SELF STUDY REPORT

FOR

THE UNIVERSITY OF WASHINGTON ACADEMIC PROGRAM REVIEW

OF

THE SCHOOL OF ENGINEERING AND TECHNOLOGY
UW TACOMA

DEGREES OFFERED

Computer Science

BS, BA, MS, PhD in Computer Science & Systems
Graduate Certificate in Software Development Engineering

Information Technology
BS in Information Technology
Master of Cybersecurity & Leadership
Minor in Applied Computing

Engineering
BS in Civil Engineering
BS in Computer Engineering
BS in Electrical Engineering
BS in Mechanical Engineering
MS in Electrical and Computer Engineering

YEAR OF LAST REVIEW: 2011-12

RAJ KATTI
DEAN, SCHOOL OF ENGINEERING AND TECHNOLOGY

DECEMBER 1, 2023

EXECUTIVE SUMMARY

This summary highlights the School of Engineering & Technology's major strengths, our challenges, and opportunities available to us. We will use these to chart our course forward. We start by stating the mission of UW Tacoma and the School.

The Mission statement of the University of Washington Tacoma is:

"As an urban-serving university, we: Expand access to higher education in an environment where every student has the opportunity to succeed; Foster scholarship, research and creativity to address the challenging problems of our time and place; Partner and collaborate for common good; Catalyze the economic and social vitality of the region."

The Mission Statement of the School of Engineering and Technology is:

"To provide the highest quality computing, engineering, science, and technology education for a diverse population and engage in research and innovation that benefits the community by fostering social mobility and economic development."

Strengths.

Establishing a new School of Engineering & Technology (SET) in 2016 has begun providing access to high demand majors in the South Sound region. Prior to becoming a school, we were called, The Institute of Technology, and we had the following programs: BS/BA Computer Science & Systems (CSS), MS CSS, BS Information Technology (IT), Master of Cybersecurity & Leadership (MCL), Minor in Applied Computing, and BS Computer Engineering (CompE). After 2016, we have added the following degrees: BS Electrical Engineering (EE), BS Mechanical Engineering (ME), BS Civil Engineering (CE), MS Electrical & Computer Engineering (ECE), PhD CSS, and the Graduate Certificate in Software Development Engineering (GC-SDE). In 2016, the programs that received ABET accreditation were, BS CSS, BS IT (both for the first time) and BS CompE. In 2022, all these programs got reaccredited including BS EE (the BS EE received accreditation for the first time in 2019). BS ME had an excellent accreditation visit in Oct. 2023 and BS CE will go up for accreditation in 2024-25. The BS ME and BS CE programs were largely funded by a state proviso of $1.634M per year in 2019. In 2019, the state also funded ($40M) a new building to house new ME and CE labs. In 2023, the state funded another proviso for growing computing and engineering programs ($854k in 2023-24, $2M in 2024-25 and every year thereafter).

The enrollments in all our programs have been strong. Enrollments have gone from 656 in 2014-15 to 999 in 2023-24. We expect growth in enrollments to continue over the next few years.

Student Success: Student/Alumni surveys in the ABET accreditation reports indicate a high level of student satisfaction (see Section on Continuous Improvement (for EE, CompE, ME) or the Appendices (for CSS & IT) in ABET self-study reports for survey results). Upon graduation SET undergraduate and graduate students receive job offers from companies and government agencies of the region and beyond and they receive admission into graduate programs in many major universities across the nation. The average number of years to graduation is 4.09 (High School Students) and 2.76 (Community College Students). The average 5-year graduate rate is around 88% (see Tables E.8 through E.11 in Appendix E).

Some companies that offered jobs to SET graduates in the last three years: Microsoft, Amazon, Boeing, Costco, Facebook, Google, Siemens, Weyerhaeuser, Intel, PACCAR, Fred Hutch Cancer Center; Local Companies include, Tacoma Power, Infoblox, Namatad, Puget Sound Naval Shipyard, Naval Undersea Warfare Center, MultiCare Health System, Texas Instruments.

Some universities other than UW Tacoma that admitted SET students (BS and MS) into their graduate programs in the last three years: UIUC, U of Minnesota, Georgia Tech, Northwestern University, Carnegie Mellon University, UC San Diego, University of Colorado-Colorado Springs, Louisiana State University, Purdue University, Boston University, UW Seattle, UCLA, University of Arizona.

UW Tacoma's and SET's mission of fostering social and economic mobility of students has largely been met. SET continues to play a role in catalyzing the economic vitality of the region by attracting companies to the region.

Diversity: Student diversity for undergraduates has improved as follows: underrepresented minorities: grown from 15% in 2014 to 28% in 2023, women: grown from 17% in 2014 to 20.5% in 2023, Black or African Americans: grown from 5% in 2014 to 14.1% in 2023, Hispanic or Latino: grown from 5.6% in 2014 to 9.8% in 2023, and first generation: grown from 48% in 2014 to 57% in 2023. Currently, 71% of SET undergraduate students are students of color, 26.4% of faculty are female, and 49% of faculty are White. See Appendix E for more details.

Research: The main research areas in SET are machine learning, cybersecurity/cryptography, bioinformatics, cloud computing, transportation engineering, engineering pedagogy, and environmental engineering. The number of journal papers published by faculty has gone up from 27 in 2018-19 to 80 in 2022-23. The grant amount in 2022-23 was $1.65M, $797k more than the previous year. Since 2018, SET has received several large grants including, a $1.34M NIH R01 grant in 2018, a $2.03M NSF grant in 2018, a $2M NIH center grant in 2022 (this is part of a multi-institutional $7M grant), and a $1M grant from the WA State Department of Ecology in 2023. The collaboration with Infoblox, a local cybersecurity company, has resulted in grants close to $500k and collaborations with Madigan Army Medical Center (MAMC), Fred Hutchinson Cancer Center, UW Medicine, and Harborview Medical Center have resulted in several funded research projects over the years. SET faculty have started four successful companies: KenSci, Namatad, BioDepot, and CueZen. These companies have funded projects in SET and hired SET students. Boeing, TI, and the Naval Undersea Warfare Center (NUWC) have funded several senior design projects for SET's engineering students. The City of Tacoma is going to fund CE student scholarships and the EE Power Consortium.

SET Finances: Two fee-based programs (MCL and GC-SDE) help with SET's finances but recent budget cuts (2% in 2023-24: one Computer Science faculty position and a staff position in Communication and Marketing were cut) have put a strain on our current budget (because our enrollment has increased at approx. 8% a year for the past two years). In 2022-23, we had a deficit of about $60k which we were able to cover from revenue generated from fee-based programs.

Challenges.

Growth has forced us to constantly change the way we structure administration. The faculty and staff have had to adapt to a changing school, which has led to a work environment (including well-being and work/life balance of faculty/staff) that is not always ideal (see faculty/staff survey in Appendix J). We want to deal with this via departmentalization (*i.e.* splitting the school into departments or divisions each with a chair) and via increasing revenue by starting new fee-based programs. Regardless of whether we departmentalize or not, we will commit to summer salaries and course releases in an academic year for program chairs, graduate program chairs, and associate deans. Currently, these chairs and associate deans do not work in the summer. Paying them in the summer will result in them paying more attention to issues that result in an improved work environment.

Increasing school revenue via expansion of current fee-based programs or via starting new ones will help with faculty administrator summer salaries (partially), TA salaries, program marketing costs, costs related to improving the balance between teaching and research, and research productivity. High faculty teaching loads adversely affect research productivity. Aggressive marketing of our programs is needed so that people of the region and state know about the programs we offer.

As we continue to grow, there is a high likelihood of a shortage of space for faculty, staff, labs, and graduate students.

Opportunities.

SET has a large part to play in the journey of the City of Tacoma towards becoming the next tech hub in the state. Currently, the school has many opportunities that can help us move forward with respect to completing the establishment of the School of Engineering & Technology.

A new state proviso that began in the 2023-25 biennium ($2M per year) gives us the opportunity to expand our high demand programs by hiring 6 new faculty and 3 new staff. Strategic hiring of faculty can help improve instructional effectiveness and research productivity. New staff members can help with many of our challenges such as student advising, recruiting, managing internships and the first-year direct admit program (or direct admit program).

Another opportunity available to us is due to the high demand for our programs. This allows us to start new fee-based programs such as MS IT (slated to start in fall 2024 as a tuition-based program but can be converted to a fee-based program) and an online fee-based section of MS CSS. Increased revenue from these fee-based programs can be used to tackle many of our challenges.

A third opportunity exists because of rapid advances in technology that has made a master's degree a minimum qualification for many careers in engineering and computer science. We thus have the opportunity to start master's programs such as MS ME and MS CE.

This is a critical time for the School and the above factors will play a major role in strategically planning for the future of the School.

Self-Study Report for the Academic Program Review of the School of Engineering and Technology, UW Tacoma

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PART A

BACKGROUND INFORMATION FOR THE REVIEW COMMITTEE

Section 1: OVERVIEW OF ORGANIZATION

Mission & Organizational Structure

Overall mission of the School of Engineering & Technology:

To provide the highest quality computing, engineering, science, and technology education for a diverse population and engage in research and innovation that benefits the community by fostering social mobility and economic development.

The School of Engineering & Technology (SET) at UW Tacoma, known as the Institute of Technology before 2016, was established in 2001 to address the growing demand for technology professionals and to spread the prosperity of the high-tech economy to more Washington State residents. SET began with 60 students in the Computer Science and Systems program and it now has an enrollment of 999 students (first-year, juniors, seniors, and graduate students) in Computer Science, Information Technology, Electrical Engineering, Civil Engineering, Computer Engineering, and Mechanical Engineering. Several legislative provisos have funded the expansion of SET. SET has a history of ensuring the success of first generation, low-income, underrepresented minority, and military-connected students. A large number of SET students are from underserved and minority groups. In 2023-24, 28.3% of undergraduate students are underrepresented minorities, 57% are First Generation, 42% are Pell eligible, 14.4% are military connected, and 20.5% are women. 12.2% of graduate students are underrepresented minorities, 28% are First Generation, 14% are military connected, and 36.5% are women.

SET offers majors that are pathways to high-paying jobs, thereby increasing the number of students from underserved and minority groups who realize their dream of social and economic mobility. Many of SET's undergraduate students continue their studies in SET's graduate programs thereby giving them access to higher paying jobs and better career prospects.

Undergraduate and graduate degrees, certificate programs, and undergraduate minors in the School of Engineering & Technology: Five new degrees and a graduate certificate have begun since 2017.

Computer Science Programs and year started:
BS Computer Science & Systems (CSS) (1999)
BA Computer Science & Systems (2005)
MS Computer Science & Systems (Six Options: Bioinformatics, Distributed Systems, Cybersecurity, Data Science, Geographic Information Systems, Cyber-Physical Systems) (2003): Offered in thesis, capstone, or coursework-only format.
PhD Computer Science & Systems (2019)
Graduate Certificate in Software Development Engineering (GC-SDE) (fee-based) (2019): Offered in capstone format.

Information Technology Programs and year started:
BS Information Technology (IT) (2009)

Master of Cybersecurity & Leadership (MCL) (fee-based) (2013): Offered in capstone format.
Minor in Applied Computing (2005).

Engineering Programs and year started:
BS Computer Engineering (CompE) (2006)
BS Electrical Engineering (EE) (junior year started in 2017)
MS Electrical & Computer Engineering (ECE) (2020): Offered in thesis, capstone, or coursework-only format.
BS Mechanical Engineering (ME) (junior year started in 2021)
BS Civil Engineering (CE) (junior year started in 2022)

Enrollment and Graduation Patterns for each degree program:
SET undergraduate programs admitted students only into the junior year until 2022. In fall 2023, SET admitted 30 first-year students into its programs for the first time. The enrollment in SET (1st year, juniors, seniors, grad students) has grown steadily over the past 9 years (see Tables 1 & Table E.1 in Appendix E (enrollments in each degree)). The enrollments in undergraduate programs in CSS and IT have remained steady because they are at capacity. Currently, 135 students are admitted in BS/BA CSS every fall quarter and 70 are admitted every winter quarter. BS IT usually admits around 105 students in the fall quarter (this year we have increased this to 120). All other undergraduate programs admit students only in the fall quarter. The MS CSS and MS ECE programs admit students mainly in the fall quarter and a few more students in the spring quarter. The enrollments in the CSS graduate programs are at capacity (except for the graduate certificate). MS CSS has experienced a slight drop in enrollment during the pandemic but this has been compensated by the enrollment in the PhD program. Most engineering programs are new except for BS Computer Engineering which has been experiencing a drop in enrollment. We attribute this to the fact that students can now select other engineering majors like EE, ME and CE. Prospective 1st year student numbers indicate that enrollments in all engineering BS programs (including computer engineering) are on the rise.

