

UNIVERSITY of WASHINGTON

FY2020 Annual Review Narrative Response for: **260 - College of Engineering**Programmatic & Academic Vitality Narrative

- 1) Please briefly describe your unit's annual internal budget development process. *Question Type: Free Text, Word Limit: 500, Required For: All Units*

The College of Engineering (COE) is a departmentalized college with ten academic units, including nine departments and one school. COE has a longstanding allocation model grounded on an incremental budgeting process. Distribution of resources is generally based on the allocation of funds from the previous period. Over the past three biennia, any allocations of new permanent tuition or supplement funds have been deployed to offset increases in permanent costs, which are generally associated with merit, faculty promotion, and retention. Any residual funds have been used either to help build reserves for faculty startup or for strategic investments such as facilities improvements. Units are allowed to build local reserves through carryover and recaptured faculty salaries to reinvest and to fund faculty startup. The dean meets with chairs and administrators to assess each unit's overall vitality and plans, including key initiatives, faculty hiring, research, and infrastructure needs.

Annual key performance indicators are used in those meetings to help review, assess, and plan for the upcoming year (please see Appendix for a copy of the most recent version). Our intention is that these metrics will help shape an efficient and equitable distribution of resources to the academic units. In recent biennia, legislative funds to support growth, including proviso funds, have been allocated to the College of Engineering based on student and industry demands for engineering degrees. Allocation of legislative funds to units within the college is supported by student application data, trends in industry demand for the discipline, and recommendations from the college's elected Engineering Faculty Council and Executive Committee (unit chairs). Annual review materials, including this financial report and forecast, are presented and reviewed by the elected Engineering Faculty Council, College of Engineering Student Advisory Council (COESAC), and the Executive Committee.

- 2) What are 3-5 key elements of your unit's current strategic plan? *Question Type: Free Text, Word Limit: 500, Required For: All Units*

Our five-year strategic plan was approved in 2014 and is set for review in 2019-20. The plan outlines a vision in which the college seeks to be a world leader in engineering education, in discovery, and in innovation that benefits the region, nation, and the world. The college's stated mission is to develop outstanding engineers and ideas that change the world. Below are the key goals with highlights on how they are being addressed:

Provide an education experience that prepares our students to be leaders

- Improve the student experience with Direct to College (DTC) admissions and first-year programming.
- Expand student opportunities for early team and project involvement.
- Develop student support structures, such as Living Learning Communities, Engineering Academic Center, Career Center @ Engineering, and MakerSpace collaborations with Housing and Food Services.
- Work with the Legislature to expand enrollment to meet student and workforce demand and to build and renovate facilities that support growth.

Increase diversity, inclusion, and access to foster excellence

- Support a robust suite of college diversity and access programs: ADVANCE Center for Institutional Change, The Washington State Academic RedShirt (STARS) program, Math Academy PEERS (Promoting Equity in Engineering Relationships) WiSE (Women in Science & Engineering), MSEP (Minorities Scholars Engineering Program), DO-IT (Disabilities, Opportunities, Internetworking Technologies), Engineering Academic Center
- Fine-tune the admissions process for DTC cohorts to ensure continued and increased diversity of students graduating with engineering degrees.
- Improve hiring processes to expand the diversity of our faculty pool.



UNIVERSITY of WASHINGTON

FY2020 Annual Review Narrative Response for: **260 - College of Engineering**

Programmatic & Academic Vitality Narrative

Build interdisciplinary collaborations that inspire innovation

- Continue to support and lead university-wide collaborations such as GIX, CoMotion, Clean Energy Institute, Boeing Advanced Research Center, eScience Institute, ADVANCE, Washington Nanofabrication Center, Institute for NanoEngineering Systems and the Molecular Engineering & Sciences Institute.
- Continue to foster interdisciplinary work through joint academic appointments. Currently, more than 10% of our faculty have joint appointments.

Create industry and community partnerships to increase our impact

- Leverage the economic strength of our region to foster corporate research partnerships, student internship and job opportunities, industry capstone programs, and tech transfer activities.
- Invest in the Career Center @ Engineering and expand corporate relations to enhance and expand industry/student/campus interactions.

