of 28% in 2014. Representation among departmental venues compare well with national data for the proportion of women faculty in the respective disciplines (Figure 4).

The department of Geosciences had the highest proportion of women speakers, which averaged around 40% for the past four years, well above the proportion of women on geoscience faculties nationally (18%). Geography has the second highest proportion of women speakers, and in line with the 36% of women on geography faculty nationally. Both Meteorology and Material Science and Engineering colloquia speakers included women in proportions that are well in excess of faculty in their disciplines nationally (both ca. 15%). The proportion of women invited in other seminar series is more varied. In several of the smaller venues, the committee noted that no women at all were invited, while in other instances, a high proportion were invited. It is difficult to evaluate these proportions because we are uncertain what is the appropriate comparable national data.

The committee encourage organizers of all speaking venues to be attentive to gender representation among speakers invited to present their work to EMS audiences. Overall, the number of women invited to speak in EMS seminars has increased over the last several years, and gender representations among speakers for different fields compare well to national availability data.

Gender Equity Survey of EMS Faculty

Survey Goals and Respondents

The committee distributed an on-line survey to the EMS faculty in December, 2016. The questions were drawn from surveys used by universities funded by the NSF Advance program, which required extensive assessment measures. The EMS survey had fewer questions and requests for demographic information than most of the NSF Advance surveys, and was constructed with the goal that respondents would take no more than 15-20 minutes to complete.

A total of 159 individual EMS faculty members filled out the survey, just over 57% of the total faculty (240). The respondents were comprised of 42% not-tenure-line faculty and 57% tenure-line appointments, which compares well with the population as a whole. Respondents included 38% women and 58% men, which over represented women, but still provides a sizable population of each gender: 80 men, 52 women. Respondents have worked at EMS for a wide range of duration: 32% have been employed fewer than 5 years, over half have been with EMS for ten or fewer years, and 21% of respondents indicated they have been with EMS longer than 20 years. Like the College faculty as a whole, respondents who chose to indicate their racial/ethnic identity were predominantly white; 9% of responses noted they were part of a minority demographic (Hispanic/Latino/a, Asian, or Black/African American).

Respondents are members of all departments and all units in the College. Of the total respondents, 18% did not indicate a unit. Of those who did, 12% were from EME, 15% from Geography, 20% Geoscience, 10% from Material Science and Engineering, 24% from Meteorology and Atmospheric Science departments. Representation was lower from the institutes, which have notably fewer primary appointments for faculty. They included 6% from EESI, 12% from Dutton, and 2% from the Energy institutes.

Survey results were evaluated independently by a statistical consultant. Survey results were not provided to the committee directly for purposes of confidentiality. The consultant binned data by rank, gender, and department, and cross evaluated data by gender and rank, but not any additional factors, in order to avoid any potential compromise of anonymity. The survey questions are provided in the appendix of this document, and selected results are illustrated by figures in the discussions below. Tables are provided in percentages only (rounded to the nearest integer), and only if the number of total respondents in a subcategory included 5 or more individuals. Questions requesting a yes/no answer also included a third option (e.g., “I prefer not to say”). Many questions asked the respondent to indicate his or her level of agreement with a statement. These response options included: strongly agree, agree, somewhat agree, somewhat disagree, disagree, and strongly disagree. For this report, generally the three forms of agreement or disagreement were binned as a means to compare responses for smaller subgroups of the population. Confidence limits for an extrapolation of the data beyond the sampled population are provided as a function of the % response and size of a sampled population (Appendix i). Most questions had over 100 responses in total, with usually more than 70 men and 50 women. The subset of respondents who answered questions about promotion was smaller, typically about 60 individuals.

Key Findings of Faculty Perceptions

1) Job Resources and Responsibilities

Space and Facilities

Respondents indicated general agreement that they have adequate resources to do the work of the College in teaching, service, and research (Table 9). The majority of faculty respondents (about 80-90%) agreed in some form (somewhat agree, agree, or strongly agree) that they have adequate office space. Faculty responses for teaching and research facilities were more measured, and over 10% disagreed in some form for both facilities, and included a notable spread among the forms of agreement. Overall, responses suggest tenured women were less satisfied than men with their office space and facilities for research. There was no clear pattern by gender for teaching facilities, and both male and female pre-tenure faculty expressed the least satisfaction. Response profiles are illustrated in Figure 10 (a, b, c).

Job Expectations

The survey sought to learn if faculty employees perceive that their responsibilities related to teaching and service are consistent with job expectations (Table 10). Agreement levels for teaching and for service responsibilities were high for men in all faculty ranks (tenured, pre-tenure, and not tenure-line appointments) and for women who are not in tenure-line appointments. The agreement rate was lower for women in tenure-line appointments, and a third of women in pre-tenure appointments disagreed in some form that their responsibilities are consistent with expectations.

Professional Development

The survey included a number of questions about access to resources that would be helpful to professional success. Responses reveal faculty perceptions of access to professional development resources differ by both rank and gender (Table 10). Tenured faculty (both genders) were the most positive about access to professional development resources, with about 80% responding with some manner of agreement. Both men and women members of the pre-tenure faculty were the least in agreement, about 65%. Non tenure-line appointed faculty had responses that were intermediate, about 70%, and slightly higher for men than women. Overall by gender, agreement was lower for women (71%) than for men (77%). Response profiles are illustrated in Figure 11 (a, b).

Mentoring

Mentoring can be vital to professional success, and can be accessed by both formal and informal means. The College has made available “best practices” in mentoring to the departments, and encouraged all units to adopt policies informed by these guidelines for junior faculty. Among the survey respondents (Table 9), tenured faculty expressed the most agreement (about 80%) than the other ranks, and pre-tenure had the lowest rate of agreement (about 65%). Fixed-term

faculty had intermediate agreement response rates. When evaluated by gender, the data show women generally express lower agreement (66% overall) than men (75% overall). Response profiles are illustrated in Figure 11 (a, b).

Contributions Valued by Colleagues

Respondents generally perceived that their work is valued by colleagues. Agreement for individual questions about research, teaching and service revealed pervasively high agreement (Table 11). Men in all ranks strongly expressed that their work was valued. Women expressed similarly strong agreement, with one exception: 71% of women who are not in tenure-line appointments indicated they agreed their teaching was valued. In all other ranks, 83% or more of the women agreed their work was valued by colleagues.

In summary, survey responses indicated that faculty are generally positive about access to facilities for research and teaching. However, when evaluated by rank and gender, it becomes clear that tenured women were less satisfied with their research facilities, and an even lower proportion of pre-tenure women felt their teaching facilities were suitable. A third of women of all ranks disagreed that their service responsibilities were appropriate for their job expectations. Perceptions were moderate-to-low for all faculty regarding adequate resources and access to professional development and mentoring, and this was especially the case for faculty in the pre-tenure rank.

Table 9. Survey responses by rank and gender regarding access to resources.

Rank	Q4-1		Q4-2		Q4-3	
	I have sufficient space and facilities to conduct my research		I have sufficient office space for my job responsibilities		(I have access to classrooms or on-line facilities suitable for my teaching methods, style and discipline	
Agree (all forms)	% Men	% Women	% Men	% Women	% Men	% Women
Tenured	90	80	98	93	82	93
Pre-Tenure	79	83	92	100	79	67
Not Tenure-line	89	92	91	89	95	96

Table 10. Survey responses by rank and gender regarding job expectations and professional support.

Rank	4-4		Q 4-5		Q4-6		Q4-7	
	My teaching responsibilities are consistent with my job expectations		My service responsibilities are consistent with my job expectations		Support for professional development is adequate		I have access to mentors on campus who provide clear, useful career advice	
Agree (all forms), %	Men	Women	Men	Women	Men	Women	Men	Women
Tenured	92	87	86	67	81	80	81	80
Pre-Tenure	86	67	93	67	64	67	64	67
Not Tenure-line	95	100	96	100	75	69	75	69

Table 11. Survey responses by rank and gender regarding perceived value of work by colleagues.

Rank	Q13-1		Q13-2		Q13-3	
	Colleagues view my research contributions as valuable		Colleagues view my teaching contributions as valuable		Colleagues view my service contributions as valuable	
Agree (all forms), %	Men	Women	Men	Women	Men	Women
Tenured	92	93	83	93	90	87
Pre-Tenure	86	83	100	83	92	83
Not Tenure-line	90	88	95	71	87	91

2) Perceptions of Promotion

Faculty who have been promoted within EMS

Respondents were asked to identify if they a) had been promoted at some point during their time of employment in EMS or b) were eligible for promotion in EMS in the future. These two groups of individuals were asked about their perceptions about the process. Responses were evaluated by one factor only (i.e., gender, rank, or department, but not two of these), because each population was approximately half of the total number of respondents, and therefore the number of responses in any subgroup would be small.

Of respondents who had been promoted, the patterns indicated expectations were clear to most men and most women, although a notable percentage of each expressed strong disagreement (Table 12). Clarity varied more strongly by rank, with 90% and 86% of tenured faculty agreeing department and college expectations were clear. For faculty who are not on tenure-line

appointments, rates were much lower, with 65% and 76% agreement departmental and college expectations were clear.

Faculty agreement that promotion expectations are applied consistently was about 75% overall, for both men and women. Women were more likely than men to strongly disagree expectations were applied consistently: 13% women and 2% of men. When the perception of fairness was evaluated by rank and by department or unit, a stronger pattern emerged. Only half (50%) of the faculty respondents who are not on the tenure track felt promotion expectations were consistently applied, while 85% tenured faculty agreed that they were.

There was more variability in responses about promotion-relevant feedback, both prior to and following promotion. While similar numbers of men felt feedback before and after promotion was constructive, women were mixed. More women indicated feedback received before promotion was constructive than that received after promotion. 18% of women disagreed that feedback was constructive for both prior to and following promotion. Non-tenure-line faculty indicated feedback was constructive at a lower rate than tenured faculty, and a notable low of 47% of non-tenure-line faculty indicated agreement that feedback was constructive after promotion.

Departmental patterns differed widely for all questions about the clarity, fairness, and feedback associated with a prior promotion (Table 12). In all categories, responses were highly positive for Materials Science & Engineering, Meteorology and Atmospheric Sciences. Responses were lower or more mixed for Geography and Geosciences, but still generally positive. Levels of agreement were lower still for faculty with primary appointments in one of the institutes (ESSI, Energy, Dutton). Faculty respondents in the department of Energy and Mineral Engineering stand out for their significantly lower rates of agreements for all questions about clarity and consistency of expectations, and for both questions about feedback.

Faculty who are eligible for future promotion in EMS

For faculty who are eligible for promotion sometime in the future, their perceptions about expectations, fairness and feedback were generally low and variable (Table 13). Although most men indicated agreement in some form that expectations for promotion are clear, the rate was modest, with 52% and 66% of all men who agreed unit and college expectations were clear. Women overall had lower rates: 38% and 56% viewed the unit and college expectations as clear. These perceptions show an important pattern when considered by faculty rank or appointment type. Notably, pre-tenure faculty generally expressed positive views of expectations, with 74% and 90% agreed unit and college expectations were clear. Agreement rates were significantly lower for the tenured faculty eligible for promotion. Of these faculty, only 43% and 28% agreed in some form that unit and college expectations were clear. This population includes mostly associate professors. The response difference between pre-tenure and tenured faculty suggests EMS is doing a comparatively better job making expectations available and clear to junior tenure-track faculty, but effort is needed to communicate promotion expectations to associate professors.