Table 1. SET Enrollments in undergraduate (UG) and graduate programs.

Year	**14-15**	**15-16**	**16-17**	**17-18**	**18-19**	**19-20**	**20-21**	**21-22**	**22-23**	**23-24**
UG (juniors & seniors)	540	594	617	641	630	644	685	688	741	780
First-year direct admit										30
Master/Certificate/non-matriculated	116	174	169	164	183	177	152	156	164	169
Doctorate							7	20	20	20
Total Enrollment	656	768	786	805	813	821	844	864	925	999

Tables 2 and E.2 in Appendix E (degrees awarded per major) show trends in number of degrees awarded. The number of degrees awarded in every degree program has remained steady or has been increasing (except MS CSS, BS CompE and GC-SDE).

SET is a very diverse school ensuring the social and economic mobility of more than 50% of its students. Tables E.3 (for undergraduate programs) and E.4 (graduate programs) in Appendix E breakdown the enrollments in the school by race/ethnicity (Table E.5 gives enrollments by gender and URM status).

Table 2. SET number of degrees awarded.

Year	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23
Baccalaureate	225	264	266	300	314	302	331	300	356
Master	56	68	121	77	105	102	129	90	94
Total Degrees	281	332	387	377	419	404	460	390	450

Support for Academic Services (e.g., advising) and non-Academic faculty and student services

Our faculty and staff organizational charts are provided in Appendix A (program-based chart, staff chart, and committee chart). The faculty are divided according to areas of study (called Programs), which are, computer science, information technology, electrical & computer engineering, mechanical engineering, and civil engineering. Each Program has a chair and a graduate program chair who manages the graduate degrees in the Program. The staff are divided into academics, operations, development (or advancement), and industry partnerships, each headed by a director. The academic administrator (or Director of Academics) manages advisors and program coordinators. The Director of Operations manages the fiscal and lab/IT staff. The Director of Development manages an events coordinator. The Director of Industry Partnerships (0.6 FTE) manages relationships with industry, conducts advisory board meetings, conducts the quarterly "Life After Graduation" seminars jointly with a faculty member, conducts the annual South Sound Technology Conference (that brings companies, faculty, staff, and community members together for discussion of relevant topics in tech), and holds weekly help sessions for students on resume writing, job search, and interview skills.

Academic Advising: Academic Counselors at SET, work with students on the admissions process, academic course scheduling, mentoring/advising, and planning for graduation. They help students identify academic goals, develop strategies for achieving them, and help students with their personal and professional development. The academic counselors work closely with faculty and have been important contributors to program faculty meetings, with the exception of rare executive sessions. The Scholarship committee, consisting of academic counselors and faculty, decides on the recipients of scholarships.

Courses numbered 390 (e.g., TCSS 390), referred to as "390 workshops" are specifically designed to go with CORE courses, so that students get additional hands-on experience with course problems that are similar to their in-class homework problems. These courses are facilitated by students who are mentored by faculty.
SET maintains collaborative working relationships with other departments on campus, to ensure student success. Some of the departments that SET academics works closely with include, Financial Aid, the Graduate School, Student Affairs, the Registrar's Office, the Equity and Inclusion office, International Student Services & Scholars, Professional Development, Campus Housing, the Office of Undergraduate Education, Global Honors, and the Study Abroad

program. As a team, SET staff, faculty, and our academic partners work to help students integrate their academic, career, and personal goals.

Non-Academic Services: The Director of Operations works with the Senior Computer Specialist to ensure that the computing needs of the school are met. Lab engineers maintain all the equipment in engineering labs. They also order parts and consumables needed in the labs and maintain an inventory of equipment. Fiscal services (budget planning and projections, expenditure, reimbursements, grants & contracts) are managed by the Director of Operations and one staff member.

Shared Governance and Advice from Stakeholders: SET (previously called the Institute of Technology) became a school in 2016. At this time, a Faculty Council (FC) consisting of two faculty from each program (CS, IT, ECE, ME, CE) was formed. The FC formulated School Bylaws that govern how the school operates. The FC also advises the dean on fiscal matters including, budget, annual raises, and other policies.

Committees in the school are the JEDI (or DEI) Council (faculty and staff), ABET Committee, Staff Council, Scholarship Committee, Research Showcase Committee (conducts the annual faculty/student research poster presentation), Direct Admissions Committee, and graduate program committee (one for each graduate program). Outside of committee meetings the following meetings occur in the school: all-faculty meetings (once a quarter), and program faculty and advisors' meetings (once a month, programs are CS, IT, ECE, ME, CE). Initiatives, rules, regulations, and policy are mainly discussed in the Program Faculty meetings (advisors also attend these meetings) if they are program specific or in the FC/all-faculty meetings if they apply to the whole school. Faculty meetings (all-faculty or Program Faculty) are mainly devoted to communication by the administrators (FC chair or Program Chair) and to debate major legislation (e.g., curriculum, course changes, bylaws changes). The Dean has monthly (or quarterly) meetings with all the program chairs and graduate program chairs, and the staff directors.

SET has one main advisory board for the school and smaller advisory boards for ECE, ME, and CE. We seek approvals of the Educational Objectives of programs from the advisory boards. The advisory boards also give the dean and program chairs input on various issues including recruiting, fundraising, and industry relationships. The dean seeks input from students via the quarterly town hall meeting. The FC solicits advice from FCs of other schools on campus through informal meetings. Some SET faculty are members of the campus Faculty Assembly (UWT Faculty Senate), thereby increasing their interaction with faculty from other schools.

Budget and Resources

Appendix B provides a detailed breakdown of the unit's budget (funding sources and expenses) over the past three biennia. Funding for the school mainly comes from the following sources:

- General Operating Fund (GOF) and State Provisos: These are funds provided by the university from state appropriations and tuition.
- Self-Sustaining Programs: These funds are revenue from fee-based programs that are not supported by the state (MCL and GC-SDE).
- Indirect Cost Recovery Return (ICR Return): A portion of grant indirect cost returned to the school.

These funds are used for salary of faculty and staff, for part-time faculty, graders, and operations. RAs are paid through grants. Additional resources include gifts and fellowship income, which are collected and dispersed independently. In 2022-23 we had a deficit of about $60k which we were able to cover from revenue generated from fee-based programs.

Research grant expenditures have begun to increase in the past two years. It should be noted that the teaching load of SET faculty is very high (6 courses/year for tenure track faculty and 7 courses a year for teaching track faculty). Research awards (sum of all the grant amounts for a particular year of all multiyear grants) in SET increased by $797k in 2022-23 compared to the previous year. The Federal Grant Amount in 2021-22 was $620k and the Foundation Grant Amount was $228k, for a total of $848k. The Federal Grant Amount for 2022-23 was $1.467M and the Foundation Grant Amount was $179k, for a total of $1.646M. Additional research contracts from industry (e.g., KenSci) are not included in the amounts stated. More details on grants and contracts are provided in the section on Scholarly Impact.

Due to decreasing enrollments in the other schools on campus (SET is the only school with increasing enrollments over the past 10 years), our school's budget was cut by 2% in 2023-24, (one Computer Science faculty position and a staff position in Communication and Marketing were cut). These cuts have put a major strain on the school's expansion and have reduce faculty and staff morale.

In 2019, SET received a state proviso of $1.634M/year for starting BS ME and BS CE and in 2023, SET received a proviso of $2M/yr for expansion of computing and engineering programs that leads to 55 more graduates per year ($854k in 2023-24 and $2M in 2024-25 and every year thereafter). Some of these funds will have to go towards making up for cuts in the budget.

Our present strategies to improve the budget situation include the following:

- Increase the number of fee-based programs: The new MS IT program that is going to start in Fall 2024 can be converted to a fee-based program to increase revenue. Another option is to start a section in the MS CSS program that is fee-based. A third option is to expand the existing fee-based programs (MCL, GC-SDE). A fourth option is to start a new master's degree in Criminal Justice and Cyberforensics jointly with the School of Social Work and Criminal Justice (a proposal for this program is currently being written).
- Increase grant and contract revenues by improving the balance between teaching and research. This is hard to achieve because campus teaching loads are fixed. The newly funded proviso will result in the hiring of six new faculty next year. This gives us the opportunity to hire faculty in areas that complement current research. Another option is to increase interaction with industry.
- Expansion of undergraduate programs by state provisos.

In 2018, SET and UWT Advancement have hired a Director of Development. Our focus has been on securing endowed funds, scholarships and programmatic support related to the construction of Milgard Hall (the new building for ME and CE labs). The school successfully secured a $1.4M endowed gift to support SET graduate programs. This flexible endowment allows SET to support Ph.D. fellowships, graduate and undergraduate research opportunities and other graduate school priorities.

Academic Unit Equity, Inclusion, and Justice

SET has a unit diversity committee called the Justice Equity Diversity Inclusion (JEDI) Council that is open to all faculty and staff. In the fall of each academic year, we make a call for anyone to join the committee, and then work with program chairs to make sure we have at least two members from each program. In the last two years the committee has averaged 14 members. In recent years this council has organized a seminar series on DEI topics and completed a detailed review of the most recent UW climate survey, including a list of action items for the unit to address.

SET's faculty diversity demographics are given in Appendix E, Table E.7. 26.4% of the faculty are women. We have many international faculty and our unit has worked hard in recent years to follow best practices from UW's ADVANCE group for hiring. This has resulted in several additional BIPOC/women in faculty roles. Our campus has a BIPOC faculty mentoring and support group that we encourage our faculty to join. We are currently in the process of adopting a more formal mentoring plan to support all SET faculty.

Our unit has several outreach strategies with a focus on recruitment and retention. A few activities in recent years:

- Prepared a SET fellowship application for UW's GSEE (Graduate Student Equity & Excellence) program to recruit underrepresented graduate students.
- Led the submission of several grants focused on DEI topics. Dr. Raghavi Sakpal led a grant to connect our regional high schools more closely with our computer science program. Dr. Heather Dillon won a pathway grant from the Sloan Foundation focused on helping recruit and retain women/BIPOC students using undergraduate research. Dr. Dillon applied for related funding from the NSF to expand this program.
- Developed a quarterly survey to gather feedback from students about any climate issues that may exist in the unit.
- Hosted DEI focused workshops for faculty/staff at each of the recent SET retreats. In September 2022 our workshop was led by Corey Clay and focused on implicit bias. In 2021 our workshop focused on how faculty could build DEI modules for their classrooms.
- Our JEDI council led efforts to include DEI activities directly in our promotion and tenure guidelines.
- JEDI faculty worked to support the formation of a Society of Women Engineers (SWE) chapter at UWT.

Perhaps most importantly we have worked to disaggregate our retention data and set goals. Our aspiration is to approach 50% women in SET programs. We have also prepared an application for the American Society of Engineering Education (ASEE) Diversity Recognition Program.

SECTION II: TEACHING & LEARNING

All undergraduate programs in SET promote excellence in the curriculum through a culture of continuous evaluation and improvement. The educational objectives of each program are approved by the advisory board after faculty review of inputs received from other constituents such as students, alumni, and employers. Below, objectives, outcomes, assessment statements,

and results of assessment are summarized from our ABET accreditation documentation. Links to the full ABET self-study reports for all the undergraduate programs except BS CE can be found in Appendix I. Appendix F gives educational objectives, learning outcomes, and results of assessment for undergraduate programs in SET. This appendix is summarized below.

Student Learning Goals and Outcomes

Educational objectives describe what the graduates of a program will achieve three to five years after graduation. As an example, we state the educational objectives for the BS ME program. Other undergraduate programs have similar educational objectives (See Appendix F).

Program Educational Objectives (BS ME) (approved by one of the advisory boards listed in *Appendix H*)

- Our graduates will thrive in careers that utilize scientific principles, professional skills, and technical innovation.
- Our graduates will be prepared to advance their studies through professional development, certifications, or postgraduate degrees.
- Our graduates will pursue excellence in collaboration and leadership with an emphasis on the importance of transformational diversity/equity, integrity, and respect as they create work of value for their communities and society.

Student Outcomes: Below we give ABET defined student outcomes for engineering programs (BS EE, CompE, ME, CE) followed by outcomes for computing programs (BS CSS, BS IT).