Focus on key global challenges where we can achieve greatest impact and excellence

The college identified five strategic research areas and developed a program to place Washington in a clear leadership position in promising and growing areas of engineering research, through strategic investment in:

- Infrastructure and Smart Cities
- Engineering and the Environment
- Engineering and Energy
- Engineering and Health
- Engineering and Manufacturing

Make a significant and visible societal impact

Our faculty, students and staff are dedicated to advancing research and innovation for social good. The college is home to vibrant programs, student clubs and initiatives such as Engineering Innovation in Health, HuskyADAPT, and Engineers Without Borders. We support these efforts through strategic investment in the research enterprise and educational programs. For example, in partnership with CoMotion we have lowered barriers for IP and commercialization; the college is responsible for over 50% of UW startups, yet comprises only 6% of the faculty.

- 3) What major obstacles or institutional barriers currently do, or likely will, hinder execution of your strategic plan? What are you doing to address these challenges? *Question Type: Free Text, Word Limit: 500, Required For: All Units*

Challenge 1: Lack of quality space to meet student, industry, and research demands. (Please reference the “Space and Physical Resource Needs Projection” section.) Efforts to address this challenge:

- Housing and Food Services collaborations (AREA 01 and the MILL MakerSpaces)
- Leasing off-campus facilities to support research (Bowman, Sandpoint, Russell)
- Partnerships to secure new building and renovation funding

Challenge 2: Unit-Funded Merit, Promotion, Unit Adjustment and Retention

The college has self-funded all or a significant portion of merit, promotion, unit adjustment and retention costs over the past few biennia (Table 1). These expenses have been funded primarily by revenue increases resulting from enrollment growth. As a result, funds that could have supported additional faculty, research, and instructional support have instead funded permanent salary adjustments.



UNIVERSITY of WASHINGTON

FY2020 Annual Review Narrative Response for: **260 - College of Engineering**
Programmatic & Academic Vitality Narrative

Table 1 - Cost and Funding Sources for Merit and Promotions

Cost of Merit/Promotions (in Millions)

Actual Merit + Promotion (GOF/DOF Budgeted Positions)			Funding Source	
			COE	Central UW
FY15	4%	\$1.86	100%	0%
FY16	3%	\$1.56	46%	54%
FY17	4%	\$2.21	62%	38%
FY18	2%	\$1.60	100%	0%
FY19	2%	\$1.46	100%	0%
Projection	2% Merit	3% Merit	COE	Central UW
FY20	\$1.80	\$2.51	100%	0%
FY21	\$1.83	\$2.58	100%	0%
FY22	\$1.87	\$2.66	100%	0%
FY23	\$1.91	\$2.74	100%	0%

*Benefits included in data

In an effort to explore other mechanisms for generating funds for dean’s reinvestment, COE has modeled options for recapturing and parking vacant faculty lines. Elected Engineering Faculty Council and department chairs have been involved in this effort.

Challenge 3: Recruitment, hiring, and retention of outstanding faculty

Maintaining a competitive salary structure remains a challenge. Moreover, competition for junior faculty at current market rates contributes to salary compression. Efforts to address the challenges of recruitment and retention include:

- Evaluating the financial feasibility of FY20 faculty unit adjustments to address retention and salary issues.
- Partnering with central units to develop an equitable and transparent internal process for addressing childcare needs.
- Clarifying expectations, funding options, and related issues around A/B salaries.

Challenge 4: Recruitment and retention of diverse faculty, students, and staff.

While we have many programs and efforts to attract and retain a diverse group of students, and in many cases our students are more diverse than our engineering peers, we still have more work to do to reach our goals. Recent efforts include recruitment and support of underrepresented students through outreach, mentoring, tutoring, professional development, internships, and programming such as:

- Engineering Academic Center
- STARS program
- Women in Science and Engineering (WiSE)
- Minority Scholars Engineering Program (MSEP)

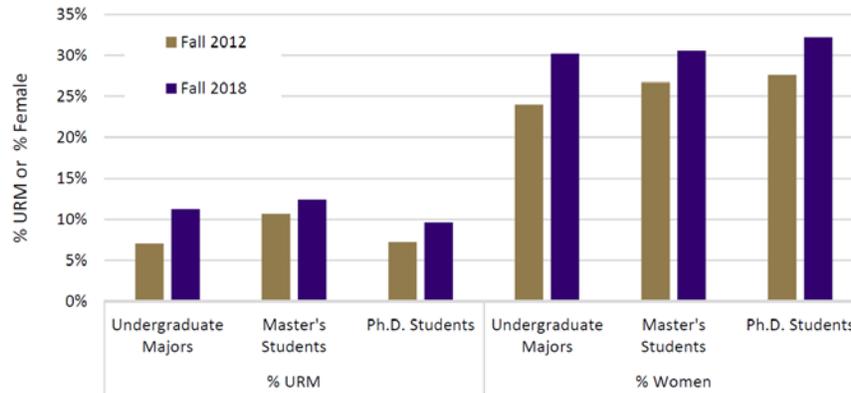
A comparison of the composition of engineering students in Fall 2012 to Fall 2018 (Figure 1) shows increases at all levels in the percentage of underrepresented minority and female students.