Perceptions that promotion expectations are applied consistently, an important measure of perceived fairness, were similar for the eligible population to the previously promoted faculty.

Pre-tenure faculty have the strongest perception of fairness, with 100% agreeing in some form that expectations are applied consistently. Faculty not on tenure-track appointments have the lowest rate of perceived fairness, 50%.

Faculty who are eligible for promotion have modest to low rates of agreement that feedback to date has been constructive. Overall, agreement for men (66%) and women (51%) was lower than for the population recalling a previous promotion. Similar to the data about clarity of promotion expectations, tenured faculty who are eligible for promotion have far lower positive response rates than pre-tenure faculty. Again, this suggests the College is serving its pre-tenure faculty relatively well with regards to information about promotion, but that more effort is needed to inform and provide promotion-relevant feedback to associate professors.

Like the perception of fairness, faculty of both genders who are not on the tenure track have the lowest rates of perceived usefulness of feedback. These indicators signal significant need to clarify expectations and provide promotion-relevant feedback to this population.

Positive responses for faculty currently eligible for promotion varied when considered by department or unit. Overall, agreement rates were notably lower and more variable than the previously promoted population. In this population, EME had overall lowest agreement rates for clarity, fairness, and feedback questions, while rates were more mixed for the remainder of the departments. Faculty who agreed expectations were consistently applied fell below 50% for EME, Geography, Meteorology and Atmospheric Sciences, and all institute respondents, and were about 60% for Geosciences and Material Science & Engineering.

In summary, there are segments of faculty who have experienced or are eligible for promotion with relatively negative perceptions about the process. Responses for the population of both promoted and promotion-eligible faculty in EME were significantly lower than other units.

Tenured faculty who are eligible for promotion (i.e., associate professors) have the least agreement about clarity of promotion expectations and constructive feedback. On a more positive note, pre-tenure faculty appear to be getting better information and have a stronger sense of fairness about the promotion process.

Both promoted and promotion-eligible faculty who are not on the tenure track have generally lower rates of agreement than tenure-track appointments about clarity and consistency of promotion expectations or usefulness of feedback.

Table 12. Survey responses by gender, rank, and department of respondents who have been promoted within EMS on their perceptions of the promotion process.

Question		Q6-1	Q6-2	Q6-3	Q6-4	Q6-5
Respondent has been promoted						
Respondent group	Response	Promotion expectations in my department or unit were clear	Promotion expectations in the College were clear	Promotion expectations were applied consistently	The pre-promotion feedback I received was constructive	The post-promotion feedback I received was constructive
Men (all)	% Agree (all forms)	83	83	77	78	75
Women (all)		78	83	73	74	59
Men (all)	% Strongly disagree	7	2	2	7.5	6
Women (all)		9	4	13	18	18
Tenured	% Agree (all forms)	90	86	85	78	74
Not Tenure Track		65	76	50	67	47
EME		29	43	43	14	20
Geography		100	89	89	100	55
Geosciences		88	81	75	73	72
Material S & E		100	100	90	89	90
Meteorology		100	100	100	92	90
All Institutes		50	88	50	71	60

Table 13. Survey responses by gender, rank, and department of respondents who are eligible to be promoted within EMS on their perceptions of the promotion process.

Question		Q8-1	Q8-2	Q8-3	Q8-4
Respondent is eligible for promotion in the future					
Respondent group	Response	Promotion expectations in my department or unit are clear	Promotion expectations in the College are clear	Promotion expectations are applied consistently	The pre-promotion feedback I have received to date is constructive
Men (all)	% Agree (all forms)	52	66	73	66
Women (all)		38	56	70	51
Men (all)	% Strongly disagree	6	3	8	4
Women (all)		14	7	13	11
Tenured	% Agree (all forms)	43	28	83	35
Pre-Tenure		74	90	100	73
Not Tenure Track		37	54	50	63
EME		20	50	33	40
Geography		54	53	40	55
Geosciences		70	80	57	63
Material S & E		20	67	60	60
Meteorology		50	44	33	71
All Institutes		67	73	33	75

3) Perceptions of Fairness and Respect

Fairness in Teaching and Service Responsibilities

Two questions served to assess faculty perceptions about the distribution of teaching and service responsibilities (Table 14). In all ranks, and for both teaching and service, women had lower rates of agreement than men. The positive response rates were more similar for men and women faculty with tenure and for non-tenure-line faculty. In contrast, there were striking differences in positive responses for pre-tenure men and women. There is a nearly 20-percentage point

spread between men and women (86%, 67%) about teaching, and an over 60-point spread (92%, 33%) regarding service. Based on this finding, all departments should check to be sure teaching and service responsibilities are clearly and equitably distributed among pre-tenure faculty. In particular, units should make sure that pre-tenure women faculty are not excessively asked to participate in service relative to their male peers, as this is a well-recognized and common occurrence in academic communities.

This finding is echoed in the responses regarding the perceptions of mentoring efforts by faculty (Table 15). Many tenured men and women serve as a mentor (92%, 87%), although both groups were less positive that their efforts are valued (67%, 64%). About a third of pre-tenure men and women serve as mentors to other faculty, and 83% of men perceive this effort is valued. Notably, no pre-tenure women agreed in any form that their mentoring work is valued.

Respect by Colleagues

A strong organizational culture that foster respect of all individuals is critical for a climate of inclusion for all genders and all forms of diversity. The survey asked respondents to indicate their perception of whether colleagues treat them with respect. This question generated mostly positive responses, with nearly all faculty indicating some form of agreement. When evaluated by rank, tenure-line and not-tenure-line faculty showed slightly different patterns but generally strong agreement (Table 14). For both tenure-line faculty and fixed-term faculty, over 75% of the respondents either strongly agreed or agreed, and no strong trend by rank emerges. Response profiles are illustrated in Figure 13.

Total forms of agreement were indicated by over 97% of all men, and by 91% of all women, and agreement rates were high in most rank categories, although a bit lower for pre-tenure women. However, differences in agreement become more apparent in the spread in the degree of the positive responses (Table 16). For all men, 83% answered they strongly agreed or agreed, while for all women, less than 64% either strongly agreed or agreed. For men, about 14% somewhat agreed with the statement, while over 27% of the women somewhat agreed. Thus, the different spread in positive responses reveals men had strongly affirmative responses, while women's positive responses were more muted. Response profiles are illustrated in Figure 14.

In summary, one third of tenured women and two thirds of pre-tenure women faculty perceive the distribution of service responsibilities is unfair. Pre-tenure women especially, but also all tenure-line faculty had low rates of agreement that the institution values their efforts at mentoring. Overall, faculty indicate there is a good culture of respect in EMS. However, the pattern of responses clearly show that men were more strongly affirming, while agreement by women was less positive in nature.

Table 14. Survey responses by rank and gender regarding fairness in job responsibilities and respect by colleagues.

Rank	Q13-4		Q13-5		Q14-1	
	Teaching responsibilities are distributed fairly and appropriately to job expectations		Service commitments are distributed fairly and appropriately to job expectations		I am treated with respect by my colleagues	
Agree (all forms), %	Men	Women	Men	Women	Men	Women
Tenured	75	73	73	67	96	93
Pre-Tenure	86	67	92	33	100	83
Not Tenure-line	95	82	86	86	96	91

Table 15. Survey responses by rank and gender regarding perceptions of mentoring contributions.

Rank	Q14-5		Q14-6	
	I serve as an informal or formal mentor to faculty colleagues		My mentoring contributions are recognized and valued by my dept. or unit.	
Agree (all forms), %	Men	Women	Men	Women
Tenured	92	87	67	64
Pre-Tenure	33	33	83	0
Not Tenure-line	71	68	57	73

Table 16. The full range of survey responses by gender regarding perceived treatment with respect.

Q14-1	Strongly Agree	Agree	Somewhat Agree	Somewhat Disagree	Disagree	Strongly Disagree
I am treated with respect by my colleagues						
% Men	43	41	14	3		
% Women	29	35	27	2	4	4

4) EMS Organizational and Professional Climate

A series of questions in the survey aimed to elucidate perceptions about the professional and organizational climate for men and women in EMS. Questions asked for faculty perceptions about their connectivity within their department community, transparency and opportunity to participate in governance and leadership, and perceptions of the commitment of the community to the success of both men and women. These included questions about isolation and networking in the unit or department, and about faculty perceptions of support and opportunity for all EMS faculty.

Isolation and Networks

Questions addressing feelings of isolation revealed striking patterns among faculty populations. All groups indicated high levels of agreement that they feel isolated in their department or unit, although differences are large by rank and gender (Table 17). Tenured faculty members have the lowest agreement rate of 24%, but this still means nearly a quarter of all associate professors and professors agreed in some form that they feel isolated in their department or unit. For both pre-tenure faculty and fixed-term faculty, 50% of the respondents agreed in some form that they feel isolated in their unit. These indications of feelings of isolation show strong differences by gender. Overall, 28% of men, and 51% of women indicated agreement with the statement they feel isolated, and isolation was prevalent (83%) for pre-tenure women. Response profiles are illustrated in Figure 11.

When binned by department or unit, indicators of isolation show marked patterns. The combined responses for the EMS institutes (Energy, EESI, Dutton) and the department of Energy and Mineral Engineering all had pronounced rates of isolation. More than 60% of all respondents in these categories indicated some form of agreement with the statement of isolation. Although other units had lower rates, the levels of agreement are still notable: 40% Geosciences responses indicated some form of agreement, and rates were within 20-30% for remaining departments.

The respondents indicated modest to low levels of agreement that there are opportunities to be included in informal networks (Table 17). These response rates show strong differences by gender, with women consistently less likely than their peers to agree they are included in networks. Faculty perceptions about the role in gender indicates that women in all ranks sense men are more likely to be involved in networks than women. Women with tenure were the most likely to indicate gender plays a role in networking opportunity, a response pattern that echoes the strong difference in isolation reported by tenured men and tenured women.

Faculty expressed similar patterns of responses about networking, access to professional development, and mentoring by unit (Table 18). Feelings of isolation are widespread through the College, even though challenges regarding isolation are clearly concentrated in some units. There is a correspondence between feelings of isolation and perceptions of access to both mentoring and professional development resources. These data emphasize the need to build stronger connections within units and across the EMS faculty community, and investments in professional development and mentoring resources provide an opportunity to do so. Response profiles are illustrated in Figure 12.

Table 17. Survey responses by rank and gender related to isolation and networking in units.

Rank	Q14-2		Q 14-4		Q 15-5	
	I feel isolated within my EMS dept. or unit		I have opportunity to be included in informal networks		Men are more likely than women to be involved in informal networks	
Agree (all forms), %	Men	Women	Men	Women	Men	Women
Tenured	20	27	78	60	44	73
Pre-Tenure	36	83	86	50	42	50
Not Tenure-line	41	53	95	81	18	43

Table 18. Survey responses by gender, rank, and department or unit comparing isolation responses with perceptions of networking, access to professional development, and mentoring.