Prior to graduation, we have assessed and evaluated that each engineering student has:

- An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- An ability to communicate effectively with a range of audiences.
- An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
- An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
- An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
- An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Student Outcomes for computer science (IT outcomes are similar, see Appendix F):

- Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
- Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.

- Communicate effectively in a variety of professional contexts.
- Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
- Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
- Apply computer science theory and software development fundamentals to produce computing-based solutions.

Assessment of UG programs: All programs use similar assessment techniques for continuous improvement. Below is an example of how the BS EE program conducts assessment.

Assessment of the student outcomes involves both *Direct Measures*, which includes organizing and analyzing the samples of student achievement (i.e., assignments, exams, reports, etc.) for student performance in accordance to a 6-year timeline, and *Indirect Measures:* Annual Senior exit interviews, Alumni Surveys (see Section on Continuous Improvement (for EE, CompE, ME) or the Appendices (for CSS, IT) in ABET self-study reports for survey results), FE exam results (used mainly by ME and CE). Alumni are surveyed every few years. Electrical and Computer Engineering (ECE) faculty are involved in evaluating the data and recommending curricular changes on a regular basis.

Recent changes in the curriculum of all undergraduate programs resulting from the evaluation processes include the following (for a full list of changes see *ABET self-study reports)*:

BS EE

- 2019: A new required, junior-level course TEE 317 Electric Machines replaces the required course TCES 430 Microprocessor system Design, which has been made an elective for the BS in EE. Another change is the introduction of a new elective, TEE 417 Power Electronics, to increase the breadth of senior electives for electrical engineering students.
- 2021: The ECE Curriculum committee approved a new elective course, TEE 433 Sustainable Energy, for electrical engineering students who have passed TEE 317 Electric Machines (prerequisite) with minimum grade 2.0.

BS Computer Engineering

- 2017: Replaced TMATH 390 Probability and Statistics with TCES 380 Stochastic Signal Theory in order to expose students to advanced concepts such as random processes.
- 2018: developed a new elective TCES 425 Intro to Computer Communication Networks.
- 2019: The ECE faculty decided to develop a new course TCES 310 Signals and Systems to replace TCES 310 Linear Systems and Transforms. The goal is to add a laboratory component where MATLAB is introduced to new junior students early in the junior year.
- 2021: The ECE faculty discussed the option to add additional prerequisites for senior design 1 (480) for the Computer Engineering program. This will help with the requirement of students to have certain skills and knowledge based on coursework taken before the senior design course. TCES 455 Devices and Controls was replaced with TEE 451 Control Systems.

BS ME

- New courses created: TME 402 FE review (new course (1 credit) for structured review of material for the Fundamentals of Engineering exam), new electives that align with faculty research (TME 489 Engineering Research Methods, TME 436 Power Plant Systems), and TME 491 Seminar in ME (new optional course (1 credit) that will provide a structured way to provide support to the senior students on career progression).
- For improving student writing quality: Created a plan for how to adjust laboratory reports and better communicate expectations to students. This included moving most of the laboratory classes to use the same report template and grading rubrics so students could practice with the same criteria over time.
- Lab experience: In Fall of 2023 we decided to streamline the laboratory course experience so students are taking no more than one laboratory class at a time. This would allow flexibility in course scheduling and better utilize faculty and student time. The change will also allow the students to focus more completely on the laboratory work they are completing, and increase the quality of their work.

BS Civil Engineering: Since the program is new, no recent changes have been made to the curriculum.

BS CSS

After our Oct 2016 visit, we made several curriculum changes. The first was to make TCSS 343 Design and Analysis of Algorithms a required course in December 2016. In April 2018 we made the following courses mandatory in order to strengthen our curriculum: TCSS 380 Fundamentals of Programming Language Concepts, TCSS 360 Software Development and Quality Assurance Techniques, TCSS 372 Computer Architecture, TCSS 422 Computer Operating Systems.

TCSS 380 is a new course designed to provide more in-depth coverage of Python, Java and C.

The CSS Honors Thesis program is now in its fourth year and is designed to prepare our high achieving students for graduate schools or strengthen their skills for further advancement.

A group of five courses has been designated as a design elective instead of creating a capstone design course. These five courses are: TCSS 437 Mobile Robotics, 445 Database System Design, 450 Mobile Application Programming, 465 Embedded Systems, and 491 Computational Worlds.

BS IT

System Administration Course: A systems administration course was deemed required for every IT major. Before Spring 2019, students could take TINFO 452 Windows Systems Admin or TINFO 457 Unix/Linux Systems administration or neither since they were both electives. This action strengthens our program and students often take both courses now.

TINFO 476 Threat Modeling: An excellent hands-on course was designed around the Microsoft Threat Modeling tool. It gives our students excellent skills that are valued by future employers.

<u>BA Computer Science & Systems:</u> This degree is a non-ABET accredited degree that blends a solid foundation in computer science with a minor in another discipline. This degree is good for students who know that they want to study computer science but are not sure on a career path in

the field yet. The program allows graduates to pursue careers in the field of computing, while it offers them the ability to have a more specialized focus outside of computer science. Example minors taken by students include math, economics, and technical communications.

The assessment in this program is similar to the BS CSS program.

Last year, a portfolio course was added to the junior year of the curriculum in which students build a portfolio of their work to showcase their abilities to prospective employers when looking for internships and full-time employment. This change has increased the enrollment in this program. In 2023, 25 students graduated from this program.

Minors & Graduate Programs

Minor in Applied Computing

The goal of this minor is to give non-technical majors a technical education. The curriculum consists of five courses. The three required courses are, (1) Computational problem solving, (2) Database management and data analysis, and (3) Networks and the internet, and foundations of information. The list of elective courses consists of courses from fields such as business, communication, computer science, geology, biology, physics, chemistry, environmental science, history, technical writing, psychology, information technology, and urban studies.

The faculty in the Information Technology program oversee the curriculum quality.

The minor allows students to go into the field of their major at a technical company due to the advantage of having a strong technical education which the majority of their peers do not have. Some technical companies that former students are currently working for are: Amazon, Microsoft, Infoblox, EY, and more. Many students have also gone into technical analyst roles**.** Enrollment in the minor varies from 20 to 30 students.

Master of Science in Computer Science & Systems, Doctor of Philosophy in Computer Science & Systems

Goals of MS CSS: to acquire both breadth and depth of understanding of the latest applied and theoretical concepts within computer science. Three core courses (Advanced Algorithms or Theory of Computing, Applied Distributed Computing, and the Master's Seminar) are mandatory components of the curriculum. Options available are (1) thesis, (2) capstone design project, and (3) course-only. MS Degree concentrations that are available are in (1) Bioinformatics, (2) Distributed Systems, (3) Cybersecurity, (4) Data Science, (5) Geographical Information Systems, and (6) Cyber-physical Systems.

The PhD in CSS program in SET began in 2019. The goal of the program is to develop scholars, educators, and interdisciplinary researchers in the profession. Currently, the program has 20 students and one student has graduated from the program. The program builds on the thesis option of the MS CSS program (10 credits of thesis and 30 credits of coursework) and requires 20 more credits of coursework after the MS plus 30 credits of doctoral dissertation.

There is an overarching "graduate committee" composed of graduate faculty members who meet the criteria of UW graduate school graduate faculty status. This committee oversees the approval of new courses and monitors enrollment and student satisfaction with various courses. Since the program emphasis is on advanced coursework and independent research, the committee also

reviews all MS project and thesis proposals and approves these in a single-blind peer-review manner. Each course in these programs has codified the learning objectives and outcomes are assessed using a variety of instructional instruments such as assignments, course projects and reading materials covered by the course. Students are encouraged to submit instructor evaluations and the graduate faculty participate in a peer evaluation process annually to document any shortcomings and changes to coursework and teaching assignments. Such recommendations are then made to the chair of the CSS program and the dean of the school for their final consideration.

Quality in the PhD program is realized by the following, (1) annual evaluation of the progress of student research performed by the Graduate Committee, (2) a general exam (presentation of a research proposal) which is intended to ensure that students are prepared to conduct independent research successfully, and (3) the dissertation defense. Recent changes made in CSS graduate programs are: the PhD student policy handbook is being revised to ensure higher dissertation quality and the MS admission process is changing so that applicants can receive decisions earlier. 5 new TA positions for PhD students will be created to assist instructors in UG courses.

Master of Science in Electrical & Computer Engineering

The MS ECE is designed for students who want to deepen their understanding of the principles and applications of electrical and computer engineering, and who want to gain the skills and knowledge needed to become leaders in their fields. The curriculum includes courses in advanced computer architecture, advanced digital systems, advanced embedded control systems and signal processing, RF microelectronics, wireless communication, power systems, as well as cryptography and implementation of cryptographic systems. Options available are (1) thesis, and (2) course-only.

Similar to MS CSS, the MS ECE graduate committee (all ECE graduate faculty) oversees curricular and course approvals. Assessment involves, student exit surveys, alumni surveys, and course assessment (based on student performance in courses). Assessment of research occurs via the thesis defense. In response to students' feedback asking for more elective courses at the graduate level, we recently added a course on Graphics Processing Unit Architecture TECE 516 as an extended specialized topic on Advanced Computer Architecture, and TECE 535 Power Distribution Systems as a specialized topic in the power option of our MSECE.

Master of Cybersecurity & Leadership

The goal of the MCL program is to develop a practical understanding of operational cybersecurity, including the principles of data protection, network security, and information assurance, as well as the skills to manage technical professionals and lead strategic change in an organization. MCL is a fee-based program offered jointly with the Milgard School of Business. The enrollments in this program are usually capped at 35. Demand for this program is high and there is a possibility for future expansion.

Learning Outcomes:

- Graduates are effective interdisciplinary communicators who can integrate the technical aspects of cybersecurity with the strategic and managerial concerns of their organization.
- Graduates are diagnostic problem-solvers who can evaluate the information security needs and design strong cybersecurity capabilities for their organizations.

- Graduates are change-savvy managers who can effectively coordinate activities and lead individuals and teams.

Assessment involves exit surveys, evaluation of the two-quarter long capstone project, and assessment of course learning outcomes.

Recent changes made due to assessment: An NSF funded collaboration with the University of Colorado, Colorado Springs (UCCS), has created a pathway for MCL graduates to continue their study in the PhD in Cybersecurity at UCCS. Based on student feedback, a free one-week tech bootcamp is offered to students with non-technical undergraduate degrees. Other changes based on student feedback include, making courses more technical and starting the program in the summer quarter.

Graduate Certificate in Software Development Engineering

The GC-SDE provides an opportunity for students seeking training in computing-related technologies who lack the background to qualify for admission to a Master's program in computer science. The certificate program consists of 6 new courses (3 credits each) over 3 quarters. In each quarter, one course is devoted to theoretical ideas and practical aspects of software engineering. In the companion lab course, students receive hands-on training to write programs to practice and reinforce core concepts in a series of assignments and a final project. This graduate certificate program is administered by a faculty member who serves as the chair and who reports to the CSS graduate committee described in the MS/PhD CSS section. Any changes to courses or structure of this program must be approved by this graduate committee and subsequently by the CSS (Computer Science and Systems) program committee. The chair of this certificate is also responsible for student recruitment. Assessment is carried out via student surveys. Student surveys indicate a high level of student satisfaction. In response to student and faculty feedback, the GC-SDE program offers a free Python programming bootcamp to all admitted students before the start of the program starting 2022. The goal is to provide background materials to prepare students for this certificate program. Graduates of the certificate have secured jobs and admission in MS CS programs.

Instructional Effectiveness

Improving teaching effectiveness is done by evaluating teaching materials and techniques, by effective use of Txxx390 seminar courses (or workshops), and by an annual teaching workshop where faculty discuss effective teaching techniques. The review of instruction is primarily based on the following items:

- A faculty member's self-reflection of their teaching in every course. This includes reflections on teaching techniques, materials, and class assessment (exams, homework, projects etc.).
- The students' perception of their learning experience obtained from student evaluations (both written comments and computer summary).
- Peer evaluations: Every faculty member has to have at least one course per year evaluated by a peer. In this evaluation, a faculty member attends one or more class sessions and provides feedback on class activities. Sometimes, the faculty member also evaluates the canvas course page (or course materials). UW Tacoma Teaching Squares is a peer evaluation mechanism where a group of faculty from different disciplines attend each other's class sessions in order

to give feedback on teaching strategies. Many faculty in our school participate in Teaching Squares.