Figure 1 – Changes in the Demographic Composition of College of Engineering Students



UNIVERSITY of WASHINGTON

FY2020 Annual Review Narrative Response for: **260 - College of Engineering** Programmatic & Academic Vitality Narrative

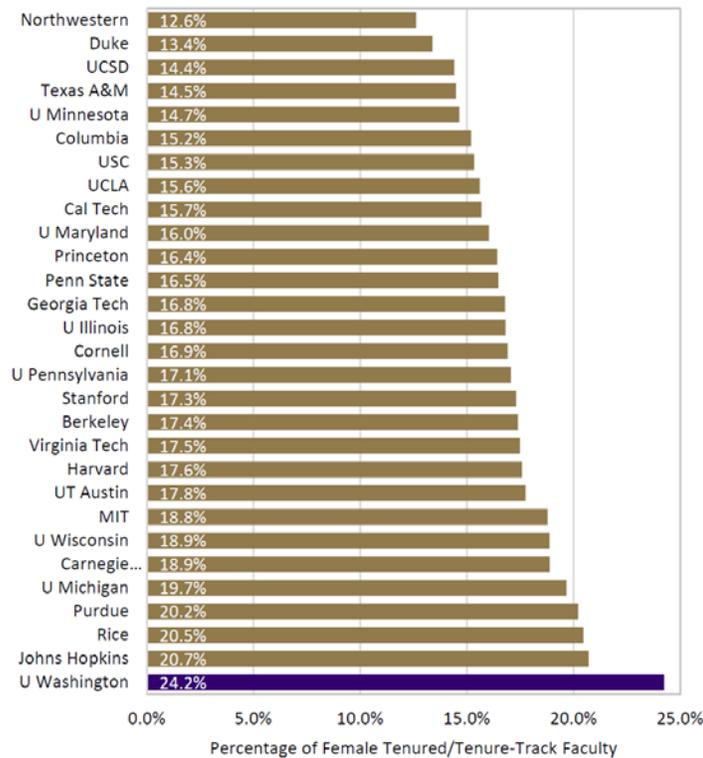


In addition, the college has a number of initiatives to improve faculty and staff diversity:

- UW ADVANCE Center for Institutional Change
- Unit-specific diversity statements for inclusion in recruitment materials
- Development of required diversity trainings and the use of standardized rubrics in hiring

Currently, UW has the highest percentage of women engineering faculty among the top 25 engineering programs (Figure 2).

Figure 2 - Percentage of 2017 Female Tenure-Track Engineering Faculty, US News Top 25 Engineering Programs



Source: ASEE College Profiles



UNIVERSITY of WASHINGTON

FY2020 Annual Review Narrative Response for: **260 - College of Engineering**

Programmatic & Academic Vitality Narrative

- 4) Over the next year, could any of your planned strategic activities result in material changes to revenues or expenditures, faculty or staff workload, or the student experience within your unit and/or another unit/campus? *Question Type: Free Text, Word Limit: 500, Required For: All Units*

A number of the college's planned strategic activities may result in material changes to revenues or expenditures, faculty or staff workload, or the student experience over the next year.

- For the 2019-21 legislative budget, the University has requested the following annual increases for the College of Engineering in Seattle: \$5M to design a new interdisciplinary teaching and research facility, \$4M to increase College of Engineering enrollment (an increase of 133 degrees), and \$500K to maintain the influential STARS program. If funded, these additional investments on behalf of the Legislature would increase COE's budgeted authority as well as planned expenditures, including salary associated with engineering instruction, faculty startup, lecturers, teaching assistants, staff, program and facility support. Each year, more than half of those who have taken prerequisites and apply to engineering majors are not admitted. Given this demand saturation, the growth funded by this proviso will not represent additional STEM enrollments for the campus.
- COE is investing \$2M to remodel a number of undergraduate educational laboratories, to include the purchase of new equipment and maintenance and upgrade costs. This investment supports the college's strategic goal of improving the student experience and helps faculty better test and document instructional outcomes.
- Support for DTC implementation requires funding for additional advising and associated space needs. The college continues its investment in the college's strategic instruction initiatives, which aim to reimagine engineering education by identifying, developing, implementing and accelerating innovative best practices for teaching and learning. The college is also providing bridge funding for self-sustaining programs such as Career Center @ Engineering and Industry Capstone.
- Leveraging opportunities to lease off-campus facilities such as the Bowman building and other possible options in Sandpoint over the next five fiscal years provide a temporary solution to support the college's expanding interdisciplinary research endeavors.