Respondent group	Q4-6	Q4-7	Q14-2	Q14-4
	Access to Professional Development	Mentorship Access	Feel Isolated in Dept. or Unit	I have been given the opportunity to be included in informal networks
% (all forms)	Agree	Agree	Agree	Agree
Men (all)	77	75	28	85
Women (all)	71	60	51	73
Tenured	80	76	24	75
Pre-Tenure	65	65	50	75
Not Tenure Track	73	68	50	83
Energy & Mineral Engineering	44	35	69	50
Geography	74	71	21	79
Geosciences	83	80	43	92
Material S & E	92	75	31	77
Meteorology	73	69	29	72
EESI	75	86	63	75
Dutton	86	85	31	100
Energy	33	33	66	100

Opportunities for Participation and Leadership

The survey included questions that sought to learn about faculty perceptions of the professional culture with the EMS organization. These included questions about opportunities to participate in the governance of units and EMS through opportunities to be included in decision-making processes, committees, and leadership. Data are reported in Tables 19, 20, and 21.

In almost all questions, men responded with relatively high levels of agreement about opportunities for engagement, and about institutional support for women's opportunities. Women provide more mixed responses, and had generally lower levels of agreement to the same set of questions. Faculty not in tenure-line appointments of both genders and pre-tenure women had lower rates of agreement that they feel like full and equal participants in decision making. Women in all rank categories agreed at lower rates that departmental governance is transparent. Women of all ranks also agreed at lower rates relative to men that leadership opportunities in their department or unit are equally available to both genders. On a positive note, the faculty as a whole perceived that women and men have equal opportunity to serve on college committees, although both responded at somewhat lower rates about the opportunities for women in college leadership positions.

Perceived discrimination in the workforce may underlie the greater sense of isolation and diminished sense of respect indicated by women (Zimmerman et al., 2016), particularly in the more male-dominated tenured population. Overt discriminatory behaviors are more likely to be reported and acted upon by unit supervisors. In contrast, subtle forms of interpersonal discrimination are increasingly identified as damaging to workers from underrepresented groups, including women. These can include non-verbal and verbal behaviors that result in incivility, unpleasant social interactions, or exclusion from workplace interactions (Zimmerman et al., 2016; O'Brien et al., 2016).

Subtle discriminatory behaviors, sometimes called "microaggressions," can isolate individuals from social reciprocity, and reinforce perceived differences in social stature. Stigmatized individuals end up with diminished access to resources and information within the academic organization, greater social and intellectual isolation, diminished access to mentorship, and slower promotion (O'Brien et al., 2016). Personal health consequences resulting from exposure to subtle discrimination can be pernicious because attribution of the motivation for the behaviors tends to be highly ambiguous, leading recipients to doubt their own experiences. The resulting increased personal stress and related negative professional and health impacts may be as significant as for overt discrimination (Crocker et al., 1991; O'Brien et al., 2016). Subtle discrimination can have deleterious impacts on the organizational culture. Perceived discrimination can cause decreased job satisfaction, greater intentions by employees to leave the organization, lower organizational commitment, and decreased engagement and citizenship behaviors (Ensher et al., 2001; Willness et al., 2007; Cortina et al., 2011). On a positive note, remediation efforts to prevent subtle discrimination can be effective at mitigating negative consequences for individuals and organizational culture. A responsive supervisor and supportive colleagues can significantly mitigate the stress and other negative effects of interpersonal discrimination (Miner et al., 2012; O'Brien et al., 2016).

In summary, both men and women respondents experience isolation within their departments or units at high rates. About one in four men and half of all women currently experience isolation. Modest to low rates of men and women indicated they have opportunities for inclusion in informal networks. The experience of isolation corresponds by rank, gender, and department with faculty perceptions of insufficient access to professional development opportunities and adequate mentoring. Experiences of isolation may be tied to responses indicating lower agreement in perceived transparency and opportunities to engage in governance. Many faculty within EMS feel excluded and less connected to each other and to the organization as a whole. This is a significant finding, and it raises the concern that respondents experience subtle interpersonal discriminatory behaviors or incivility that are known to cause isolation within organizations. Both individuals and organizational cultures suffer from occurrences of interpersonal discrimination, and the committee strongly urges the College to address factors that contribute to feelings of isolation by all faculty.

Table 19. Survey responses by rank and gender related to perceptions of decision making and governance.

Rank	Q 14-3		Q 15-1		Q 15-8	
	I feel like a full and equal participant in decision-making		Dept. or unit governance is conducted with transparency		Women and men have similar opportunity to participate in governance and policy decisions	
Agree (all forms), %	Men	Women	Men	Women	Men	Women
Tenured	78	80	78	60	92	67
Pre-Tenure	78	50	86	50	79	100
Not Tenure-line	61	63	83	68	86	73

Table 20. Survey responses by rank and gender related to perceptions of professional support for women.

Rank	Q 15-2		Q 15-3	
	My dept. or unit makes an effort to retain and promote women		Most of my colleagues are serious about treating men and women faculty equally	
Agree (all forms), %	Men	Women	Men	Women
Tenured	90	93	100	87
Pre-Tenure	79	67	79	83
Not Tenure-line	80	76	100	84

Table 21. Survey responses by rank and gender related to perceptions of leadership opportunities.

Rank	Dept. or Unit		College			
	Q 15-9		Q 16-1		Q16-2	
	Men and women have similar opportunities for leadership roles		Women and men have similar opportunity to participate in governance and service through college committees		Men and women have similar opportunities for leadership roles	
Agree (all forms), %	Men	Women	Men	Women	Men	Women
Tenured	83	67	84	86	76	80
Pre-Tenure	79	60	86	100	79	75
Not Tenure-line	86	77	90	92	85	89

5) Sexual Harassment

Sexual harassment has been implicated as a deterrent for women in the STEM fields and especially for women who conduct field science (Bohannon, 2013), as well as more generally for women throughout the US workforce. In STEM fieldwork, women identified perpetrators more frequently as men with supervisory positions in the organizational hierarchy than they individuals who were peers, of lower stature, or not affiliated with the organization (Bohannon, 2013). The committee sought to learn faculty experiences and awareness of sexual harassment within the EMS community. Respondents were asked to indicate their experience or awareness of sexual harassment specifically during their time of employment with EMS (Table 22).

No men indicated they had experienced harassment from another member of the College, while 4% of women indicated they had been the target of sexual harassment from an EMS colleague. Further, 4% of men, and 16% of women indicated they had been the target of sexual harassment by someone outside of the EMS community. Thus, at least 1 in 6 women in EMS have directly experienced sexual harassment during their time of employment with the College.

Awareness of others who have been harassed within EMS was significantly higher by women (28%) than men (12%), as it was for someone harassed but not involving an EMS colleague (9% men, 20% women). Overall, about one in four women has direct awareness of a female colleague who has experienced harassment.

The prevalence of sexual harassment experienced by EMS women faculty (1 in 6) is lower than estimates for the national workforce (about 1 in 4 women experience sexual harassment in their workplace; ABC-Washington Post poll, 2011; National Women’s Law Center fact sheet, 2016). This may reflect that the question was restricted to respondents’ time of employment with EMS, which was 10 years or less for about half of the respondents. Sexual harassment of workers is more prevalent in lower-wage service professions, and importantly for EMS, also in higher-wage

jobs that are traditionally held by men, such as in the mining industry (OSHA, 1999). Nationally, about 18% of complaints regarding sexual harassment are filed by men, and 82% by women, although it is estimated 70% of women who have been harassed do not report it to their supervisors (Huffington Post and YouGov poll, 2013).

In summary, sexual harassment is a reality in the lives of women faculty in EMS. This reality is present both through their own personal experiences and through their awareness of the experiences of others. EMS faculty are not free from the consequences of destructive behaviors by harassing individuals documented at other schools, for women in the STEM population, and nationally. Negative impacts of sexual harassment within work units can include damaged workplace relationships and greater conflict, lower sense of fairness, and decreased team performance, and for individuals, it can lead to diminished work performance and greater stress and associated health impacts, and finally, for the employer, harassment can result in significant financial liability (NWLC fact sheet; Cortina and Berdahl, 2008; Cortina and Leskinen, 2013).

It is vital to make sure the College of EMS has in place effective reporting, investigation, education, and enforcement policies for sexual harassment. Penn State has a stated zero-tolerance for any form of sexual harassment, and has recently reinforced its commitment to this policy for women on campus via the Affirmative Action and Title IX offices.

Table 22. Survey responses by gender regarding experiences and knowledge of sexual harassment.

	Q18		Q19		Q20		Q21	
	I have been a target of sexual harassment from members of our college		I have been a target of sexual harassment not involving members of our college		I have personally witnessed or know someone within EMS who has been a target of sexual harassment involving members of our college		I have personally witnessed or know someone within EMS who has been a target of sexual harassment not involving member(s) of our college	
%	Men	Women	Men	Women	Men	Women	Men	Women
Yes	0	4	4	16	12	28	9	20
No	99	94	94	82	83	70	91	80
Prefer not to say	1	2	2	2	5	2	0	0

6) Satisfaction with EMS, Career Choice, and PSU

The survey asked a series of questions to learn faculty perceptions about their choices regarding an academic careers, EMS, and PSU. These questions were intended to help assess overall sense of satisfaction, and contentment of EMS academics.

Most faculty of all ranks expressed satisfaction with EMS, PSU, and their decision to follow an academic career (Table 23). Pre-tenure men expressed the greatest satisfaction (100%, 92%, 92% agree for EMS, careers, and PSU, respectively) about the institution and career choice. Tenured men agreement rates were similar for EMS and career choice (88%, 97%), but lower for PSU (79%). Women in tenure-line appointments expressed positive but slightly lower levels of satisfaction. For tenured women, satisfaction rates were slightly less than tenured men (87%, 93%, 73%). Pre-tenure women had lower rates than all the other tenure-line populations (80%, 83%, 80%). Overall satisfaction for non-tenure-line faculty was strong for EMS (100% men, 97% women), but generally lower for their choice of an academic careers (75%, both men and women), and PSU (87% men, 78% women).

By department, patterns of satisfaction tend to echo other measures of faculty wellbeing, especially isolation. Faculty in Material Science and Engineering have uniformly strong rates of satisfaction with EMS, their career choice, and PSU. Geoscience and Meteorology and Atmospheric Sciences has slightly lower, but still positive, rates of satisfaction. Faculty in Energy and Mineral Engineering are moderately satisfied, while Geography faculty expressed lowest rates of satisfaction with EMS, and modest satisfaction with PSU, they were strongly positive about their choice of career.

Retention of EMS Faculty

The College has top-ranked departments, comprised of faculty who are active researchers and who care significantly about excellence in education. Thus, the EMS faculty includes many individuals who may be offered opportunities at other institutions. In addition, the rural geographic location of State College can influence retention for some individuals, while the small professional community in the region has implications for family, social, and partner professional opportunities. It was expected that a significant fraction of the population would have considered leaving at one time or another.

Many faculty have seriously considered leaving EMS (Table 23). These include 41% of men with tenure, 33% of men on the tenure track, and 46% of non-tenure-line men faculty. Rates are significantly higher for women faculty of all ranks. 87% of women faculty with tenure, 80% of pre-tenure women and 55% of women not in tenure-line appointments have seriously considered leaving EMS.