- Faculty subgroups (or all program faculty in small programs) periodically evaluate course materials and syllabi of a group of related courses. For example, faculty teaching programming courses meet to evaluate course syllabi and share their experience with different teaching techniques. One outcome of such discussions has been the creation of a new course in Python Programming, TCSS 141.
- Faculty Annual Evaluation and Feedback: The student evaluations, a faculty member's self-reflection of their teaching, and their peer evaluations are discussed in annual evaluation meetings by higher-ranking faculty and the dean. The dean writes relevant portions of this discussion in an annual evaluation letter. The dean also meets with faculty (assistant professors once a year, associate professors once every two years, and full professors once every three years) to discuss their teaching and scholarship.

Annual Teaching Workshop: All faculty meet once a year in a Teaching Workshop that facilitates the exchange of teaching ideas and hence the wider adoption of best practices. Many faculty have adopted active learning techniques they learned at this workshop. Some topics discussed in workshops have been the following: effective active learning techniques for courses in engineering/CS/IT (e.g., group problem-solving, multiple-choice questions to assess learning), how to use the Discord page effectively (this is a platform where students can ask questions anonymously), how to teach effectively online (this was helpful during the pandemic), and how to effectively use labor-based grading in technical courses (grading based on student effort). A large number of faculty have begun adopting the teaching techniques discussed in these workshops. The topic discussed in the September 2023 workshop was, "The use of Large Language Models, such as ChatGPT."

Txxx390 workshops (https://www.tacoma.uw.edu/set/students/390-workshops): Workshops (1 credit courses that are attached to a core course or a group of core courses) offer the opportunity to practice and discuss problems related to specific courses in the core curriculum, and are overseen by a faculty member and a student mentor. A typical workshop session involves working on problems in smaller groups. Groups then share and discuss their solutions. A student facilitator helps find problems to work on and helps when groups get stuck. Some advantages of the workshops are: ensures regular study and enough practice by students to be confident with the material, students get to see multiple approaches to solving a problem, students form a consistent group of peers to study with who are all interested in academic success, students get important feedback about how well they really understand the material, and students become part of a learning community and get to know classmates.

Tutoring: CSS undergraduate student tutors help students in intro classes (like TCSS 142, 143, 305, 321, 333, 371 and 342). The Teaching and Learning center on the UWT campus provides help in writing and quantitative courses like discrete math and calculus.

Undergraduate Research: Examples of research projects that students participate in are: the development of an evolutionary robotics experimental framework, energy harvesting from trees, wearable biopatch, circular economy of coffee machines, embodied carbon analysis of conventional and advanced insulation materials, and curved seawalls as an erosion management tool for Saipan. Undergraduate research is a best practice for the success of students from underserved communities.

Teaching and Mentoring Outside the Classroom

The most noteworthy activities outside the classroom are: capstone design projects, student groups participating in programming contests and other competitions (see Section III Scholarly Impact), research, independent studies, and internships. The school conducts an annual research showcase in which some of the research paper submissions are selected for poster/oral presentations. The End-of-the-Quarter Colloquium is where SET undergraduate students participating in internships, directed readings, or research for credit, present their work and findings to a broad audience. Senior Project posters may also be presented during the colloquium. Engineering undergraduate students present the results of their capstone projects (prototypes and posters) on demo-day usually held in the last week of May (a link to student project videos is provided at the end of this subsection).

Student Academic Progress: Undergraduate and graduate advisors work with faculty to ensure that students are making academic progress. They identify resources to promote the success of students and support students through challenges. The supervisor of graduate students ensures that they are making adequate academic progress. Other mechanisms for graduate students include: thesis/project proposal evaluation (for MS CSS), thesis/project defense (for MS CSS and MS ECE), annual evaluation of progress (PhD CSS), general exam (PhD CSS), and thesis defense (PhD CSS).

Preparing Students for the next phase of their lives: A quarterly seminar called, "Life After Graduation," is conducted by Dr. Donald Chinn and Andrew Fry, Director of Industry Partnerships. In this seminar, students learn about two options: graduate school and careers in industry. The Director of Industry Partnerships holds weekly office hours for helping students with writing resumes and cover letters. Graduate students present papers at the SET Annual Research Showcase and also travel to conferences to present papers. The campus career development office helps students (undergraduate and graduate) find internships/jobs.

Artifacts supporting Teaching and Mentoring outside the classroom:

End of the Quarter Colloquium: https://www.tacoma.uw.edu/set/news/colloquia

Student Clubs/Organizations: https://www.tacoma.uw.edu/set/students/orgs ; Engineers Without Borders (application for a new chapter has been submitted). A club not mentioned in this list is the HuSCII programming club.

Capstone Project Videos for Electrical and Computer Engineering: https://www.tacoma.uw.edu/set/programs/undergrad/ces/videos

SECTION III: SCHOLARLY IMPACT

SET faculty have a high teaching load (6 courses a year for tenure track faculty and 7 courses a year for teaching track faculty; most course enrollments are capped at 35 for undergraduate and 30 for graduate courses). Newly hired assistant professors teach 5 courses a year for the first two years. Faculty can teach a lower course load if they have grant funding to buyout courses. Traditional research is not expected of teaching track faculty. In 2023-24, SET has 33 tenure track faculty members, one research assistant professor, and 18 teaching track faculty. The number of faculty members in SET has grown from 27 full-time faculty in 2014-15 (15 tenure track and 12 teaching track faculty) to 52 in 2023-24.

Broad Impact of Faculty Members' Research:

As the school has grown the impact of faculty research has also grown. The main research thrusts in the school are Machine Learning, Cryptography/Cybersecurity, Bioinformatics, and Cloud Computing. Other areas in which research has begun to grow are Internet of Things (IoT), High Frequency Circuit Design, Smart City, Environmental Engineering, Transportation Engineering, Cryo-preservation of Organs, and Engineering Education/Pedagogy. Research in these areas is described below.

Main Research Areas:

- Bioinformatics and Cloud Computing (Yeung-Rhee, Lloyd, Hung). The goal of this work is to create easy-to-use and easy-to-deploy cloud-enabled tools for the creation, sharing and execution of reproducible bioinformatics workflows. Our team received an NIH basic science research grant of over $1 million, titled "Intelligent deployment of containerized bioinformatics workflows on the cloud" (R01GM126019) in 2018-2023. Two additional diversity supplements were awarded to support under-represented undergraduate students at SET to pursue bioinformatics and cloud computing research.
  Building on the cloud-based bioinformatics platform, Dr. Yeung and Dr. Hung received an NIH center grant through the MorPhiC program for $7M (~$2M for UW Tacoma) in September 2023. The goal of the MorPhiC program is to develop a consistent catalog of molecular and cellular phenotypes for null alleles for every human gene by using in-vitro multicellular systems.
- Machine Learning, Cryptography (including post-quantum cryptography), Smart City (De Cock, Nascimento, Barreto, Hu, Teredesai, Cheng, Bai). Projects in this area are in Privacy Preserving Machine Learning (Infoblox , a Tacoma Cybersecurity company, $480k), Machine Learning for Healthcare (KenSci, a faculty startup, $210k), Smart City Curbside Parking Management (NSF $250k), Predicting rare events within time series (NSF $175k), and Cybersecurity Education (NSF, NSA, ~$1.5M). Dr. Paulo Barreto is a co-author of a third-round alternate algorithm submitted to the ongoing NIST Post-Quantum standardization process (the code-based BIKE protocol: https://csrc.nist.gov/projects/pqc-dig-sig).

Growing Areas of Research:

- Internet of Things (Tolentino): Position Navigation and Timing without the Global Position System (GPS) (Airforce Research Office, ~$800k).
- High Frequency Circuit Design (Dawn): NASA funded project on high frequency transceiver design (~$500k).
- Environmental Engineering (Hadnagy, Baker): Innovation to destroy PFCs in wastewater (WA State Dept. of Ecology $1M).
- Cryopreservation of Organs (Shu, Gao (UW Seattle)): Dr. Shu is the Associate Director of the Center for Cryo-Biomedical Engineering, UW Seattle.
- Transportation Engineering (Kitali): Rural Equitable and Accessible Transportation Center, US DoT, $450k.
- Engineering Education/Pedagogy (Dillon, Lee, Abraham, Ford, Walters, Sakpal, Kitali, Hadnagy): Entrepreneurial mindset in undergraduate engineering students, Kern Family Foundation, ~$400k.

The total research grant amounts per year for SET is given in the table below (data obtained from the UW Tacoma Research office and UW Profiles).

2017-18	2018-19	2019-20	2020-21	2021-22	2022-23
$606,549	$1,488,928	$528,606	$1,420,137	$848,462	$1,645,764

Research awards in SET increased by $797,302 in 2022-23 compared to the previous year. Below we state the funding sources and amounts for the past two years.

In 2021-22: Federal Grant Amount for the year $620k, Foundation Grant Amount for the year $228k, Total = $848,462. (NSF $340,899; NIH $145,676; Uniformed Services University of the Health Sciences $100,276; PNNL $30k; NSA $3,624; Kern Family Foundation $153,164; Alfred P. Sloan Foundation $74,823)

In 2022-23: Federal Grant Amount for the year $1.47M, Foundation Grant Amount for the year $167k, Total = $1,645,764 (includes $12k from Florida A&M). (NIH $523,671; NSF $505,262; NASA $150k; NSA $137,047, US Army Medical Research and Material Command $86,446; PNNL $39,560; USDA $25k; Florida A&M $12k; Kern Family Foundation $166,778)

Major Grants since 2014-15: Appendix G gives SET research grants, number of publications by year from 2014 to 2023, and recent patent applications filed or granted.

MorPhiC Data Resource and Administrative Coordinating Center, NIH U24HG012674, UW sub-contract $1,957,364, Total cost of award: $7,020,914, 2022-2027.

NIH: R01 Intelligent deployment of containerized bioinformatics workflows on the cloud, $1,032,263, 2018-21.

NSF Grant (Yan Bai, PI): Collaborative Research: Colorado-Washington Security Scholars Program, University of Colorado, Colorado Springs and University of Washington, Tacoma. UW Tacoma portion of this award is $1,311,352 (plus indirect costs) and Colorado's portion is $1,132,119 (plus indirect costs). Total, including indirect costs, $3,081,251 (2018-23).

"Cutting the chain: Innovation to destroy PFCs in wastewater", WA State Department of Ecology [J. Baker (PI), E. Hadnagy, B. Pinkard, S. Magoon], May 2023, $1M.

Some high impact journals and conferences that faculty have published in are,

Journals: PNAS, Nature Communications, PLoS One, GigaScience, Bioinformatics, IEEE Transactions, Journal of Mathematical Cryptology, ACM Transactions, Neural Processing Letters, Journal of Fluid Mechanics.

Conferences: NeurIPS, ICML, CVPR, Selected Areas of Cryptography (SAC).

Companies Started by Faculty: *KenSci*, *Namatad*, and *BioDepot* have hired our graduates. In recent years, faculty research has resulted in several patents being filed and at least two patents being awarded (See Appendix G for a list of patents filed/awarded).

In 2015 Prof. Teredesai spun-out from UW and Co-Motion a novel healthcare AI cloud platform company *KenSci*. This company was acquired by Providence health systems in 2021 and subsequently Prof. Teredesai started a new generative AI for health company *CueZen* that is

working with global health systems in improving health outcomes by predicting next best actions for individual patients.

Namatad (founded by Dr. Tolentino): creates technologies that integrates location accountability, environmental sensing, and real-time analytics to increase situational awareness, operational visibility, and keep personnel safe in the line of duty.

Biodepot LLC (ttps://youtu.be/ydRY0KMivBg) was co-founded by SET faculty Drs. Ka Yee Yeung and Ling-Hong Hung in 2019 with the vision to transform biomedical big data analysis through innovative uses of cloud technologies, thus making an impact on clinical decisions and therapeutic discoveries. *Biodepot LLC* has received the following awards: UW CoMotion Innovation Gap Fund, NIH SBIR Phase 1 contracts (75N91020C00009 and 75N91021C00022).

Open Water Systems (founded by Dr. Walters): develops novel tools for engaging with local stakeholders to understand complex problems and identify practical solutions.

Student & Postdoc Involvement

Undergraduate and Graduate Students' Awards:

A SET team of faculty and graduate students won second prize in the 2023 U.S.-U.K. PETs (Privacy-Enhancing Technologies) Prize Challenge hosted by NSF and NIST. The competition required finding a solution to detect financial fraud using machine learning while ensuring customer privacy. $70,000 awarded to UW Tacoma. White House press release, NSF news.