- 5) What is your unit doing to effectively use resources in a way that benefits your unit and/or other units/campuses? *Question Type: Free Text, Word Limit: 500, Required For: UWB, UWT, UWS Administrative Units*

Not Applicable

- 6) What are you doing to improve the experience and outcomes of students in your unit? What could the University do to support your efforts? *Question Type: Free Text, Word Limit: 500, Required For: UWB, UWT, UWS Academic Units, UAA, Graduate School*

In Fall 2018, COE implemented the Direct To College (DTC) admission policy in response to concerns from students and faculty about the student experience. The highly competitive nature of admission to the college created an environment of uncertainty and pressure for students who wished to major in engineering. Each year, the college turned away more than half of the students applying for admission after taking prerequisites, resulting in disappointment and disruption of the educational experience for the more than 1,000 students not admitted.

Within the framework of DTC, incoming freshmen admitted to the college are able to freely engage in an immersive engineering experience from the start. The college is dedicated to maintaining college-wide and unit-specific cultures that embrace and celebrate diversity, equity and inclusion for students as they explore the multiplicity of engineering disciplines and pathway to their desired career goals. We strive to help students maximize their UW experience, to have holistic well-being, and to be prepared to make a positive impact as professional engineers.



UNIVERSITY of WASHINGTON

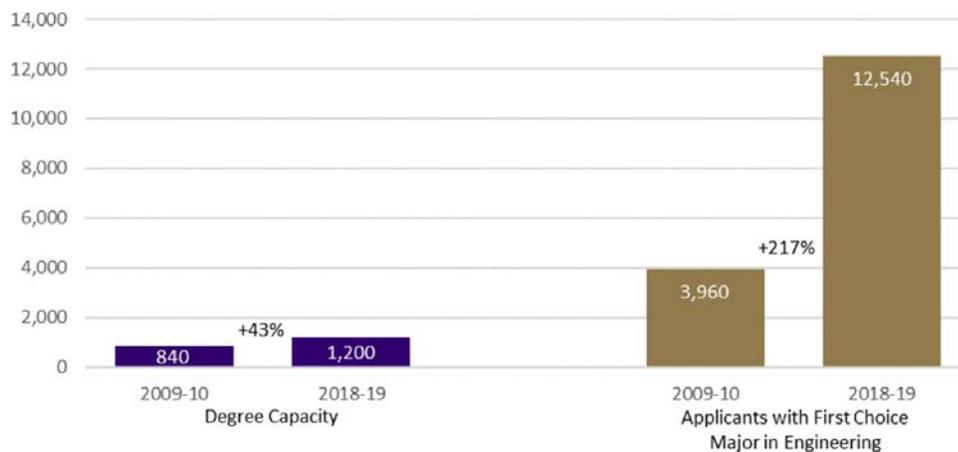
FY2020 Annual Review Narrative Response for: **260 - College of Engineering**

Programmatic & Academic Vitality Narrative

Analyses of students admitted and the success of students in the past indicate that if the college is allowed some flexibility in how the component scores of the holistic admissions process are used, it will be possible to increase the diversity of future DTC cohorts while maintaining or improving student success. Central consideration and support of DTC admissions utilizing such knowledge will allow COE to increase student diversity.

While we believe DTC will improve the student experience of the entire university, it does not address the issue of student demand and capacity constraints. As shown in Figure 3, the demand for engineering degree by currently enrolled students is palpable and persistent. We appreciate the University's support in seeking additional legislative investment for the college to meet this demand.