Among the departments, most (> 70%) of Energy and Mineral Engineering and Geography faculty and not quite half (48%) of Geosciences faculty members had considered leaving EMS. Rates in Meteorology and Atmospheric Sciences (38%) and Material Science and Engineering (27%) were notably lower, consistent with their stronger indicators of faculty satisfaction with both EMS and PSU.

In summary, the majority of women at all ranks, and especially tenured women, have considered leaving EMS. This finding reinforces the concern that emerges from EMS employment data regarding retention, and survey results that suggest women have a generally lower perception of respect, lower rates of satisfaction with the institution, greater feelings of isolation, and lower perceptions of fairness in service and teaching responsibilities and in the promotion process.

Table 23. Survey responses by rank, gender, and department or unit regarding possible departure and overall satisfaction with EMS, PSU, and academic careers.

Respondent group	Q16-3	Q23	Q25	Q26
	I would recommend employment at EMS to a colleague	Have you ever seriously considered leaving EMS?	If you could do it over again, would you choose an academic career?	If you were to begin your career again, would you still want to be employed at PSU?
	% Agree (all forms)	% Yes	% Yes	% Yes
Tenured Men	88	41	97	79
Tenured Women	87	87	93	73
Pre-tenure Men	100	33	92	92
Pre-tenure Women	80	80	83	80
Not Tenure-line Men	100	46	75	87
Not Tenure-line Women	97	55	75	78
Energy & Mineral Engineering	69	73	67	53
Geography	48	74	100	79
Geoscience	96	48	96	81
Material S&E	100	27	100	100
Meteorology	96	38	81	84
Tenured	88	55	96	79
Pre-tenure	95	47	89	89
Not Tenure-line	96	52	72	81

Recommendations

- Continue efforts to hire pre-tenure women; strive for gender balance among faculty hired with tenure.

All units in the College of EMS have worked to hire women into pre-tenure faculty positions. The committee commends these efforts, and encourages they be reinforced by following good practices for hiring a diverse faculty. These include broad job descriptions and proactive advertisement of the position to a diverse pool of potential candidates.

Implicit bias is prevalent in academia, and committed by men and women alike. Bias can influence perceptions of biographical materials and the composing and reading of recommendation letters. The College should require any faculty member who wishes to serve on a search committee to first receive training raising their awareness of implicit bias. We note that bias and discrimination in hiring related to gender and diversity can intersect, such that some populations tend to receive more bias than others. The College is encouraged to educate leadership in all units to have a greater awareness of both gender and diversity concerns, and how minority women may experience gender bias differently than majority (white) women.

Men hired with tenure outnumbered women promoted within the College from assistant professor to associate professor. College leadership should be attentive to this disparity, and work to ensure that hiring of faculty with tenure include far better gender representation. The College should advocate for university funds when there are targets of opportunity to hire women into the tenured ranks.

- Focus resources on professional development measures to support the success of all faculty, and to help retain tenured women.

Tenured women leave the College at rate that is disproportionate to their representation in the population, and a vast majority of tenure-line women have seriously considered leaving EMS. Retention of tenured women needs to be a priority for all units, and this can be fostered by measures that will also support the professional success of all faculty.

Investments in professional development should prioritize measures to enhance scholarship, such as support for travel to professional workshops, meetings, or research opportunities. This could also include training and other forms of support for mid-career faculty to help them adjust to changing funding climate from federal agencies and build skills for getting research funds from other sources such as foundations and philanthropic entities.

In addition, the College should develop ways to help all faculty at times of personal and professional transitions. EMS leadership is generally attentive to lessening job responsibilities during times of personal or family illness, pregnancy, elder care, loss, or other demanding occurrences. However, the College could strengthen efforts to help such individuals after these events as they transition back to reclaim research and scholarship productivity. We suggest a small grants program could include support following major transitions of all types, including

significant professional transitions, such as stepping down from major administrative responsibilities. Finally, the College could also foster opportunities to train members of the early tenured ranks in order to empower them as EMS and disciplinary leaders to promote excellence in research, teaching, and service.

- Clarify promotion expectations and provide more promotion-relevant feedback for associate professors and for non-tenure-line faculty who are eligible for promotion.

The survey revealed a sense of discouragement within the population of faculty who are eligible for promotion, particularly among the tenured faculty, and the faculty who are not tenure line. This calls for clear and open communication about promotion expectations, and regular means that provide constructive feedback and inform faculty about their progress towards advancement. Review of candidates should focus on quality and quantity of scholarly products, and not be tied to time since degree or hire.

Measures of merit are subjective and subject to cultural bias. Individuals responsible for reviewing candidates for promotion should be trained to help them recognize implicit bias in their own thoughts and in other forms, such as letters of recommendation, SRTE scores, and written teaching evaluations.

- Foster faculty citizenship by formally valuing mentoring and other efforts that enable the success of others.

Although the College has a strong set of best practices for mentoring, enforcement of these principles is uneven through departments and units. Greater accountability is needed from department and unit leaders. Further, mentoring should be formally recognized in merit review process for all faculty. Women perceive that their service work, including mentoring, is less valued than their male peers. Departments and units should make sure that both formal service responsibilities (committee work, etc.) and informal service work (such as extra-committee counseling to provide emotional, academic, or career support for students, etc.) are equitably distributed, recognized, and rewarded.

The support of peers and especially supervisors can go a long way to mitigate negative consequences of discriminatory behaviors. College leadership should be attentive to subtle behaviors or incivility between colleagues that can denigrate individuals and cause social isolation. Leadership should also clearly communicate to all faculty such behaviors, no matter how subtle, will not be tolerated in EMS.

The committee recommends EMS Faculty Activity reports include formal recognition of efforts by faculty that build organizational citizenship. These can include activities that strengthen inclusion and diversity, and those that lower intellectual and cultural isolation within and between units.

- Foster faculty citizenship by making transparency and diversity a priority in EMS governance and policy.

A lack of transparency emerges in both the survey responses and in many of the individual comments (not included in this report). The College should ensure that all policies (hiring, tenure, promotion, harassment/discriminations, space allocation, teaching assignments, and so forth) are both transparent and easily available to all.

Salary distribution was not covered by this review process, however, in regard to other College resources, women indicated lower agreement that their research and teaching facilities were adequate compared to men. The committee encourages EMS leadership to ensure female faculty are paid equitably to their male peers, and that they have access to the same space, resources, promotion, and recognition as their male peers.

Faculty are often reluctant to be strongly involved in governance at all levels. This is likely a consequence of elevated stress and high workloads experienced by many EMS faculty, especially in the tenure-line ranks. The committee encourages College leadership to address faculty workload stress, and also to recognize those who do contribute their time to governance activities. A higher level of engagement in committees at the college level can empower faculty to help EMS develop a working environment that values a diverse workforce. Faculty are also encouraged to engage in college-level governance vehicles to develop work/life policies that respond better to family, care-taker, personal, health, or other needs.

- Ensure there are effective reporting, investigation, education, and enforcement policies for sexual harassment. Penn State has zero tolerance for any form of sexual harassment.

National data show sexual harassment in academia is most commonly perpetrated by supervisors on lower stature females, such as by an advisor on his postdocs or graduate students. Women faculty are more likely to be called on for informal emotional and other forms of support in such cases. The College should clearly communicate and strongly enforce Penn State's zero tolerance policy for all forms of sexual harassment.

- Support and enforce efforts for inclusion and diversity by visible and frequent communication of priorities and data.

EMS is encouraged to become a campus leader in visibly supporting diversity by publically releasing data on diversity regularly. The committee also encourages EMS to invest in a staff position to enable the acquisition and analysis of EMS gender and diversity data, national comparison data, and metrics that can be used to evaluate Affirmative Action compliance.

EMS leadership is encouraged to communicate diversity and inclusion priorities regularly and visibly to the entire College. As part of this effort, the committee recommends the College issue an annual "state of EMS diversity" report that highlights progress, identifies opportunities and challenges for continued efforts, and reinforces values of inclusion to the EMS community.

References

- ABC News & Washington Post, One in Four U.S. Women Reports Workplace Harassment (Nov. 16, 2011). <http://www.langerresearch.com/uploads/1130a2WorkplaceHarassment.pdf>.
- Bohannon, J. (2013) Survey of peers in fieldwork highlights an unspoken risk. *Science* 340, p. 265.
- Cortina, L.M. & Berdahl, J.L., (2008) Sexual Harassment in Organizations: A Decade of Research in Review, 1 the Sage Handbook of Organizational Behavior 469, 484 (J. Barling & C.L. Cooper eds.).
- Cortina, L.M. & Leskinen, E.A. (2013) Workplace Harassment Based on Sex: A Risk Factor for Women's Mental Health Problems, in *Violence Against Women and Mental Health* 139 (C. Garcia-Moreno & A. Richer-Rössler eds).
- Cortina, L.M., Kabat-Farr, D., Leskinen, E.A., and Huerta, M. (2011) Selective incivility as modern discrimination in organizations: evidence and impact. *J. Manag.* 39, 1579-1605. doi:10.1177/01492063114 18835
- Ensher, E.A., Grant-Vallone, E.J., and Donaldson, S.I. (2001) Effects of perceived discrimination on job satisfaction, organizational commitment, organizational citizenship behavior, and grievances. *Hum. Resource Dev. Q.* 12, 53–72. doi: 10.1002/1532-1096(200101/02)12
- Huffington Post & YouGov, Poll of 1,000 Adults in United States on Workplace Sexual Harassment (Aug. 2013). http://big.assets.huffingtonpost.com/toplines_harassment_0819202013.pdf.
- Lunn, J. (2016) Geographers by Gender, American Association of Geographers, 7 pp. <http://www.aag.org/cs/disciplinarydata/gender>
- Miner, K.N., Settles, I.H., Pratt-Hyatt, J.S., and Brady, C.C. (2012) Experiencing incivility in organizations: the buffering effects of emotional and organizational support. *J. Appl. Soc. Psychol.* 42, 340–362. doi:10.1111/j.1559-1816.2011.00891.x
- O'Brien K.R., McAbee S.T., Hebl M.R., and Rodgers J.R. (2016) The impact of interpersonal discrimination and stress on health and performance for early career STEM academics. *Frontiers in Psychology*, DOI: 10.3389/fpsyg.2016.00615
- Occupational Safety and Health Admin. (OSHA) (1999) Women in the Construction Workplace: Providing Equitable Safety and Health Protection. <https://www.osha.gov/doc/accsh/haswicformal.html>.
- Revell, M. (2017) American Association of Geographers. Personal communication.

Willness, C.R., Steel, P., and Lee, K. (2007) A meta-analysis of the antecedents and consequences of workplace sexual harassment. *Pers. Psychol.* 60, 127–162.doi: 10.1111/j.1744-6570.2007.00067.x

Wilson, C. (2016) American Geosciences Institute. Personal communication.

Yoder, B. L. (2015) Engineering by the Numbers, American Society for Engineering Education, 47 pp.