A team of UW Tacoma School of Engineering & Technology faculty and students won first prize in the iDASH in 2019 (Track IV Secure Collaborative Training of Machine Learning Model) and 2021 (Track III Confidential Computing). The goal is to analyze genome data using machine learning while maintaining the privacy of the data.

A SET team of four undergraduate students and one graduate student won 4th place in Phase 1 of "Pushback to the Future" competition hosted by NASA for predicting pushback time of a flight (the time that a flight leaves the departure gate). $7500 award. 2023.

SET students received the following PhD student fellowships: NSF CS Grad4US PhD fellowship 2022-27, JP Morgan Chase PhD fellowship 2023-24.

Post-Doctoral Fellows' Participation in Research:

Between 2014 and 2019 at least two post-doctoral fellows have participated in research projects on Health Informatics and Social Networks, and Geographic Information Systems. Currently, there is a post-doctoral fellow working on Chip-Based ADS-B for High-Density Low-Altitude UAV Operations and another on Graph Neural Networks (GNN). The GNN project seeks approaches to solving prediction tasks for explainable graph neural networks. A faculty member mentors a post-doctoral fellow at PNNL (research on building lifecycle modeling). Two new post-doctoral fellows are being hired in 2023-24, one in transportation engineering and another in environmental engineering.

Program Graduates' Impact on Field:

Every year, more than 20 conference and journal papers have resulted from research carried out by SET students (while being mentored by SET faculty).

Some companies that offered jobs to SET graduates in the last three years: Nordstrom, Techtronix, Facebook, Intel, Costco, ARM Research Lab, AMD, Raytheon Missile & Defense, Tacoma Power, Boeing, Naval Undersea Warfare Center, Siemens, Microsoft, Capital One, Amazon, Accenture, Boeing, Google, Infoblox, Namatad, Fred Hutch Cancer Center, PACCAR, NSA, DoD, Social Security Administration, FDIC, Econ One Research, Puget Sound Naval Shipyard, SBW Consulting, NASA, PAE, Weyerhaeuser, MultiCare Health System, and Delta Airlines.

Some universities other than UW Tacoma that admitted SET students into their graduate programs in the last three years: UIUC, U of Minnesota, Georgia Tech, Northwestern University, University of Rhode Island, Carnegie Mellon University, UC San Diego, University of Colorado-Colorado Springs, Louisiana State University, Purdue University, Boston University, UW Seattle, UCLA, University of Arizona, Mississippi State University, University of North Dakota, and UW Bothell.

How has new Technology Changed Our Scholarship

Recent advances in Machine Learning and Cryptography have encouraged our faculty to begin research in Privacy Preserving Machine Learning. Research in Post-Quantum Cryptography has been influenced by the fact that current cryptographic techniques may be broken by a quantum computer. Research in applications of machine learning to other data rich fields such as fluid mechanics and transportation has also begun in the school.

Collaborative and interdisciplinary efforts

MorPhiC: The National Human Genome Research Institute (NGHRI), an arm of the National Institutes of Health, has launched a multi-phase, multi-year, multi-institution project called MorPhiC (Molecular Phenotypes of Null Alleles in Cells). The goal is to systematically investigate the function of every human gene and generate a catalog of the molecular and cellular consequences of inactivating each gene. As part of a $7 million grant over five years, Yeung's team (at SET, UW Tacoma) is helping to build the MorPhiC Data Resource and Administrative Coordinating Center (DRACC). The center will be based at the University of Miami Miller School of Medicine and will be led by Miami's Dr. Stephan Schürer. Other institutional partners are the European Molecular Biology Laboratory's European Bioinformatics Institutes and Queen Mary University of London. UW Tacoma's and Yeung's share of the grant will total about $2 million over five years.

Madigan Army Medical Center (MAMC) at JBLM: Over the years, Dr. Yeung has established a track record in funded collaborations with the MAMC on bioinformatics projects with applications including healthcare, precision medicine, precision nutrition, and vaccine design. Example funded projects include the following:

- Prospective validation of a genomic classifier for the early detection of ectopic pregnancy, funded by the AMEDD Advanced Medical Technology Initiative (AAMTI) in 2017-2018.
- Precision nutrition impact on health-related behavior change in active-duty service members, funded by the Geneva Foundation in 2022.
- A Precision Health Trial to Reduce Illness & Promote Resilience in Hospital Staff, funded by the Geneva Foundation in 2021-2022.

- Evaluation of Immunosequencing and Bioinformatics Methods for the Rapid Development of Neutralizing Antibodies, funded by the Advanced Medical Technology Initiative (AMTI) in 2022-2023.

Fred Hutchinson Cancer Center: Dr. Yeung has also funded-collaborations with clinicians at the Fred Hutch on bioinformatics projects with applications in precision medicine and cancer diagnostics. A recent project titled "Rapid Acute Leukemia Genomic Profiling with CRISPR enrichment and Real-time long-read sequencing for Clinical Use" (2023-2025) is funded by the National Cancer Institute to develop efficient and affordable assays with integrated bioinformatics solutions for cancer diagnostics. Deliverables from this collaboration include 1 accepted journal paper, 1 pre-print, and 2 provisional patents.

UW Medicine & Harborview Medical Center collaboration between NIH PI Grant O'Keefe and led at SET by Prof. Teredesai and Prof. Hu. This research is a Machine Learning modeling project on Early Detection of Sepsis, a life-threatening hospital acquired condition for trauma patients. We currently support one post doc at 90K (salary + benefits).

Shu collaboration with UW Seattle, Mechanical Engineering: Shu collaborates with Gao in the Department of Mechanical Engineering at UWS in the area of Cryo-Biomedical Engineering and Artificial Organs.

Kitali collaboration with Florida State University in transportation engineering: Kitali is part of a USDoT funded research center at FSU. UWT receives $450k from the center.

PNNL: Dillon has a dual appointment with PNNL and mentors a postdoc at PNNL.

KenSci, InfoBlox, Microsoft: these industries have funded SET faculty research in machine learning, cybersecurity, and geographic information systems respectively.

Walters' collaboration on techniques to address complex societal challenges: Food Security with Univ of South Florida, Climate Change Migration with University of Sydney, Circular Economy of Construction Waste with Universidad Diego Portales Chile.

Baiocchi collaboration with the Federal University of Paraiba, Brazil in the areas of Energy Harvesting and Wireless Sensor Networks with applications in the prevention of forest fires, helicopter navigation, and smart cities.

Within Campus and School: Pedagogy research collaboration between SET and School of Interdisciplinary Arts and Science, Machine Learning collaboration with the School of Nursing (https://www.aim-ahead.net/university-of-washington-tacoma/), Robotics collaboration with the School of Education, Machine Learning collaborations between CS and ME, Wireless sensor networks collaboration between ECE and ME.

Mentoring of Junior Faculty

Junior faculty are mentored by program chairs (on teaching and research), dean (on balance between external and internal service, and balance between journal and conference papers), or a self-selected senior faculty member (on teaching and/or research).

The Faculty Council is currently working on formulating a mentoring system for the school. This system could range from group mentoring (where a group of faculty mentor junior faculty) to one-on-one mentoring from mentors appointed by the program chair.

The UW Tacoma campus has a BIPOC faculty mentoring program that is available to SET faculty.

SECTION IV: FUTURE DIRECTIONS

Where is the Unit Headed?

The city of Tacoma is transitioning into a city where tech companies are choosing to locate. Boeing has expanded into Pierce County and Infoblox, a cybersecurity company, is one block from the UW Tacoma campus. Examples of other companies include Aquagga (a water treatment startup that builds PFAS destruction units and provides water, wastewater, and environmental remediation services), Namatad (creates easy-to-use technology that connects people, promotes safety, and enables data-driven decision making), and Homeostasis Systems (developing atmospheric carbon capture technology that will turn the CO2 into industrial products). Examples of incubators in Tacoma include Maritime Blue, Traction Space, and StartUp253. These incubators admit companies that can contribute to innovation and economic growth in the South Sound community. The ecosystem in the Tacoma area includes the military bases (JBLM, the Puget Sound Naval Shipyard, and the Naval Undersea Warfare Center (an R&D arm of the Navy)) and the Port of Tacoma. A strong and high-quality School of Engineering and Technology is a necessary part of this ecosystem. A major opportunity that we have at this time is to be part of and to enable the transition of Tacoma into the next high-tech city in the state.

In the next few years, we want to complete the establishment of the School of Engineering & Technology in a manner that leads to high quality undergraduate and graduate programs and high-quality research. Our goal is to become a destination school in the state for students aspiring to study engineering and conduct research. Another goal of the school is to enable the economic mobility of our diverse body of students. A third goal is to enable economic development of the region by providing the necessary workforce for local companies and by attracting new companies into the area. A fourth goal is to increase the quality and innovation level of faculty-led student research. Already such research has led to three successful startup companies (KenSci, Namatad, and BioDepot).

In a short span of seven years, SET has succeeded in offering high quality undergraduate and graduate programs. Our students find jobs in all major companies in the area, conduct high-quality research, and receive admission into graduate programs in major universities. Rapid growth has made us realize that, in order to remain successful, we have to constantly rethink the way we operate.

Below are some of the major tasks in order to complete the establishment of the school:

- Create departments in the school.
- Have a proper balance between teaching and research that results in better instructional effectiveness and research productivity.
- Increase the visibility of SET so that we become a destination school for studying engineering, CS, and IT in the state. This implies better marketing and recruiting.

- Start new graduate programs (MS IT, MS ME, MS CE). This helps with recruiting high quality faculty.
- Complete establishing the direct admit program (the goal is to admit more than 100 1st year students every year). This can be accomplished by hiring one staff member using the recently funded proviso. We want to start a 1st year student success program (much like the STARS program in UW Seattle) but this requires a new proviso to fund several faculty and staff positions. Other student success programs (390/tutoring, student clubs, student participation in competitions) can be largely funded by increasing course/lab fees.

What opportunities to pursue and goals to reach?

In 2023, SET has received a state proviso ($2M/yr) for expanding undergraduate programs to produce 55 additional graduates a year. Our goal is to use the proviso to strategically hire faculty in areas that complement current faculty research with the goal of increasing research productivity (publications and grant funding) and instructional effectiveness. We will also hire three to four new staff members to establish the 1st year admit program, improve advising/recruiting (especially of graduate students), improve relationships with industry, and improve marketing of SET programs. Proper use of 6 TAs funded by the proviso will improve both teaching and research.

The state community colleges are starting (or have started) BS programs in Computer Science and Applied Bachelor's programs in computing. The graduates of these programs will be a source of expansion of our MS CSS and MS IT programs.

It is also very important for us to pursue other ways of increasing school revenue that will help us achieve our goals. Answers to *Question 1* in the section on "Unit Defined Questions," lists ways to increase school revenue and some ways to effectively use this increased revenue.

Unit's benefit and impact regionally, statewide, nationally, and internationally. Given the unit's envisioned future, describe how reaching this future will augment that benefit and impact.

The regional benefits of SET are:

- SET provides access to undergraduate and graduate programs in engineering, CS, and IT to place-bound students from underserved communities in the South Sound. 85% of SET students are residents of Washington State. Most of these students come from low-income families and are the first in their family to go to college.
- SET graduates get high paying tech jobs thereby improving their social and economic condition.
- SET provides a tech workforce, which attracts companies to the South Sound area.

The goal of completing the establishment of the School of Engineering & Technology will enhance the benefits listed above.