Figure 3 - Increase in Undergraduate Engineering Degree Capacity and Applicants



A sampling of some of the college's efforts to ensure student success includes:

- Washington State Academic RedShirt (STARS) program
- The Women in Science and Engineering (WiSE) program
- Minority Scholars Engineering Program (MSEP) Supplementing online instruction for engineering students with one-credit courses
- New advising clusters created in collaboration with OMA&D Programming for the DTC cohort designed to improve retention of women in engineering
- Engineering Academic Center (EAC)
- Career Center @ Engineering, a partnership between COE and the UW Career and Internship Center

An additional college priority is to provide graduate student support in the form of fellowships and assistantships, (sustained by gifts, endowment distributions, and sponsored research activities). Most assistantships and fellowships come with a waiver of tuition, which may be paid by a grant/contract or may represent foregone tuition revenue. The number of students receiving support in the form of salary or stipends, as well as the value of that support, is shown in Figure 4. Figure 5 shows the number of students who have received tuition waivers and the value of those waivers. Figure 6 shows the upward trend in resources available to support students using current use gifts and endowment.



UNIVERSITY of WASHINGTON

FY2020 Annual Review Narrative Response for: **260 - College of Engineering**
Programmatic & Academic Vitality Narrative

Figure 4 - Graduate Student Support: Salary and Stipends

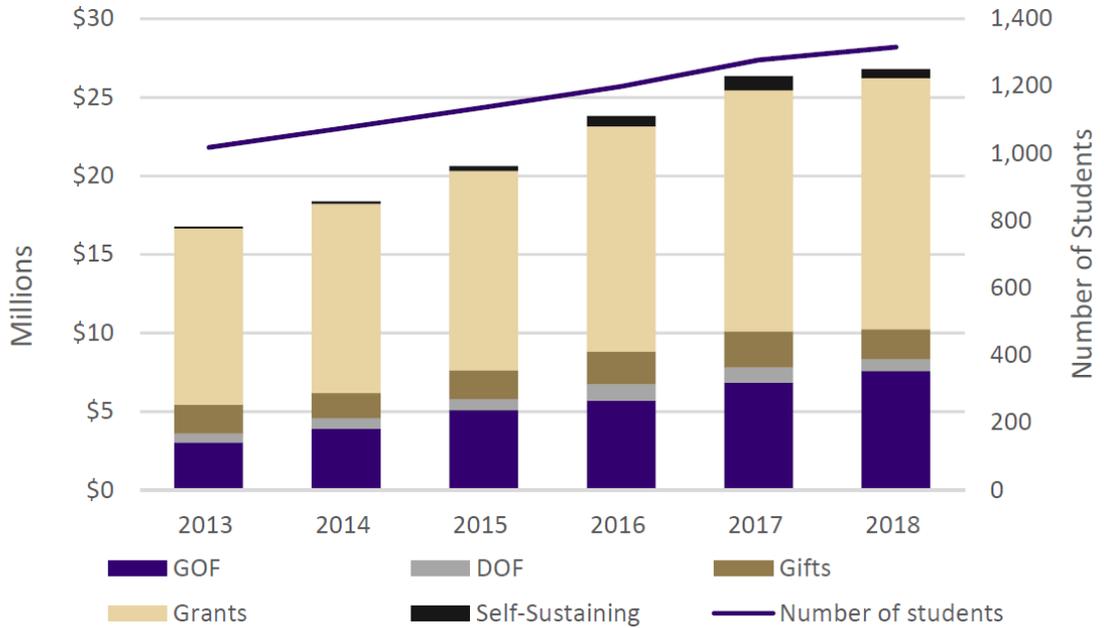
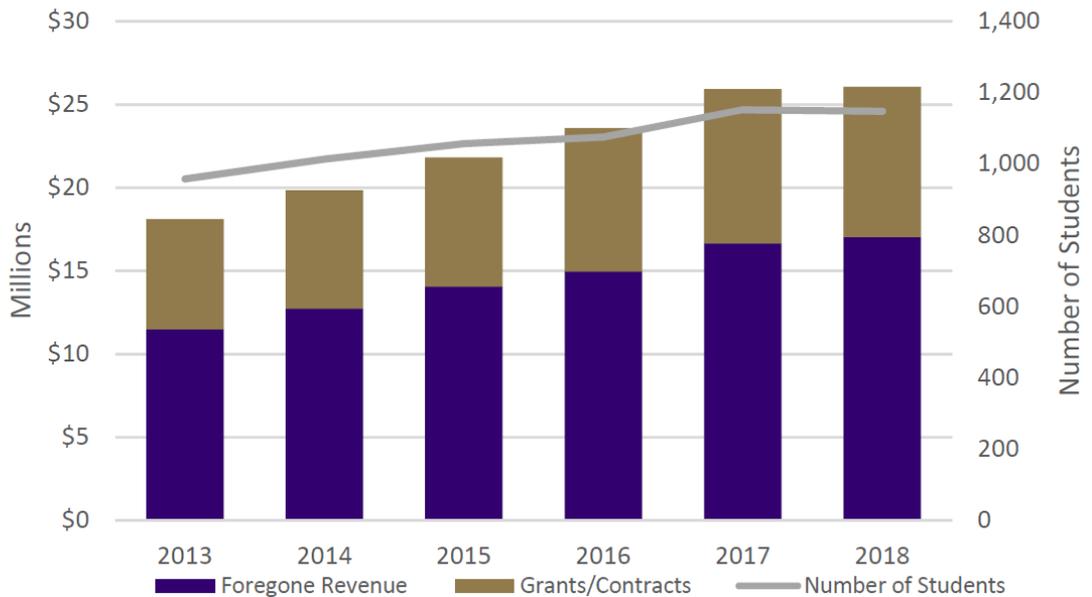