Zimmerman C.A., Carter-Sowell A.R., and Xu X. (2016) Examining workplace ostracism experiences in academia: understanding how differences in the faculty ranks influence inclusive climates on campus. *Frontiers in Psychology*. DOI: 10.3389/fpsyg.201600753

Figure 1. Trends in the percentage of women faculty in total, standing, and fixed-term (I, multiyear) appointments within EMS from 2006-2016. Data were provided by the College and are also reported in Table 1.

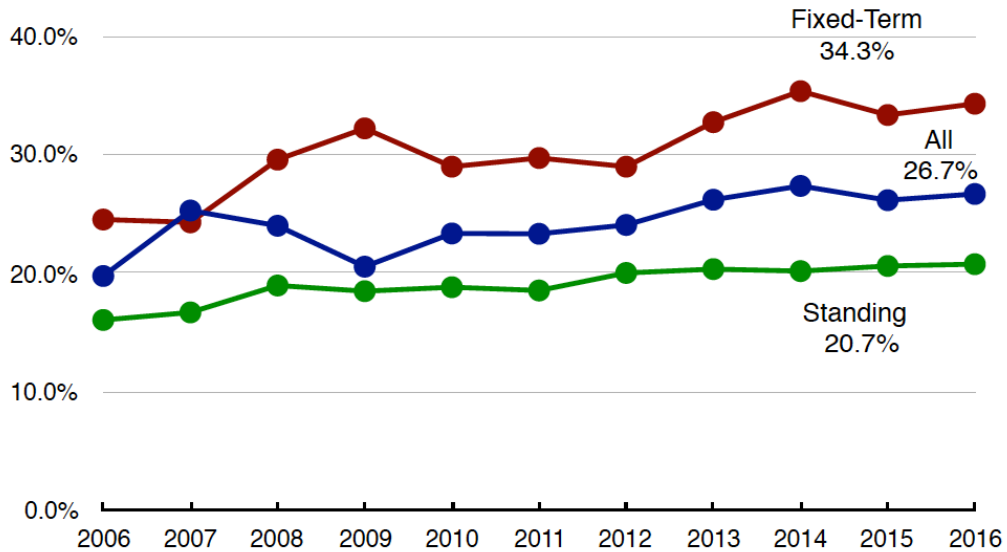


Figure 2. Trends in the percentage of women faculty in EMS who are tenured and pre-tenure. Data were provided by the College and are also reported in Table 1.

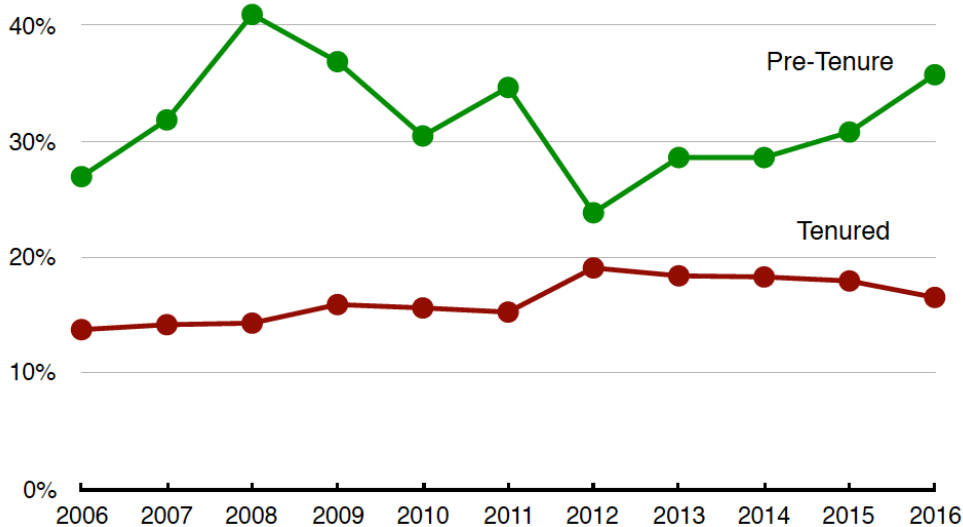


Figure 3. The percentage of women tracked by the Penn State Affirmative Action Office for EMS in fixed-term and tenure-line appointments. Also show are estimated availability of women nationally.

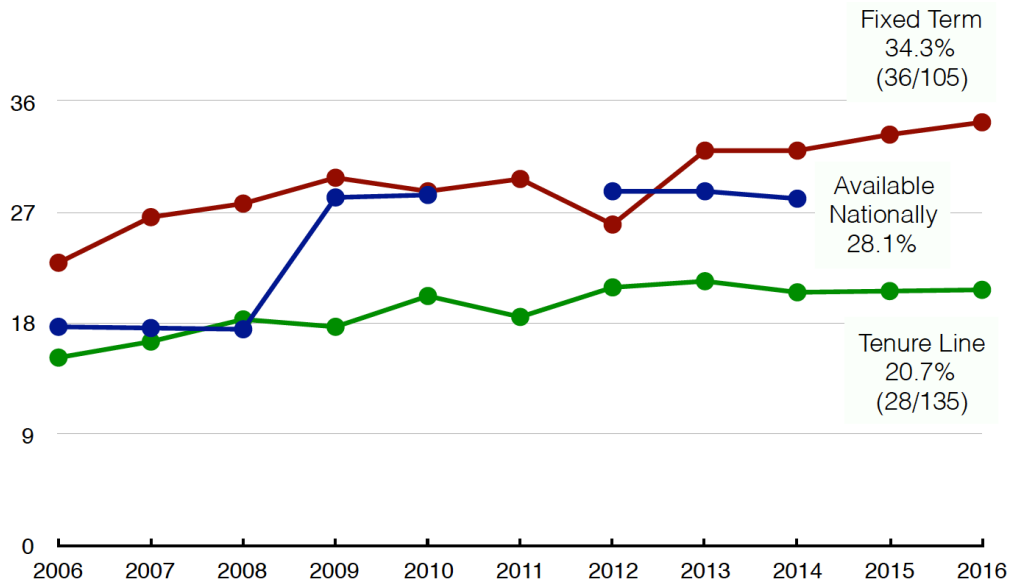


Figure 4. Percent women faculty for EMS departments and corresponding national averages. See text for data sources. Sample size = 222 for EME, NA for Geosciences, 1657 for Geography, NA for MAS, and 987 for MatSE.

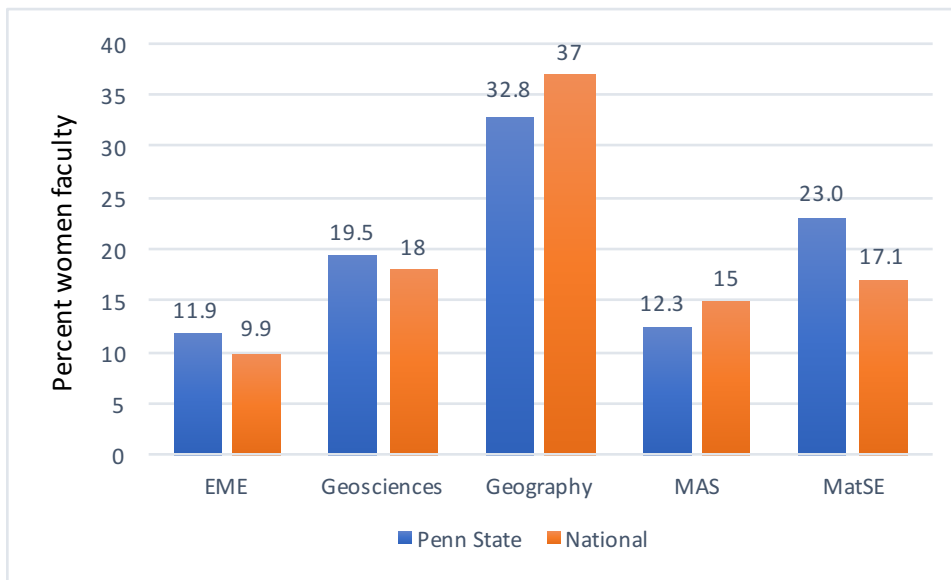
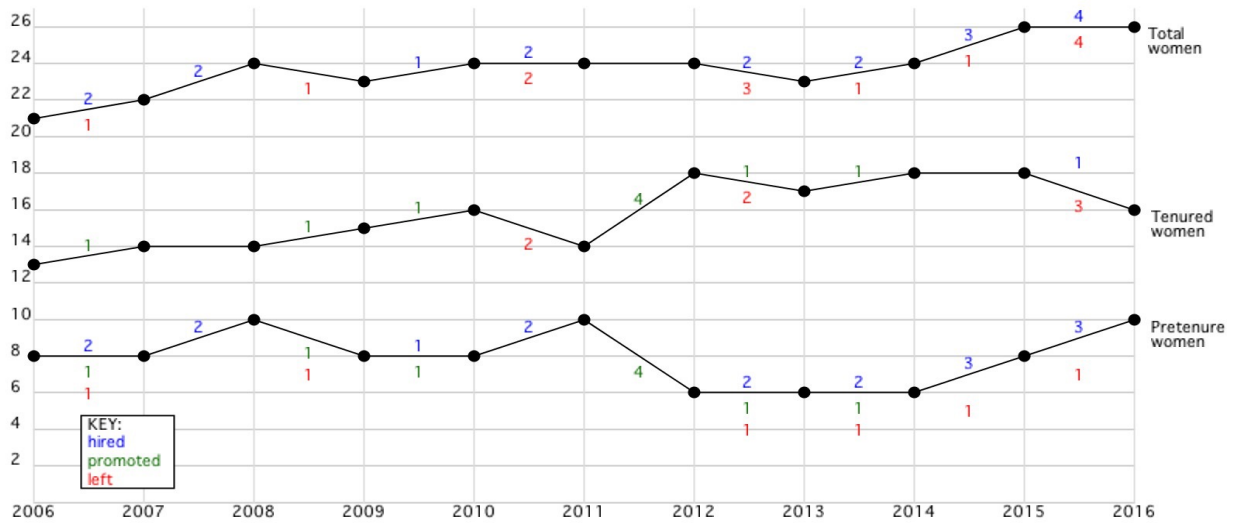


Figure 5. Numbers of individual tenure-line women (a) and men (b) in EMS from 2006 to 2016, and for how the population in each category changed from year-to-year changes. Small digits represent number of individuals who changed status from one year to the next. These are colored to indicate the reason for change: blue = increase by hiring, green = change by promotion, and red = decrease by resignation. Green values represent a loss from pretenure ranks, and a gain by the population of tenured faculty.