PART B – UNIT DEFINED QUESTIONS

Summary of the School

Summarizing from Part A, the main points guiding our path forward are:

- The school was established in 2016, all programs received ABET accreditation in 2017 (BS CSS and BS IT for the first time), and programs started since 2016 are: BS EE, ME, CE, MS ECE, PhD CSS and GC-SDE. UW has approved the MS IT that will start in Fall 2024. This is a high demand program because of high enrollments in the BS IT program and because of the applied bachelor's programs that have started in community colleges. New student groups were established (e.g., IEEE chapter, ASCE chapter, SWE, EWB (application submitted), Entrepreneurship club). Since 2015, we have hired 25 faculty (number of faculty increased from 27 to 52) and 10 staff (number of staff has doubled since 2015). In 2022, we hired the first research assistant professor on the UW Tacoma campus. This rapid expansion of the school and the pandemic have led to many challenges in managing the work environment.
- Enrollments in the School are increasing and our diverse body of students (undergraduate and graduate) are succeeding in their careers or graduate school. 71% of our undergraduate students are students of color.
- Extramural research funding and number of publications has begun to increase. Faculty research has resulted in four successful startups and the number of patent applications has gone up (see Appendix G for a list of patents filed/granted in the past few years).
- Fee-based programs (MCL and GC-SDE) bring some financial stability to the school but recent budget cuts on the UW Tacoma campus have put a major strain on the expansion and proper establishment of the school.
- Since 2014, the percentage of undergraduate URM students, Black & African American students, Hispanic students, and first-generation students has gone up steadily. The percentage of undergraduate Pell eligible students, military connected students, and women students has remained steady (although the number of women undergraduate students went up by 2.6% this year). Currently, 71% of SET undergraduate students are students of color.
- Our challenges are maintaining proper balance in faculty workload between teaching and research, creating more visibility for our new programs (via marketing), and ensuring high quality in our new graduate programs. Restructuring the school (see *Question 1* below) and increasing revenue via new fee-based programs may help with these challenges.
- We have several major opportunities that will help us achieve our goals: (1) the new state proviso for $2M a year, (2) high demand for our computing programs makes it possible to start new fee-based programs in order to increase school revenue, and (3) expansion of our MS programs is possible because of new 4-year programs in community colleges (BS CS and applied bachelor's programs).

Supplementary Unit-Defined Questions

Question 1. (Because our school is new (established in 2016, 6 new programs were started since 2016)): How do we manage growth (or how do we put all the systems in place for research and student experience in all our programs)? Some example systems include:

a. *How might we optimize our organizational structure that enables efficient management of the school?*
b. *A robust career office for our graduates for both internships and jobs.*
c. *Robust recruiting: expand recruiting of students from the South Sound Area to include King/Snohomish County, the state, and beyond.*

In September 2023, the School's faculty and staff were surveyed on the realization of the values of the school. The results show that the school is effective in research/teaching/service excellence, in increasing diversity of faculty/staff/students, and in providing access to engineering programs. The school is slightly to moderately effective in faculty and staff well-being and work/life balance. We attribute this to the increase in workload caused by the rapid growth of the school. The survey results can be found in Appendix J.

We will address two aspects of growth that are important: (1) organizational structure and (2) increasing school revenue. We will address "robust recruiting" and "career office" in *Question 3*.

- Organizational structure: The number of faculty and staff has doubled since 2015 and the number of undergraduate students has gone from 590 to 741. The number of majors/graduate certificates offered by the school has gone from 6 to 12 since 2015. The complexity of operation has increased dramatically, thereby necessitating constant reorganization of the way we operate. Even though we have 12 programs, we do not have any departments and we do not have any funding to hiring associate deans and department chairs. We are leaning towards departmentalization but below we describe two possible ways of organizing ourselves:
    - Create departments in the school: One way of doing this is to create four departments (CS, IT, ECE, and ME/CE) with department chairs who manage all the functions of the department except finance and staff management. Two Associate Deans help with some of the dean's functions so that the dean can be more external facing.
    - Have programs with greater autonomy: have 5 programs (CS, IT, ECE, ME, and CE) with program chairs who oversee the curriculum and academic matters of the program. Programs that offer graduate degrees will also have graduate program chairs for managing these degrees. The Associate Deans will help doing part of the chair functions and part of the dean's functions. The Dean is more internal facing.

  In 2023-24, we plan on appointing an associate dean to oversee the restructuring of the school and an associate dean for equity and inclusion (subject to availability of funding).
- Increasing School Revenue: An increase in school revenue will help us achieve the following:
    - Paying for part of the salaries of department/program chairs and associate deans.
    - Hiring more TAs for assisting with labs and courses. This will reduce the workload of faculty thereby giving them more time for research and teaching. This in turn will lead to improved research publications (quantity and quality) and grant funding.
    - Hiring more student help for student success initiatives like tutoring, Txxx 390, capstone design projects, and student organizations.
    - Higher startup packages for new faculty.
    - Hiring more staff for recruiting, marketing & communications, and for enabling more relationships with industry.

  Some ways of increasing school revenue are listed below:
    - Start new fee-based programs: We have already mentioned that the easiest way to do this is to convert the MS IT program that will start in fall 2024 into a fee-based program. Another option is to start a new online fee-based section of MS CSS. Start a new fee-based program in cyberforensics in collaboration with the School of Social Work and Criminal Justice.
    - Increase Grants and Contracts: This requires a reduction in the teaching load of tenure track faculty. One way to do this is to increase student help in the classroom via TAs. Another way is to increase the course caps in CSS from 35 to 45 which enables the

reduction of the number of course sections offered per year from 6 to 5. This will reduce the total number of course sections that need to be taught without compromising teaching quality.

- Increase course/lab fees: this will pay for Txxx390 student mentors and the maintenance of lab equipment, thus freeing up funds currently used for this purpose.

Addressing the organizational structure and school revenue will help improve the work environment which has been affected by school growth and an increasing emphasis on research.

Question 2. How do we make sure we have adequate resources for research and teaching that ensures faculty and student success? How do we increase collaboration with industry and community partners? How do we balance research and teaching while encouraging grant applications and enhancing research productivity?

We addressed the question of resources by increasing school revenue in *Question 1* above. Here we address the issue of recruiting and retaining high quality faculty that will result in increased graduate program quality and increased research output in terms of grants and high-quality publications. This issue is important because we are recruiting 7 faculty in 2023-24 (3 in CSS, 3 in IT, and 1 in ME). Starting graduate programs, especially the PhD in CSS, has helped with recruiting high quality faculty. Some actions that can help with recruiting and retaining high quality faculty are:

- Providing higher startup packages: Currently the startup packages consist of $12k, 2 months summer salary, and a reduction of teaching load from 6/yr to 5/yr for the first two years. Providing funds for one research assistantship for 4 years will help a new faculty member recruit a high-quality PhD student (or funding a Postdoc position in programs without a PhD). This requires increasing school revenue.
- Further reduction of teaching load: Reducing the teaching load to 4/yr for the first two years and 5/yr thereafter would help balance research and teaching and enhance research productivity. This is only possible by hiring more faculty, providing TA help in courses, and increasing the maximum number of students (course caps) in each course section. Hiring more faculty is possible by state proviso funding which is conditional on increasing enrollments.
- Strategic hiring of faculty such that their research areas complement those of existing faculty with successful research programs. This will create a critical number of faculty in areas that are research thrusts of the school such as machine learning.
- Improve industry relations to increase research contracts. Hiring an additional staff member for improving industry relations will help with this and with student internships, senior capstone projects, and career services. Currently, the Director of Industry Partnerships is a 0.6 FTE position.

Below we consider other aspects of increasing the quality of our programs.

Quality of Programs (especially PhD): A major goal of SET is to constantly improve the quality of all its programs especially newly added programs. ABET accreditation helps with maintaining the minimum quality of our BS programs. Newer graduate programs need proper policies to be put in place so that quality is maintained/improved. Examples are policies for, rigorous annual evaluation of student academic progress and ensuring that PhD supervisory committee members

are experts in the field of research of student. Having regular faculty discussions regarding their responsibility towards graduate student research quality will also be helpful.

Overall, increasing school revenue is an extremely important part of the answers to *Questions 1* through *4* in this section.

Question 3. How do we increase our visibility? How do we market our programs to a wider population that includes our state, our region, and the nation?

In addition to addressing the question above, we also address issues related to "robust recruiting" and "career office."

A large number of citizens of the region and state are not aware of the programs SET offers primarily because they have started recently. In spite of this, our school has experienced robust enrollments. However, more has to occur to market the school widely. UW Tacoma has a small marketing team that does not have the bandwidth to market programs in a particular school. There is virtually no systematic graduate student recruiting done centrally on the UW Tacoma campus. SET has a 1.0 FTE graduate recruiter and a 0.5 FTE undergraduate recruiter. Most recruiting occurs in local schools/community colleges/graduate fairs. There is very little online marketing for SET programs. Recently, UW Tacoma has made the following changes that has been helpful: data is collected from people who visit our website and undergraduate applications are now accepted via Common App.

85% of SET students are residents of WA State. We want to make SET a destination school in the state for students who want to study CS, IT, and Engineering. In order to accomplish this we have to improve the way recruiting is done for both our undergraduate and graduate programs. More resources for staff will be needed for improving recruiting, marketing, and career services.

Support for career paths and success for SET students is not only supported by staff and faculty but by a strong relationship with UWT campus Career Services. The Director of Industry Partnerships (Andrew Fry) works with Career Services in the recruitment and promotion of two Technology Industry Career Fairs specifically geared toward our student population.

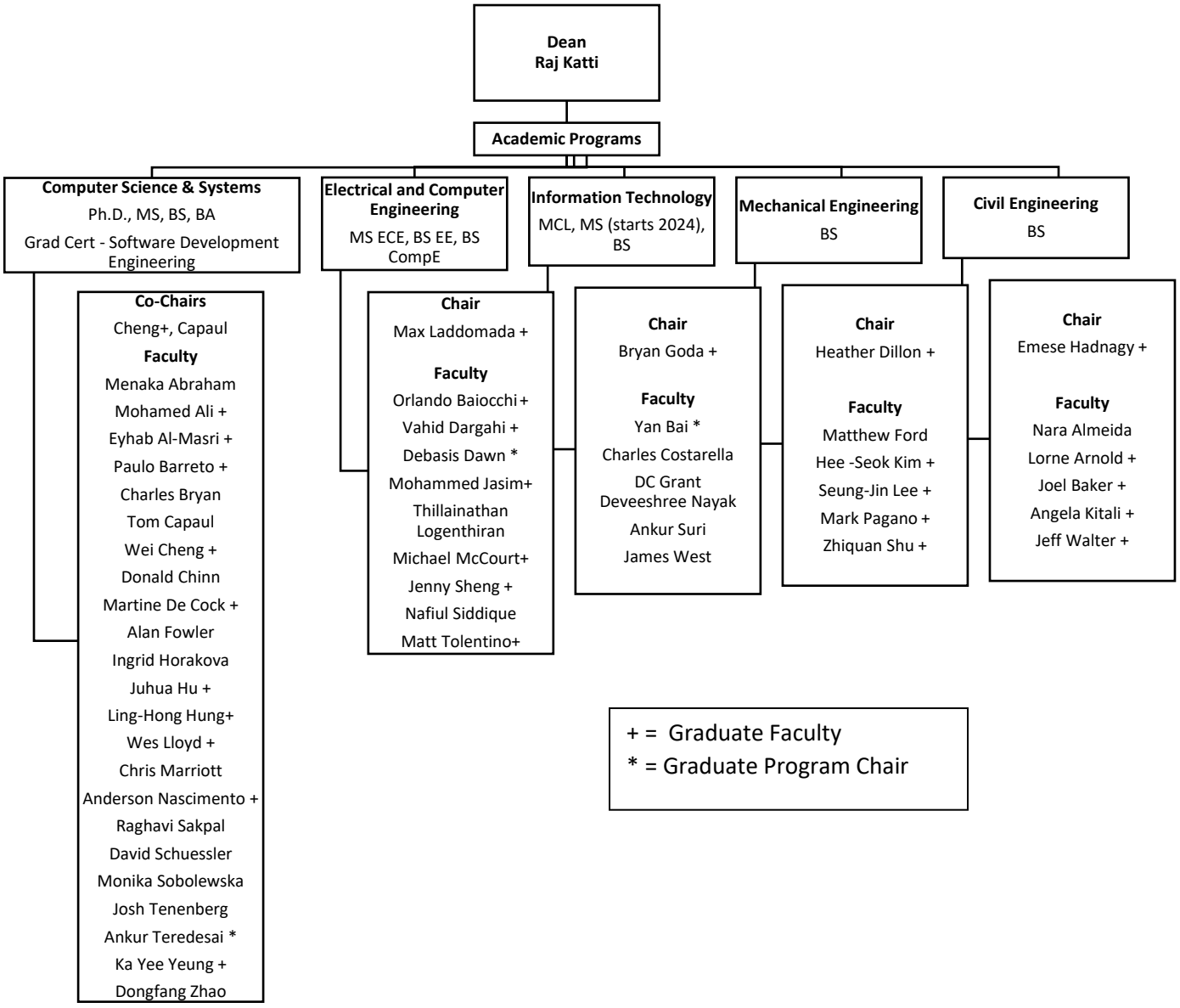
School expansion will require new staff members for improving program marketing, career/internship services, and student recruiting.

Question 4. Student Success (retention): How do we increase funds (e.g., scholarships) to support our current students and broader participation (DEI) for future students?