Figure 5 - Graduate Student Support: Tuition Waivers

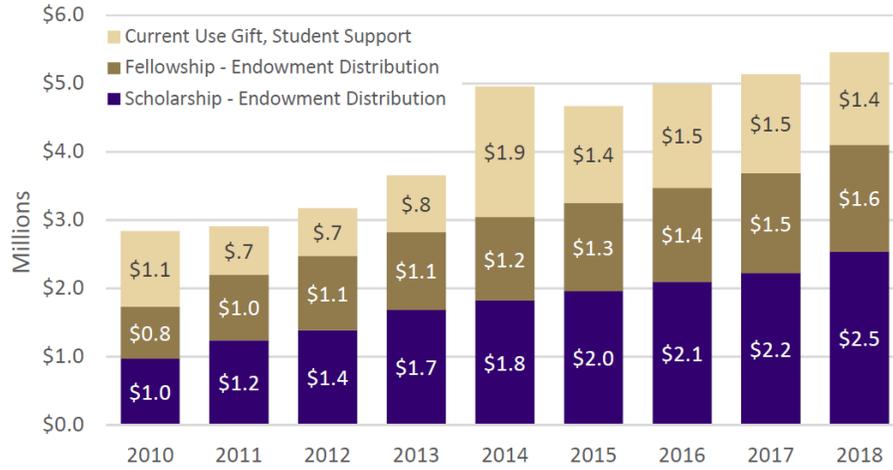




UNIVERSITY of WASHINGTON

FY2020 Annual Review Narrative Response for: **260 - College of Engineering** Programmatic & Academic Vitality Narrative

Figure 6 - Student Support: Current Use Gifts & Endowment



Source: Quarterly CEF Report & UW Advancement Report
FY18 Endowment Market Value: Fellowship \$304M & Scholarship \$749M



UNIVERSITY of WASHINGTON

FY2020 Annual Review Narrative Response for: **260 - College of Engineering**

Faculty/Librarian Trends

- 1) Please discuss your unit's Faculty/Librarian hiring trends and strategies from the last 2-3 years. *Question Type: Free Text, Word Limit: 500, Required For: UWB, UWT, UWS Academic Units, UWS Library*

Over the last three years, we have requested an average of 30 searches per year and have a hiring success rate of 45% (Table 2). We anticipate that as the number of searches returns to pre-proviso levels, our hiring success rate going forward will be approximately 60%.

Table 2 - Faculty Hiring Plans and Actual Hires - FY16 to FY18

	2015-16		2016-17		2017-18	
	Hiring Plan	Actual Hires	Hiring Plan	Actual Hires	Hiring Plan	Actual Hires
Assistant Professor	7	6	9	9	9	10
Associate Professor	17	3	20	4	16	6
Professor	4	0	3	1	2	1
Research Assistant Professor	0	0	0	0	1	0
Research Associate Professor	0	0	0	0	0	0
Total	28	9	32	14	28	17

The college has five broad strategic areas of focus that help frame new hiring and other investments: Energy, Health, Environment, Manufacturing, and Infrastructure. These areas were developed with participation from both COE faculty and faculty from across campus and are consistent with the college’s history of collaborative hiring across departments and across schools and colleges (primarily A&S, Environment, and SOM), using both cluster and joint hire mechanisms. The strategic areas are structured around societal needs rather than technical topic areas, but there is effectively a parallel layer of linkages to current and emerging technologies such as data science and quantum information systems. Finally, we also recognize core needs within units—there needs to be disciplines to enable interdisciplinarity—but this does not mean hiring can be justified via a replacement argument. Rather, the expectation is that each unit will drive its evolution intentionally rather than accidentally, and collaboratively rather than in isolation.