(a) Women Tenure-Line Faculty



(b) Men Tenure-Line Faculty

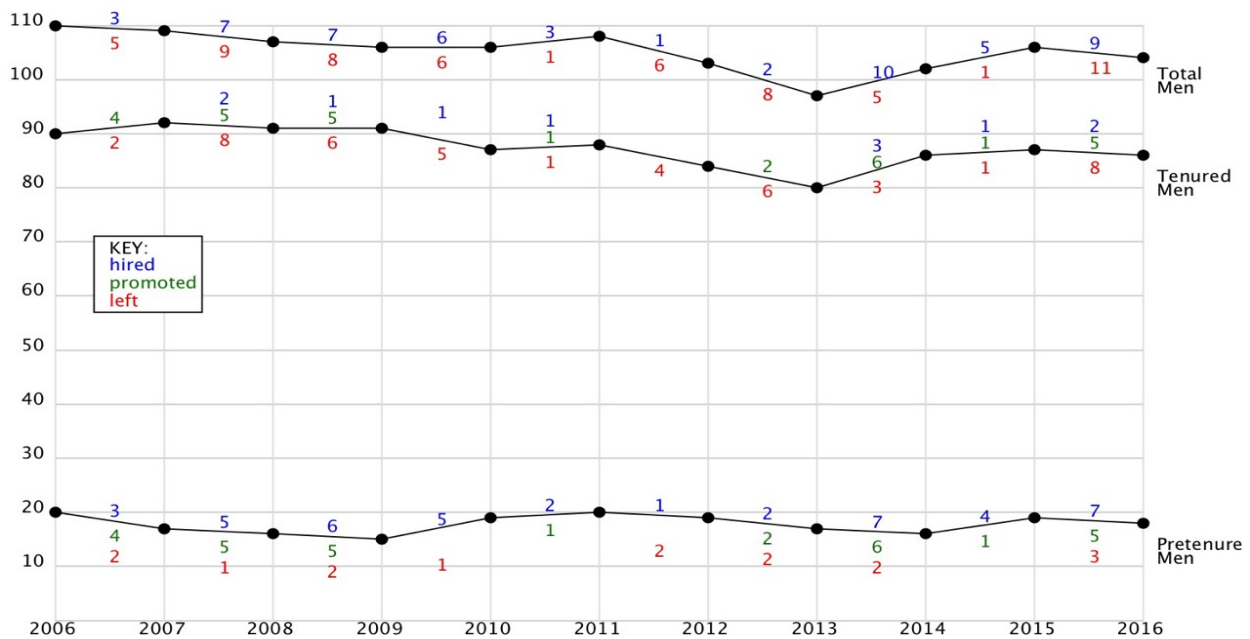


Figure 6. Percentage of women in EMS Leadership (dean, associate deans, department heads, center directors). Data from Table 7.

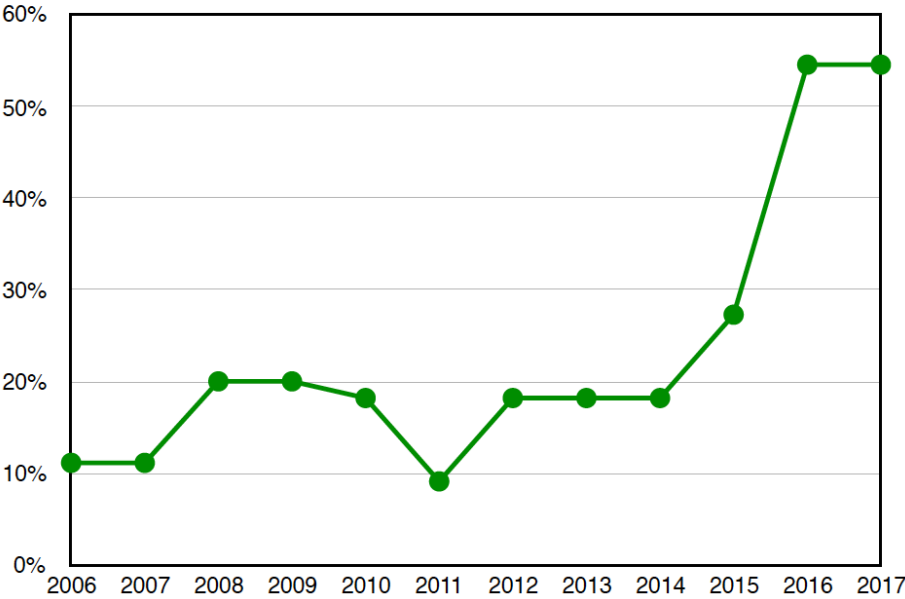


Figure 8. Percentage of award winners who are women compared to percentage of faculty who are women in biological/life sciences (warm colors), physical sciences (blue shades) and EMS (green shades). In each three-bar cluster, the first bar represents the percentage of scholarly/research award winners who are women, the middle bar represents the percentage of teaching/service award winners who are women, and the rightmost bar shows the percentage of faculty members who are women.

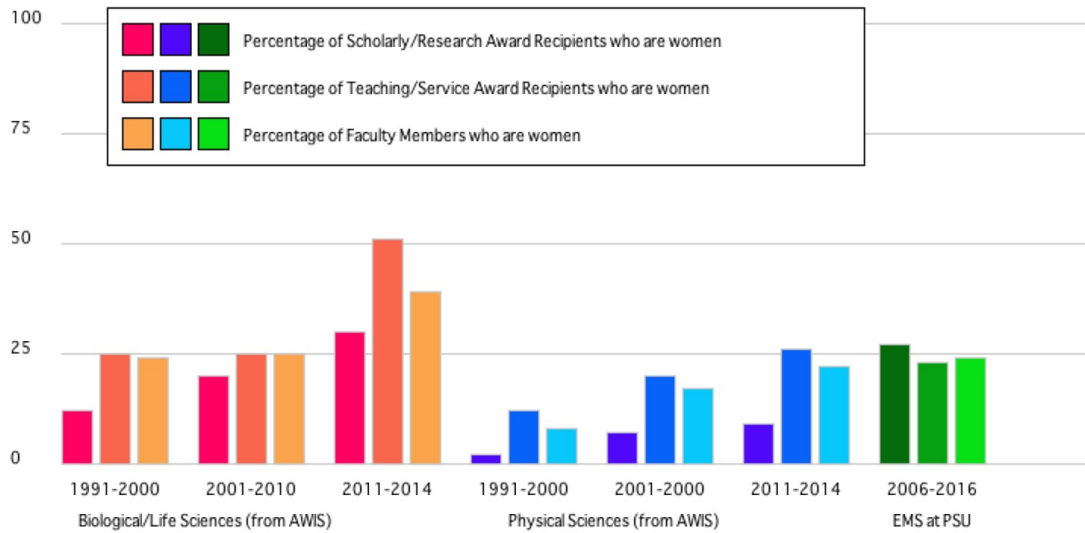
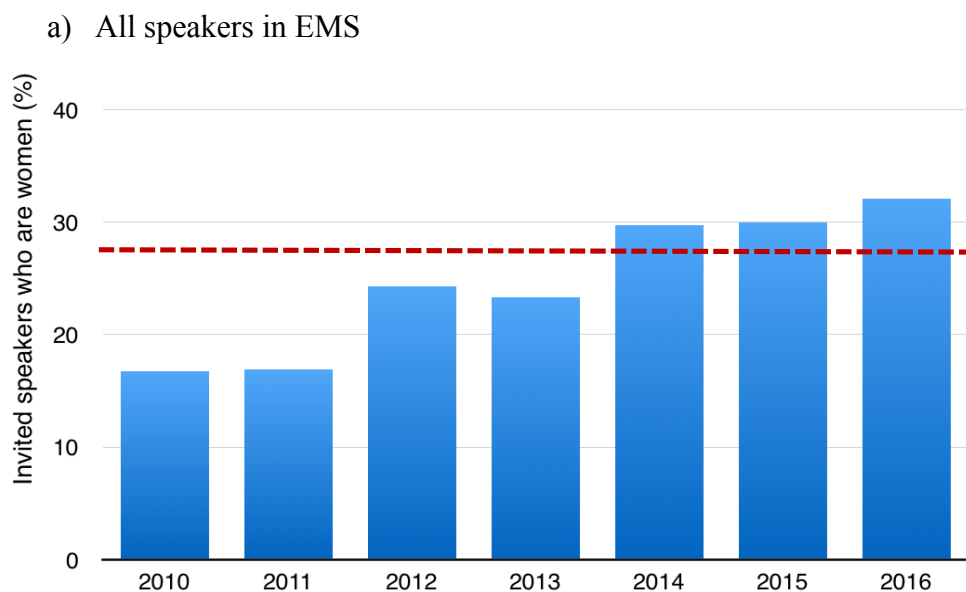
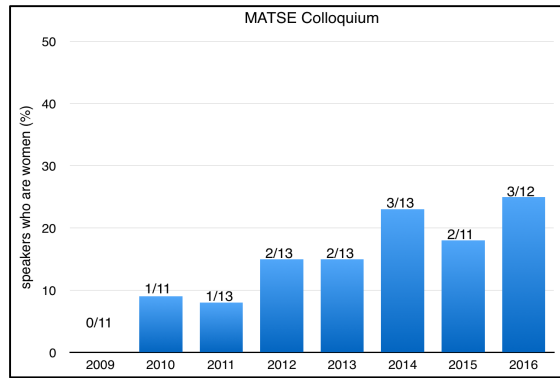
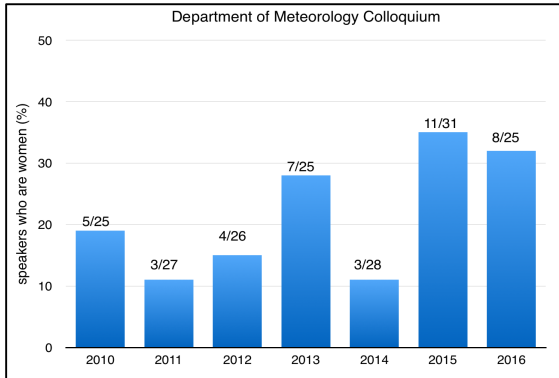
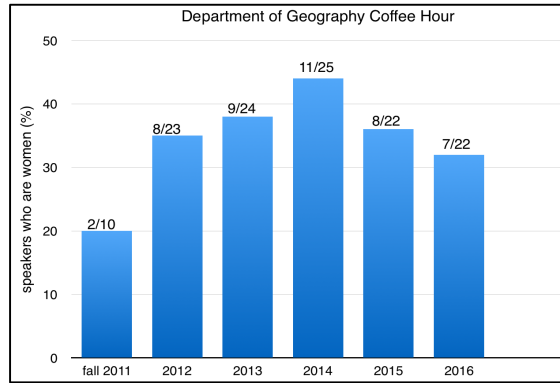
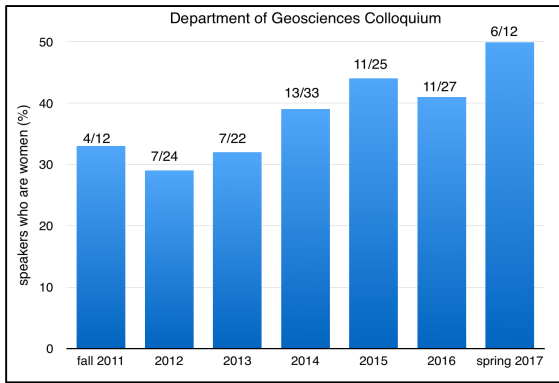


Figure 9. Percentage of invited colloquium speakers at EMS colloquia and seminar series who are women from 2010 to 2016. Raw data: 2010 = 6/36, 2011 = 12/71, 2012 = 27/111, 2013 = 30/129, 2014 = 44/148, 2015 = 39/130, and 2016 = 36/112. (a) total for all EMS with national. Estimated available women faculty nationally is indicated by the dashed red line (Table 3). (b) proportion of women speakers for individual departments and (c) for other speaker series within the College of EMS. Values indicate numbers of women and total speakers for the departmental and other speaker series.