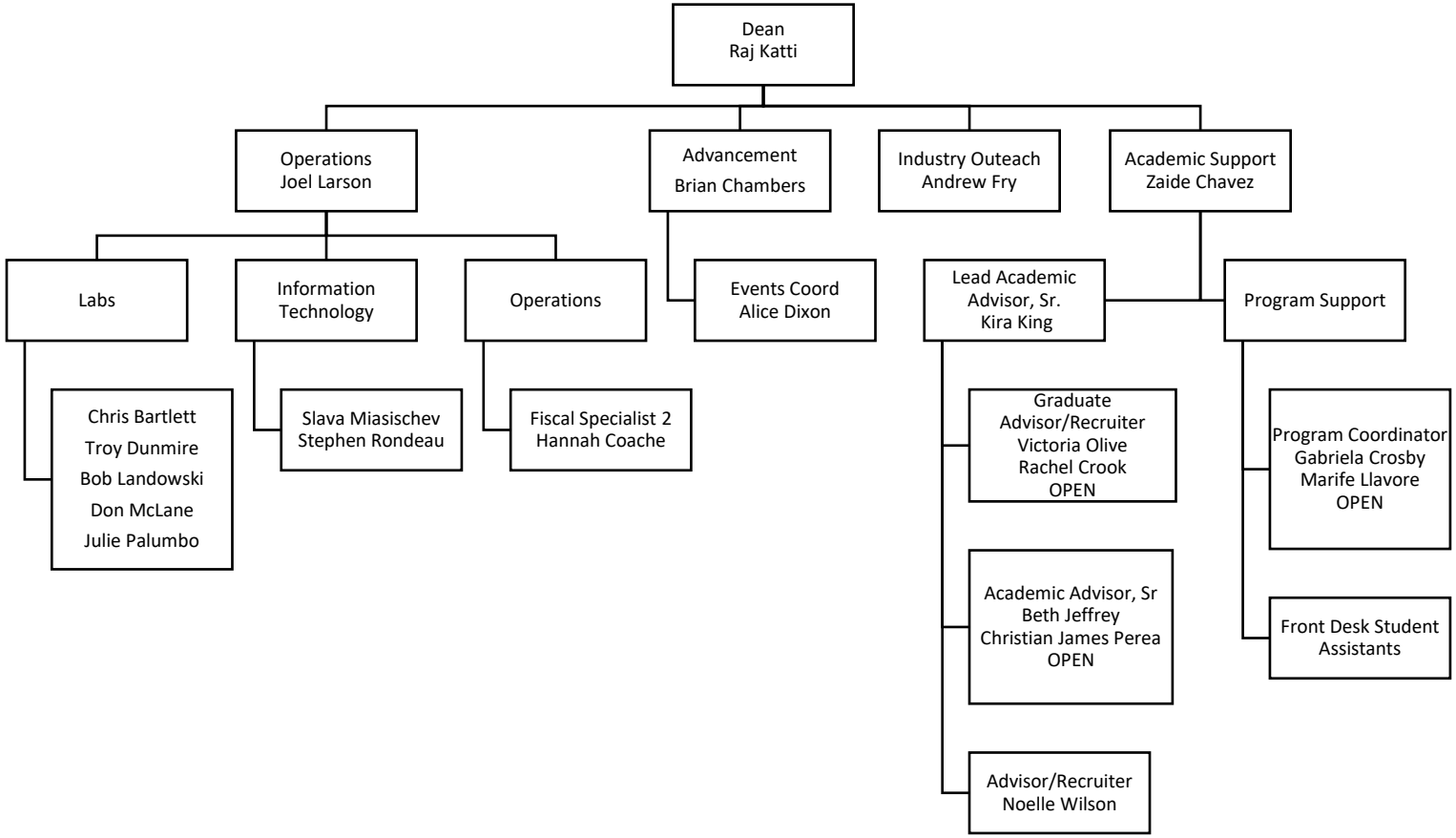
42% of SET undergraduate students are Pell-Eligible, 57% are first in their family to go to college (first generation), and 28% are underrepresented minorities. Providing scholarships for our students ensures the success of all our students especially those from underserved groups. Fundraising for more scholarships can help accomplish this goal. SET has only one person currently in charge of fundraising. Hiring another person would improve the fundraising effort of the school. This again stresses the importance of starting fee-based programs that can provide funds for hiring such a staff member.

PART C APPENDICES

Appendix A: Organizational Chart: Programs in SET, Degrees Offered, and Faculty



SET Staff Organizational Chart



SET Committees:

Faculty Council: two faculty members each from CSS, IT, ECE, ME, and CE (at least one of the two faculty members representing a program must be tenured).

Justice, Equity, Diversity, Inclusion (JEDI) Council (2022-23 members): Heather Dillon, Deveeshree Nayak, Raghavi Sakpal, Jie Sheng, Mohammed Jasim, Lorne Arnold, Angela Kitali, Monika Sobolewska, Beth Jeffrey (staff), Kira King (staff), SJ Lee

ABET Committee: Goda, Larson, Ford, Hadnagy, Laddomada, Tom Capaul

Staff Council: Jeffrey, Dunmire, Dixon, Crosby

Scholarship Committee: King, Wilson, Chambers, Jeffrey, one faculty member from each program

Research Showcase Committee: Yeung-Rhee, one faculty member from each program

Direct Admissions Committee: King, Wilson, Hadnagy, and one faculty member from each program

Appendix B: Budget Summary

Revenue	FY18	FY19	FY20	FY21	FY22	FY23
State/Proviso	$ 5,768,060	$ 6,474,615	$ 7,081,303	$ 8,268,633	$ 8,553,013	$ 8,684,971
Self-Sustaining	$ 731,889	$ 824,300	$ 801,245	$ 927,972	$ 713,109	$ 1,024,530
ICR	$ -	$ 15,307	$ 28,055	$ 36,966	$ 28,368	$ 44,653
Total Revenue	$ 6,499,949	$ 7,314,222	$ 7,910,603	$ 9,233,571	$ 9,294,490	$ 9,754,154
Expenses						
Faculty	$ 3,895,981	$ 4,483,904	$ 4,671,194	$ 5,289,751	$ 6,215,356	$ 6,551,596
Staff	$ 1,068,343	$ 1,193,972	$ 1,266,416	$ 1,372,855	$ 1,633,722	$ 1,671,034
Grad/TA	$ 1,648	$ 3,012	$ -	$ 17,235	$ (3,381)	$ 54,939
Operations	$ 1,150,940	$ 790,333	$ 990,226	$ 1,636,975	$ 793,830	$ 1,134,489
Benefits	$ 69,420	$ 83,738	$ 98,518	$ 243,318	$ 371,503	$ 402,457
Total Expenses	$ 6,186,332	$ 6,554,959	$ 7,026,354	$ 8,560,134	$ 9,011,030	$ 9,814,516
SURPLUS	$ 313,617	$ 759,263	$ 884,249	$ 673,437	$ 283,460	$ (60,362)
Gifts and Endowments	$ 221,517	$ 221,164	$ 286,746	$ 444,351	$ 457,914	$ 331,042
Research Awards	$ 606,549	$ 1,488,928	$ 528,606	$ 1,420,137	$ 848,462	$ 1,645,764

Appendix C: Information about Faculty

First Name	Last Name	Job Profile	Program	CV
Mohamed	Ali	Professor	Computer Science	Ali, Mohamed - 2023
Yan	Bai	Professor	Information Technology	Bai, Yan - 2023
Orlando	Baiocchi	Professor	Electrical and Computer Engineering	Baiocchi, Orlando - 2023
Joel	Baker	Professor	Civil Engineering	Baker, Joel - 2023
Martine I	De Cock	Professor	Computer Science	De Cock, Martine - 2023
Heather	Dillon	Professor	Mechanical Engineering	Dillon, Heather - 2023
Bryan S	Goda	Professor	Information Technology	Goda, Bryan - 2023
Raj	Katti	Professor	Electrical and Computer Engineering	Katti, Raj - 2023
Massimiliano	Laddomada	Professor	Electrical and Computer Engineering	Laddomada, Massimiliano - 2023
Mark	Pagano	Professor	Mechanical Engineering	Pagano, Mark - 2023
Josh	Tenenberg	Professor	Computer Science	Tenenberg, Josh - 2023
Ankur	Teredesai	Professor	Computer Science	Teredesai, Ankur - 2023
Ka Yee	Yeung	Professor	Computer Science	Yeung-Rhee, Ka Yee - 2023
Debasis	Dawn	Professor	Electrical and Computer Engineering	Dawn, Debasis - 2023
Anderson	Nascimento	Professor	Computer Science	Nascimento, Anderson - 2023
Paulo	Barreto	Associate Professor	Computer Science	Barreto, Paulo - 2023
Wei	Cheng	Associate Professor	Computer Science	Cheng, Wei - 2023
Donald	Chinn	Associate Professor	Computer Science	Chinn, Donald - 2023

Emese	Hadnagy	Associate Professor	Civil Engineering	Hadnagy, Emese - 2023
Wes J.	Lloyd	Associate Professor	Computer Science	Lloyd, Wes - 2023
Jie	Sheng	Associate Professor	Electrical and Computer Engineering	Sheng, Jie - 2023
Eyhab	Al-Masri	Associate Professor	Computer Science	Al-Masri, Eyhab - 2023
Lorne	Arnold	Assistant Professor	Civil Engineering	Lorne, Arnold - 2023
Vahid	Dargahi	Assistant Professor	Electrical and Computer Engineering	Dargahi, Vahid - 2023
Chunming	Gao	Assistant Professor	Information Technology	Gao, Chunming - 2023
Juhua	Hu	Assistant Professor	Computer Science	Hu, Juhua - 2023
Mohammed	Jasim	Assistant Professor	Electrical and Computer Engineering	Jasim, Mohammed - 2023
Hee-Seok	Kim	Assistant Professor	Mechanical Engineering	Kim, Hee-Seok - 2023
Angela	Kitali	Assistant Professor	Civil Engineering	Kitali, Angela - 2023
Seung-Jin	Lee	Assistant Professor	Mechanical Engineering	Lee, Seung-Jin - 2023
Michael	McCourt	Assistant Professor	Electrical and Computer Engineering	McCourt, Michael - 2023
Zhiquan	Shu	Assistant Professor	Mechanical Engineering	Shu, Zhiquan - 2023
Jeff	Walters	Assistant Professor	Civil Engineering	Walters, Jeffrey - 2023
Christopher	Marriott	Teaching Professor	Computer Science	Marriott, Christopher - 2023
Menaka	Abraham	Teaching Professor	Computer Science	Abraham, Menaka - 2023
Charles	Costarella	Associate Teaching Professor	Information Technology	Costarella, Charles - 2023
Monika	Sobolewska	Associate Teaching Professor	Computer Science	Sobolewska, Monika - 2023

Ankur	Suri	Associate Teaching Professor	Information Technology	Suri, Ankur - 2023
Thomas	Capaul	Associate Teaching Professor	Computer Science	Capaul, Tom - 2023
Raghavi	Sakpal	Associate Teaching Professor	Computer Science	Sakpal, Raghavi - 2023
Deveeshree	Nayak	Assistant Teaching Professor	Information Technology	Nayak, Deveeshree - 2023
David	Schuessler	Assistant Teaching Professor	Computer Science	Schuessler, David - 2023
Nafiul	Siddique	Assistant Teaching Professor	Electrical and Computer Engineering	Siddique, Nafiul - 2023
James	West	Assistant Teaching Professor	Information Technology	West, James - 2023
Matthew	Tolentino	Assistant Professor	Electrical and Computer Engineering	Tolentino, Matthew - 2023
Nara	Almeida	Assistant Teaching Professor	Civil Engineering	Almeida, Nara - 2023
Charles	Bryan	Assistant Teaching Professor	Computer Science	Bryan, Charles - 2023
Matthew	Ford	Assistant Teaching Professor	Mechanical Engineering	Ford, Matthew - 2023
Alan	Fowler	Assistant Teaching Professor	Computer Science	Fowler, Alan - 2023
D.C.	Grant	Assistant Teaching Professor	Information Technology	Grant, DC - 2023
Ingrid	Horakova	Assistant Teaching Professor	Computer Science	Horakova, Ingrid - 2023
Thillainathan	Logenthiran	Assistant Teaching Professor	Electrical and Computer Engineering	Logenthiran, Thillainathan - 2023

Ling-Hong	Hung	Research Assistant Professor	Computer Science	Hung, Ling-Hong - 2023

Appendix D: Equity and Inclusion Plan

Introduction

In 2020 the School of Engineering and Technology (SET) formed a Justice, Equity, Diversity and Inclusion (JEDI) Council to focus on equity and inclusion work in the school. The mission of this council is below.