From a demographic viewpoint, our hiring strategy emphasizes early career faculty (ideally pre-tenure), and we have been continuously improving our search practices to ensure diverse candidate pools and bias-resistant evaluation procedures. We work closely with ADVANCE and the Office for Faculty Advancement to help guide us in this regard. Related to this has been a trend towards relatively broad searches—fewer constraints leads to a higher likelihood of getting diverse pools with excellent candidates. Similarly, positions are not allocated in a “use-or-lose-it” fashion, so searches are rebooted rather than units feeling pressure to be limited to a particular year’s group of final candidates.

Evaluation of candidates’ potential in research, teaching, and service (professional and institutional, leadership, diversity support) are all important components of the hiring process. The college operates at a high level in terms of both quality and quantity in undergraduate education, graduate education (professional and academic), research, industry engagement, and innovation, and this can only be sustained by continuing to hire faculty capable of excelling in this kind of environment.

- 2) How do these Faculty/Librarian hiring trends and strategies relate to your previously stated strategic goals and/or priorities? *Question Type: Free Text, Word Limit: 250, Required For: UWB, UWT, UWS Academic Units, UWS Library*

We seek expertise aligned with our strategic areas of emphasis. We strive to build candidate pools that support diversity and excellence. We partner to leverage campus strengths and increase our overall competitiveness. We hire faculty who understand the UW and buy into its combined education and discovery mission. We hire at a pace and at career stages consistent with sustainable growth.



UNIVERSITY of WASHINGTON

FY2020 Annual Review Narrative Response for: **260 - College of Engineering**

Tuition Based Program Rate Recommendation Narrative Section

- 1) Which existing tuition categories are you recommending a change to? *Question Type: Select Multiple, Required For: UWB, UWT, UWS Academic Units*

Master of Industrial and Systems Engineering,

Master of Material Science and Engineering,

Master of Applied Bioengineering,

Master of Chemical Engineering

- 2) Please explain why each proposed change is needed and how your unit will use new incremental tuition revenue increases or absorb incremental tuition revenue losses. *Question Type: Free Text, Required For: UWB, UWT, UWS Academic Units*

- All four tuition categories: The increase is required to cover increased costs of instruction, including increases in faculty, staff, and TA salaries and benefits and in the cost of supplies and materials (including lab equipment).
- It is also the case that the Master of ISE program needs resources for an update of the unit's distance learning technology, which is designed to enhance the student experience.

- 3) Explain whether and how each proposed change will affect peer comparisons and/or whether a market analysis was conducted. *Question Type: Free Text, Required For: UWB, UWT, UWS Academic Units*

- BioE: A market survey was conducted. The resident rate will remain slightly below the mean for public peers, and the nonresident rate will be several thousand less than the public peer mean. Tuition at private peers is a minimum of \$52,000.
- ChemE: Tuition was compared to that at peer institutions. Tuition will remain slightly below a peer mean for professional master's programs at public institutions and substantially below that at private institutions (where tuition is \$50,000 or more).
- ISE: Tuition was compared to that for similar programs at peer institutions. Tuition is comparable to that at public peers and substantially below that at private institutions. The most similar program is at USC, where the cost for 30 credits exceeds \$60,000.
- MSE: Tuition was compared to that at peer institutions, and tuition will remain slightly below a peer mean for public institutions, and substantially below that at private institutions (where tuition is \$50,000 or more).

- 4) Discuss the impact of each proposed change on student debt load. *Question Type: Free Text, Required For: UWB, UWT, UWS Academic Units*

- BioE: Fewer than one-third of students are taking loans while enrolled in the program. The average loan amount for resident students is approximately the cost of tuition and fees for one year; the average for nonresident students is less than 30 percent of the cost of tuition and fees. This increase, then, is expected to increase loan debt by less than \$1,000 for those students who utilize loans.