b. Departmental speakers



c. Speakers invited by EMS centers and other series

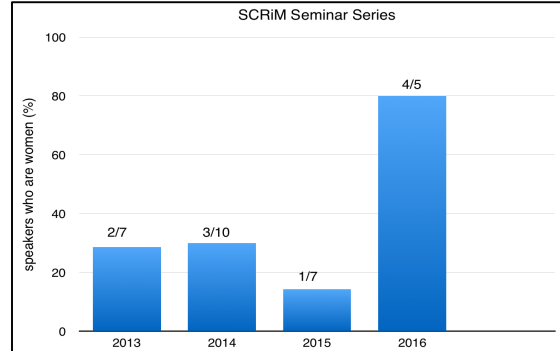
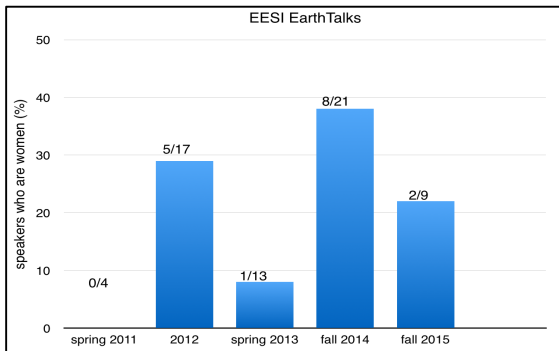
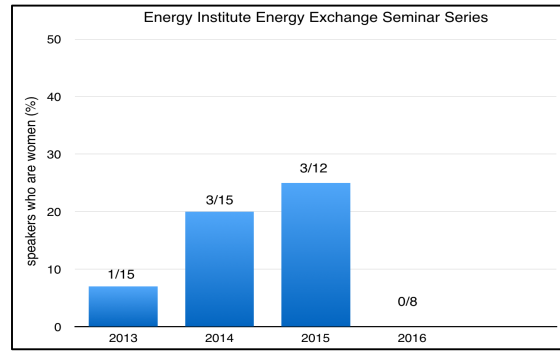
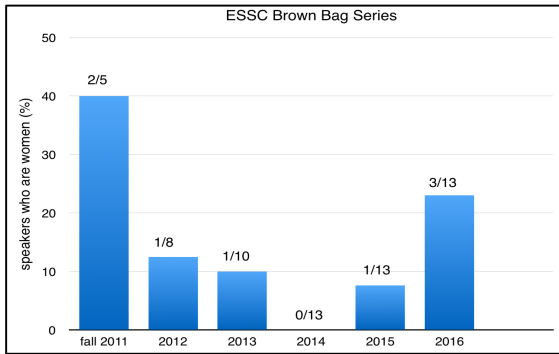


Figure 10 (a, b, c). Survey responses (in %) for men and women on the EMS faculty regarding their access to office space (10), teaching facilities (11), and research facilities (12).

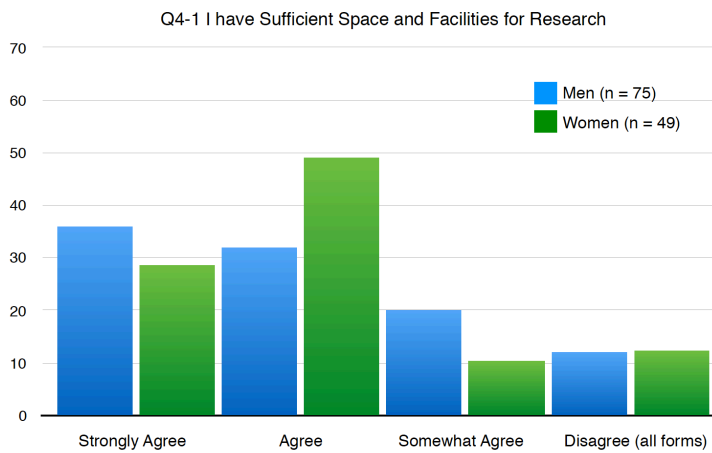
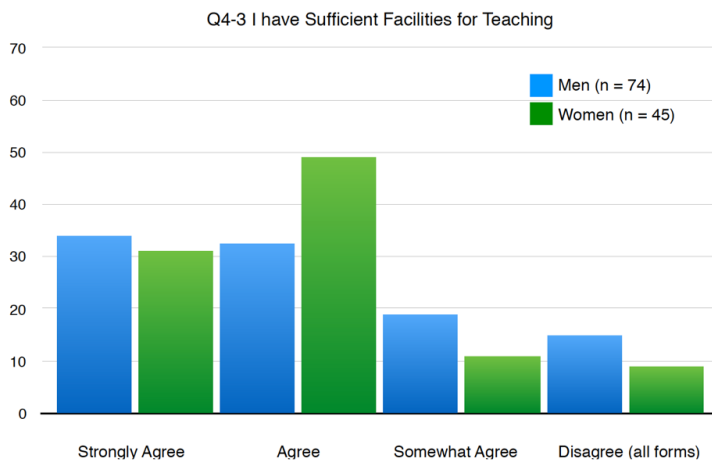
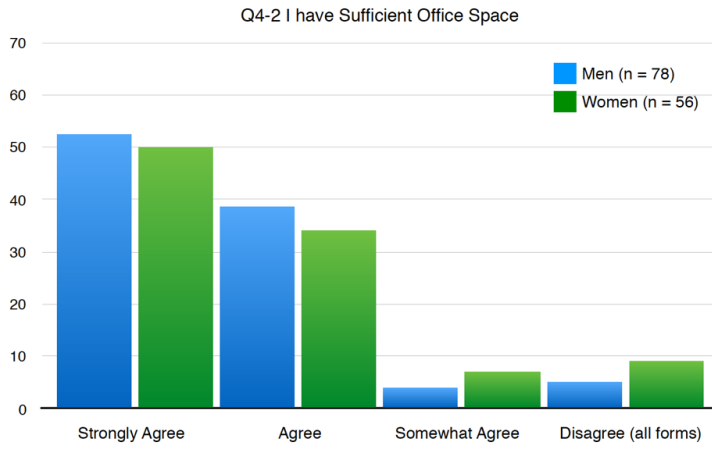


Figure 11, (a, b). Survey responses of percent (%) agreement in all forms by rank (a) and by gender (b) indicating perceptions of access to professional development resources and mentoring, and feelings of isolation.

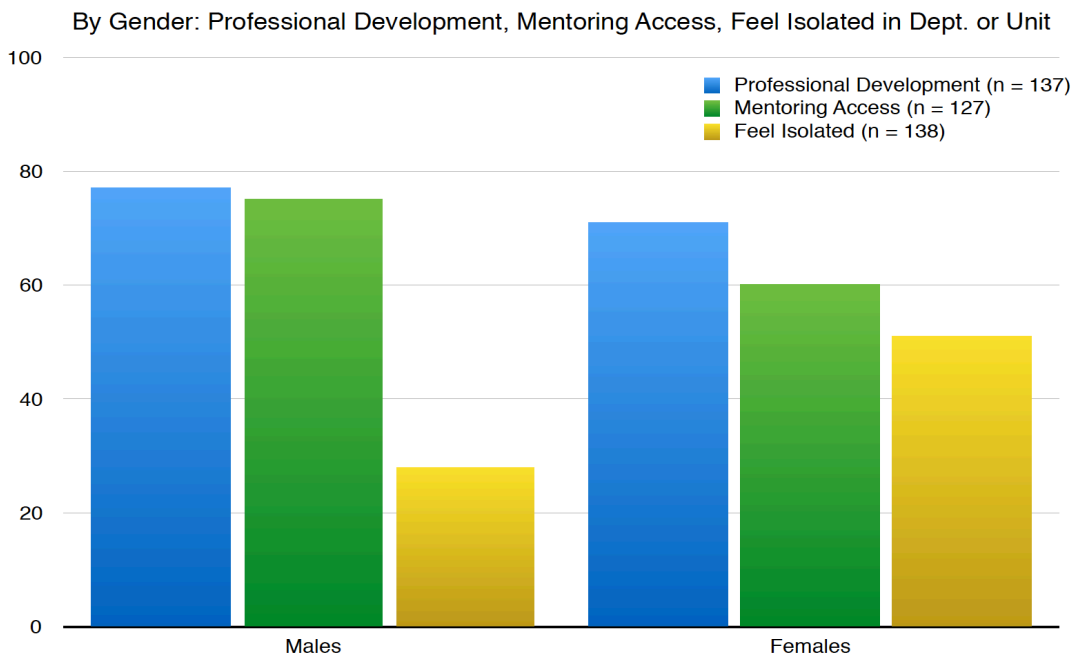
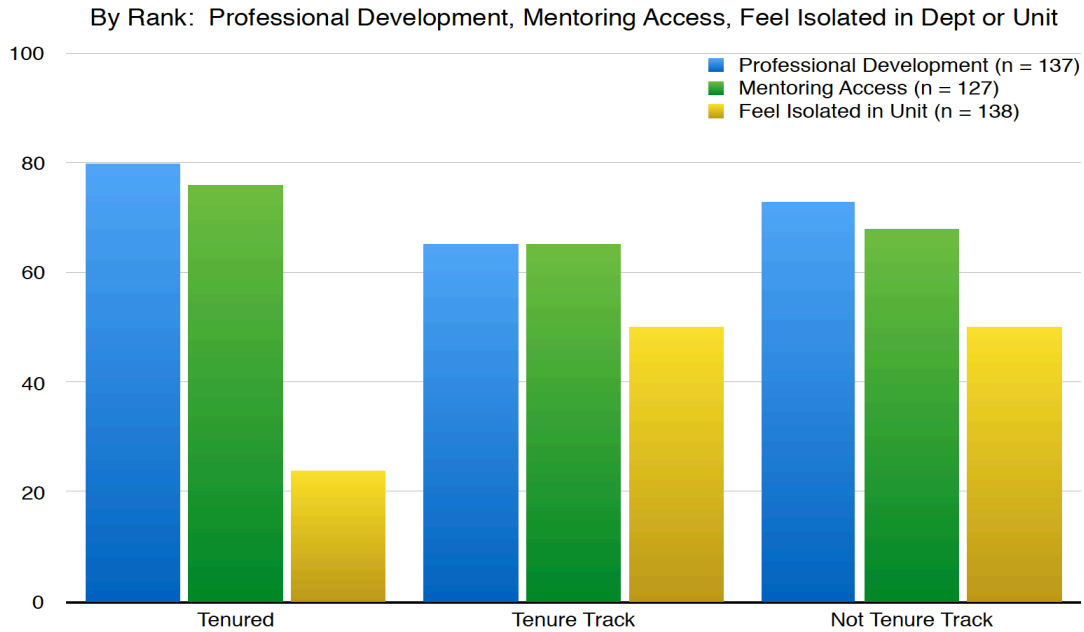


Figure 12. Survey responses (% agreement, all forms) by department indicating feelings of isolation by EMS faculty.