UNIVERSITY of WASHINGTON

FY2020 Annual Review Narrative Response for: **260 - College of Engineering**

Tuition Based Program Rate Recommendation Narrative Section

- ChemE: Fewer than 3% of students are taking loans while enrolled. The average loan amount is about 75% of tuition and fees for residents and about 20% for nonresidents. For the very small number of students who use loans to pay for their enrollment, this increase is expected to increase loan debt by less than \$500.
 - ISE: Fewer than 5% of students are taking loans while enrolled in the program (tuition is paid for most students by employers). The average amount of loans for those taking loans is less than 50% of the cost of tuition and fees. For the very small number of students who use loans to pay for their enrollment, this increase is expected to increase loan debt by about \$400.
 - MSE: About 35% of residents and 20% of nonresidents are taking loans while enrolled. The average debt of those taking loans is slightly below the total cost of tuition and fees. This increase is expected to increase loan debt by less than \$1,000 for those students who utilize loans.
- 5) Describe whether you expect the proposed tuition rate(s) to result in any substantial changes to enrollment (including a change in the resident/nonresident composition) or to the volume of waivers awarded. *Question Type: Free Text, Required For: UWB, UWT, UWS Academic Units*

All four programs: Given that tuition is in the expected range for similar programs at public institutions (and well below that at private institutions) and given no evidence of a reduction in enrollment resulting from prior tuition changes, no change in enrollment is expected as a result of these increases. Since students in these programs do not typically receive waivers, the number or amount of waiver awards is expected to remain unchanged.

- 6) For each proposed change, please explain what would happen if the change were not implemented (e.g. deficit, loss of staff positions, etc.). If a proposed change is part of a plan to eliminate a current deficit, please indicate that. *Question Type: Free Text, Required For: UWB, UWT, UWS Academic Units*

Given cost increases, the buying power of each of the programs would be reduced without the tuition increase, leading to a reduction in program quality. Additionally,

- The ISE program has noted the use of tuition revenue to hire top-notch professionals with PhDs to teach, so that less experienced professionals would be hired in the absence of a tuition increase, negatively affecting the quality of the program.
- MSE has noted that the cost of the MSE program is high given the applied nature of the program and the involvement of students in laboratory activities. A reduction in such involvement could lead to a reduction in the appeal of the program and the quality of the degrees.

- 7) For each tuition category that you have proposed changing, please discuss your unit's overall tuition rate strategy for the next 3-5 years. In your response, please explain whether and how your long-term strategy connects to "market" rates (e.g. where do you want to be, rate wise, compared to peers?) *Question Type: Free Text, Required For: UWB, UWT, UWS Academic Units*

Each program has two goals that will guide tuition-setting strategy:

- Remaining competitive to peers in cost and duration of programs, and
- Ensuring sufficient support to maintain the quality and desirability of the program.



UNIVERSITY of WASHINGTON

FY2020 Annual Review Narrative Response for: **260 - College of Engineering** Communication with Stakeholders

- 1) Please enter the date that FACULTY leadership within your unit/campus was consulted and given the opportunity to provide input as part of this budget planning exercise. If not yet shared, please enter the date you are scheduled to consult with FACULTY leadership and, immediately after that date, please send an update to Becka Johnson Poppe, jbecka@uw.edu. *Question Type: Date Select, Required For: UWB, UWT, UWS Academic Units*

Jan 29, 2019

- 2) Please list a point of contact for your FACULTY leadership (including name and email address) *Question Type: Short Answer, Required For: UWB, UWT, UWS Academic Units*

Professor Sumit Roy, Electrical & Computer Engineering, 206-221-5261, sroy@uw.edu

- 3) Please enter the date that STUDENT leadership within your unit/campus was consulted and given the opportunity to provide input as part of this budget planning exercise. If not yet shared, please enter the date you are scheduled to consult with STUDENT leadership and, immediately after that date, please send an update to Becka Johnson Poppe, jbecka@uw.edu. *Question Type: Date Select, Required For: UWB, UWT, UWS Academic Units*

Jan 25, 2019

- 4) Please list a point of contact for your STUDENT leadership (including name and email address). *Question Type: Short Answer, Required For: UWB, UWT, UWS Academic Units*

Chair of COESAC: Richard Lee, Materials Science and Engineering, rvlee@uw.edu

- 5) Enrolled students affected by tuition rate increases should be consulted on proposed increases before proposals are finalized. In the space below: (1) please describe when and how students were consulted and (2) please summarize the feedback they provided regarding EACH of your tuition recommendations. *Question Type: Free Text, Required For: UWB, UWT, UWS Academic Units*

All four programs are one-year in duration; as such, currently enrolled students are not affected by the proposed changes. The COE Student Advisory Council was consulted on January 25, 2019. Since each program is asking for a 3% increase, they considered the increases together. Students asked how the projected increase in revenue would be spent. After a brief explanation, as well as a conversation about peer rates and the estimated effect on debt load, student council members indicated they did not have concerns.