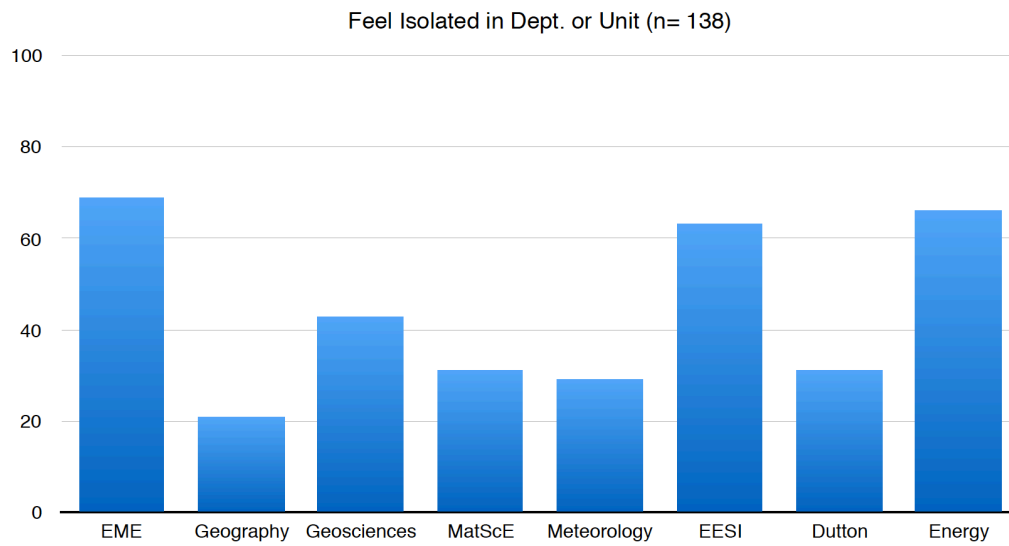
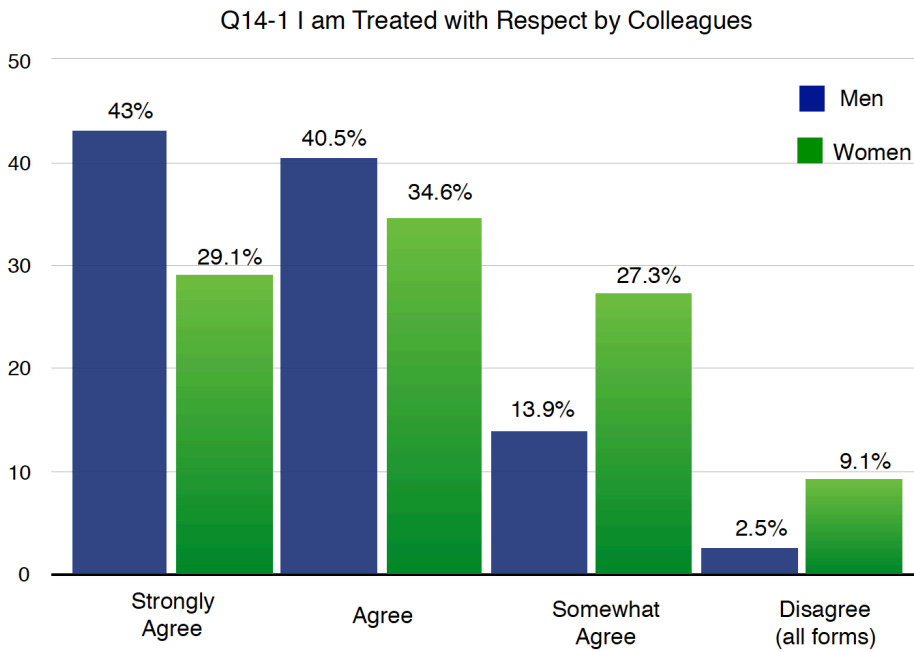
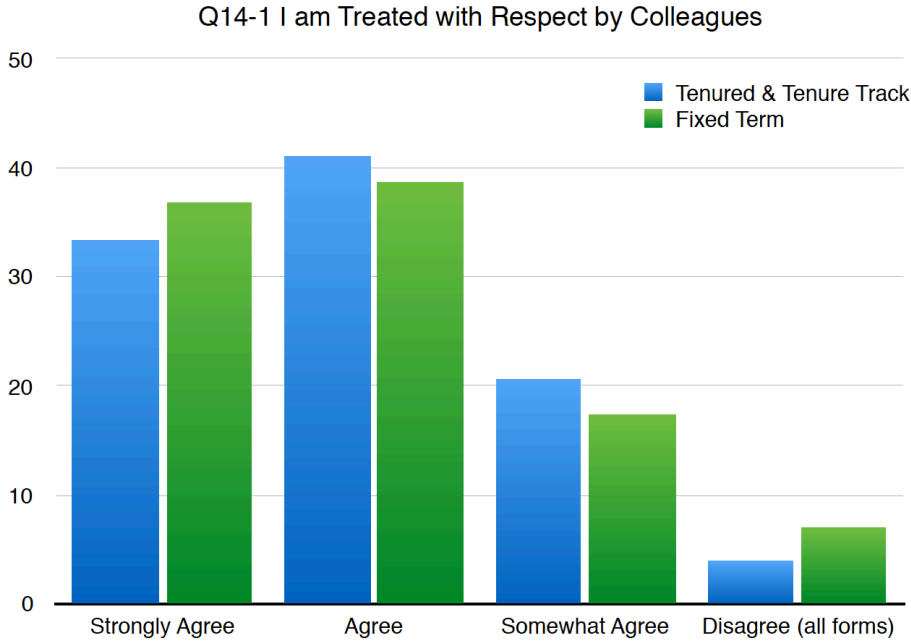


Figure 13 (a, b) Survey responses in percent (%) by rank (a), and for men and women (b) by form of agreement that they are treated with respect by colleagues in EMS.



Appendix

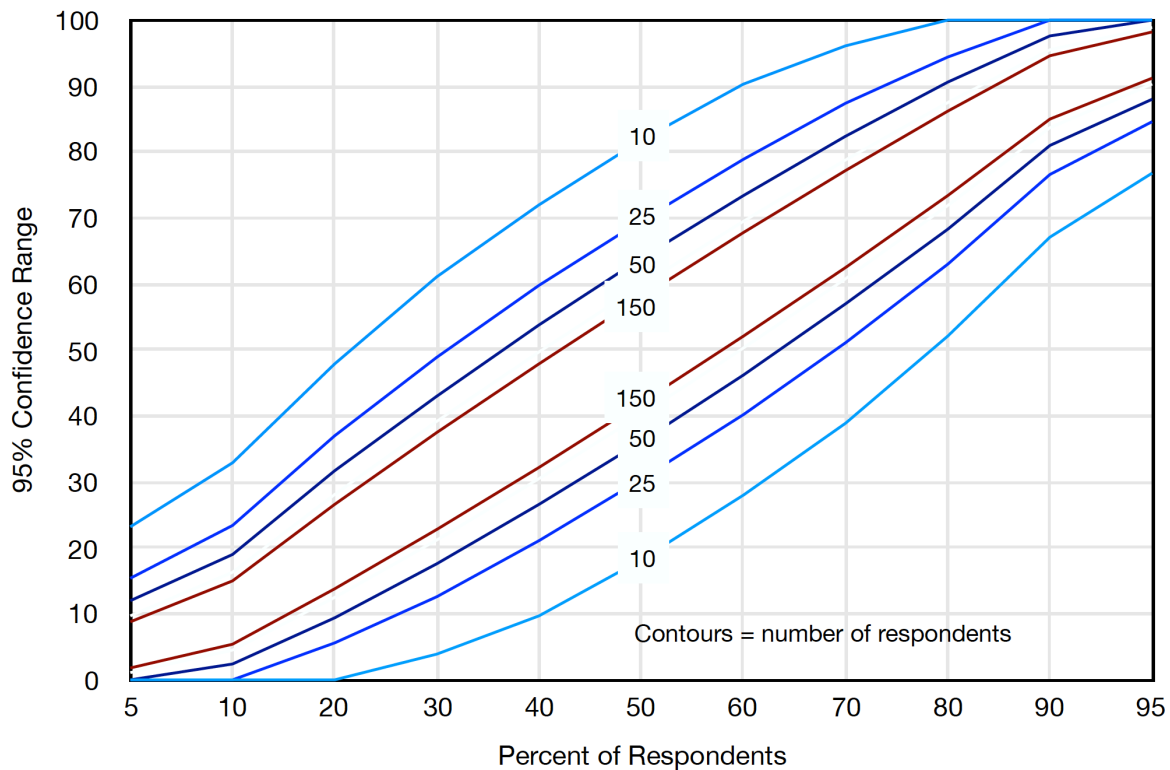
- i. Confidence estimates for survey data
- ii. Departments within EMS (Standing appointments, exclusive of administrators)
- iii. Recipients of EMS Teaching, Service, and Research Awards
- iv. Penn State Affirmative Action Reports for EMS, 2006-2016 (provided as separate document)
- v. EMS Gender Survey (provided as separate document)

i) Confidence Estimates for Survey data

In the following graph, paired contours indicate the 95% confidence range (in percent) for a given proportion (percent) of a population ranging from 10 individuals to 150. Most questions had more than 50 respondents, and the majority had over 100 respondents

The calculations were generated using the application, "Margin of Error" by Hunt Mountain Software (version 1.0, 2017; by Steve Holland, University of Georgia), and is based on methods in:

Raup, D.M., 1991, The future of analytical paleobiology. In N.L. Gilinsky and P.W. Signor, eds., Analytical Paleobiology, Paleontological Society Short Courses in Paleontology No. 4, p. 207–216.



ii) Departments within EMS (Standing appointments, exclusive of administrators)

Standing appointments in EMS academic departments. Top value is the number of women faculty, and the lower value is the total number of standing appointments. Values do not include faculty with primarily administrative appointments.

Year	EME	Geography	Geosciences	MatSE	Meteo
	Number of women/total standing appointments				
2006	2/24	6/22	4/29	5/29	4/22
2007	2/21	6/23	4/30	5/30	4/23
2008	3/26	7/20	5/29	5/29	4/23
2009	2/23	7/21	5/30	5/28	4/23
2010	3/27	7/23	5/30	5/27	4/21
2011	4/30	6/22	6/31	4/27	4/20
2012	4/29	6/19	6/31	4/27	4/19
2013	4/27	7/20	4/29	5/24	3/18
2014	3/25	7/22	5/28	6/27	3/22
2015	4/30	7/23	6/29	6/27	3/22
2016	3/29	7/22	6/30	7/28	2/21

iii) Recipients of EMS Teaching, Service, and Research Awards

College awards presented between 2006 and 2016. The percentage of women who earned the research awards was 27% (2/22). Teaching and service awards totaled 73, and 23% were earned by women (17/73).

Award	Recipients	
	Women (%)	Total
<i>Teaching Awards</i>		
Mitchell	2 (18%)	11
Wilson Teaching	3 (23%)	13
<i>Service Awards</i>		
Wilson Service	2 (17%)	12
Faculty Advising	2 (67%)	3
Faculty Mentoring	8 (24%)	34
<i>Research Awards</i>		
Breakthrough	0 (0%)	7
Wilson Research	6 (40%)	15