> *The SET DEI council advocates for and enhances education for all SET communities by supporting the academic and professional success of historically marginalized groups, empowering the community, and making an inclusive school by confronting and dismantling systemic racism and all other forms of oppression as we work toward equity.*

During the first three years of the JEDI council, our group tackled topics including the 2019 climate survey results from campus and launched new initiatives. Our work included updating the promotion and tenure guidelines to include DEI work explicitly, launching a JEDI award set for the school, and hosting new training efforts for faculty and staff. During 2022, a subcommittee worked to organize a set of specific DEI goals for our unit. For context, the demographic data for our undergraduate students are shown below in Table D.1 and D.2.

Table D.1. SET undergraduate student demographics. The percentage of students is shown above and the number of students is shown in parentheses.

	African American	**American Indian**	**Asian American**	**Caucasian**	**HI/Pac Islander**	**Hispanic/Latinx**	**Two or more**	**Int'l**	**Unknown**
2016-17	7.10% (44)	0.30% (2)	29.8% (184)	41.20% (254)	0.50% (3)	6.50% (40)	4.70% (29)	6.80% (42)	3.1% (19)
2017-18	9.80% (63)	0.30% (2)	28.20% (181)	38.70% (248)	0.60% (4)	6.20% (40)	7.30% (47)	6.40% (41)	2.3% (15)
2018-19	10.0% (63)	0.50% (3)	28.1% (177)	38.70% (244)	0.30% (2)	5.70% (36)	7.30% (46)	7.0% (44)	2.40% (15)
2019-20	8.9% (57)	0.30% (2)	28.90% (186)	39.40% (254)	0.30% (2)	7.30% (47)	7.00% (45)	5.60% (36)	2.30% (15)
2020-21	9.1% (62)	0.30% (2)	31.1% (213)	35.50% (243)	0.60% (4)	8.60% (59)	6.40% (44)	6.1% (42)	2.30% (16)
2021-22	11.0% (76)	unknown	30.7% (211)	33.6% (231)	0.6% (4)	8.6% (59)	7.8% (54)	5.1% (35)	2.6% (18)

2022-23	12.3% (91)	unknown	34.5% (256)	31.0% (230)	0.8% (6)	7.8% (58)	6.7% (50)	3.5% (26)	3.2% (24)
2023-24	14.1% (114)	0.2% (2)	34.6% (280)	29.5% (239)	0.7% (6)	9.8% (79)	6.2% (50)	1.9% (15)	3.1% (25)

Table D.2. SET undergraduate student demographics by gender.

	Female		**Male**	
	%	Students	%	Students
2016-17	18%	111	82%	506
2017-18	16.7%	107	83.3%	534
2018-19	15.4%	97	84.6%	533
2019-20	18.3%	118	81.7%	526
2020-21	18%	123	82 %	562
2021-22	17.0%	123	82.1%	565
2022-23	17.9%	133	82.1%	608
2023-24	20.5%	166	79.5%	644

In February 2023 Dean Raj Katti signed the ASEE Dean's Diversity Pledge. The first requirement of that pledge is to develop a DEI plan for the school. The following goals and metrics were identified by the JEDI Council as the core of the plan.

DEI Goals and Metrics

The DEI goals were developed after careful review of the literature and best practices that other progressive campuses have adopted for equity and inclusion. We found that many high-profile institutions across the country have already reached parity for gender in their program. The programs include Harvey Mudd [1], Illinois Tech [2], Carnegie Mellon [3], Dartmouth [4] and USC Viterbi. Other programs including MIT [5] and Caltech are quickly approaching parity with over 40% women in the programs. Nationally, only 20% of undergraduate engineers and computer scientist degrees are awarded to women, and only 6% are women of color [6]. In contrast, our own 20.5% of women in our undergraduate programs is at the national average but we are far from gender parity.

Most of these programs achieved impressive results for DEI by changing the culture of engineering and computer science on the campus, and creating opportunities for students [7]. The changes included clubs, mentorship programs, hiring women/BIPOC faculty, and strong supportive leadership. Based on this research and our specific goals, we identified measurable and aspirational metrics for SET to focus on for the next five years as shown in Table D.3.

Diversity, Equity and Inclusion Goals:

- Create and maintain a climate of inclusion for all our programs by dismantling systemic racism and bias for historically excluded groups.
- Significantly increase enrollment and retention from underrepresented groups in our programs.[1]

Table D.3. Summary of DEI goals and measurement criteria.

Goal	Metric for Aspirational Goals	Current Status of this Goal (2023)
Create and maintain a climate of inclusion for all our programs by dismantling systemic racism and bias for historically excluded groups.	100% of faculty/staff trained in DEI best practices (ongoing). 70% attainment of ABET outcomes and performance indicators for faculty/classes connected to DEI by 2028 visit. 50% of classes have DEI modules, activities, or materials designed to meet DEI Outcomes	36% faculty/staff currently trained[2] 0% attainment of ABET DEI Outcomes Less than 10% of classes have DEI modules embedded
Significantly increase enrollment and retention from underrepresented groups in our programs.	Student metrics for gender and identity to be consistent with population of Pierce County* 0% equity gap for retention of historically underserved groups.	See Table D.1 and Table D.2 for current demographics. 0% equity gap for retention of women[3] 2% equity gap for retention of historically underserved students

* Staff/Faculty demographics are not available due to HR policies

As shown in Table D.3 we aspire to reach 100% training rates for all our faculty and staff in SET over the next few years. Because there are many on-campus and remote training events each year organized by the Center of Equity and Inclusion we believe this goal is achievable. Next

[1] Staff/Faculty demographics are not available due to HR policies.

[2] 36% current training numbers based on attendance collected at the UW Tacoma training event on 3/10/2023. In the future as we host additional training events in SET and UW rolls out online training, we will collect attendance numbers. In November 2023, SET had another DEI training event.

[3] Average from the 4-year retention of SET students from AY2013/2014 to AY2020/2021.

academic year the JEDI Council will work on developing ABET performance indicators and rubrics that are aligned with DEI best practices for our programs. We plan to ask each program to adopt these performance indicators and assess them as part of the continuous improvement process. This will also allow us to gauge adoption of DEI modules in our classes.

For our second goal we plan to focus on significantly increasing recruitment and retention of women/BIPOC students in our programs. At this time, the equity gap in our 4-year retention numbers 0% for women and 2% for underrepresented students. Retention and recruitment are important since the number of women in our programs has not increased at the same rate as other national programs. We also plan to recruit and retain faculty members in these groups, but HR does not allow us to track this information formally. To achieve this goal we plan to continue working closely with our regional high schools and our community college partners. The JEDI council will continue to lead grant writing efforts to support long-term recruitment and retention for these groups.

DEI Plan and Tasks

To support these goals, we have identified several tasks that will be the focus of the JEDI Council and SET leadership in future years.

1. Provide strong administrative leadership for DEI activities in SET. Encourage Program Chairs to lead individual efforts in their units to support DEI work.
2. Continue training faculty and staff each year during the retreat about topics related to DEI. Work with the campus Center for Equity and Inclusion to host smaller training events for each program during the academic year. One JEDI representative from each program will work to coordinate these training events. Continue to encourage DEI trainings like SEED, the Indigenizing Pedagogies Institute, and those at the national level for all faculty and staff.
3. Develop DEI focused outcomes and performance indicators that align with existing ABET documentation and measurement during AY23-24. These performance indicators can be used with backward design by faculty to develop DEI modules that are assessed at multiple places in the curriculum. Having student exposure in multiple places has been shown to support longer term growth for students.
4. Implement DEI focused modules and materials in several places in each program. The JEDI Council will prepare examples of classroom activities that may be adapted by faculty.
5. Expand recruitment efforts in regional schools and community colleges. Existing partnerships with Highline Community College and Tacoma Community College are already underway and providing new opportunities for students [8].
6. Develop a set of formal external funding proposals for a STARS program in SET.
7. Increase retention and mentoring work for students in SET programs. Existing clubs and mentoring relationships may be expanded using high impact practices like undergraduate

research and CUREs. Projects related to this effort are already underway, including recent grant funding to support CUREs in more classes.

8. Continue to lead development of external funding and grants related to equity and inclusion on campus. Recent examples include an NSF proposal to connect undergraduate CS students to regional high schools.
9. Collect annual data about the current state of climate in SET using a simple survey. The current survey was approved by the JEDI Council on 3/3/23 and the Faculty Council on 3/8/23.
10. Summarize our current progress toward each of these goals using the metrics outlined in the annual JEDI Council Report.

This draft plan was approved by the JEDI council 5/12/2023. The plan is scheduled for faculty vote in September 2023.

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Appendix E: Enrollments, Graduation Trends and Student/Faculty Demographics

Table E.1 gives enrollment trends in each degree program from 2014 to 2023. Table E.2 shows trends in number of degrees awarded per major. Tables E.3 (for undergraduate programs), E.4 (graduate programs) breakdown the enrollments in the school by race/ethnicity, and Table E.5 gives the number (and percent) of women and URM students in undergraduate and graduate programs. Tables E.6 and E.7 give faculty demographics and Tables E.8 through E.11 give graduation rates and time to graduation.

Table E.1. SET Enrollments in undergraduate and graduate degree programs.

Year	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
BS/BA CSS	361	394	402	369	328	319	371	361	369	384
BS IT	123	132	165	194	208	207	200	205	222	230
BS EE				27	52	72	81	72	72	58
BS CompE	86	81	56	56	64	51	36	34	25	23
BS ME								19	46	67
BS CE									7	18
Pre-Engr/Pre-CS										30
MS CSS	93	132	143	131	146	133	106	88	96	98
PhD CSS							7	20	20	20
MS ECE								6	16	19
MCL	23	38	26	33	38	45	31	36	35	37
GC-SDE								26	17	15

Table E.2. SET number of degrees awarded by major.

Year	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23
BS/BA CSS	146	162	173	194	166	157	172	176	185
BS IT	50	60	67	89	101	93	101	89	99

BS EE					18	27	39	24	41
BS CompE	29	42	26	17	29	25	19	11	15
BS ME									16
BS CE									
MS CSS	55	46	88	51	74	69	58	55	54
PhD CSS									
MS ECE									6
MCL	1	22	33	26	31	33	71	35	34
GC-SDE								26	16

Table E.3. SET Enrollments (number of students and percent of students) by Race/Ethnicity (Undergraduate).

	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
Am. Indian	2.0	2.0	2.0	2.0	3.0	2.0	2.0			2.0
	0.4%	0.3%	0.3%	0.3%	0.5%	0.3%	0.3%			0.2%
Asian	133.0	162.0	184.0	181.0	177.0	186.0	213.0	211.0	256.0	280
	24.6%	27.3%	29.8%	28.2%	28.1%	28.9%	31.1%	30.7%	34.5%	34.6%
Black or Afr. Am.	27.0	35.0	44.0	63.0	63.0	57.0	62.0	76.0	91.0	114
	5.0%	5.9%	7.1%	9.8%	10.0%	8.9%	9.1%	11.0%	12.3%	14.1%
Hispanic	30.0	37.0	40.0	40.0	36.0	47.0	59.0	59.0	58.0	79
	5.6%	6.2%	6.5%	6.2%	5.7%	7.3%	8.6%	8.6%	7.8%	9.8%
Native Hawaiian	4.0	5.0	3.0	4.0	2.0	2.0	4.0	4.0	6.0	6.0
	0.7%	0.8%	0.5%	0.6%	0.3%	0.3%	0.6%	0.6%	0.8%	0.7%
White	244.0	257.0	254.0	248.0	244.0	254.0	243.0	231.0	230.0	239
	45.2%	43.3%	41.2%	38.7%	38.7%	39.4%	35.5%	33.6%	31.0%	29.5%
Two or more races	38.0	36.0	29.0	47.0	46.0	45.0	44.0	54.0	50.0	50
	7.0%	6.1%	4.7%	7.3%	7.3%	7.0%	6.4%	7.8%	6.7%	6.2%
International	19.0	34.0	42.0	41.0	44.0	36.0	42.0	35.0	26.0	15
	3.5%	5.7%	6.8%	6.4%	7.0%	5.6%	6.1%	5.1%	3.5%	1.9%
Not indicated	43.0	26.0	19.0	15.0	15.0	15.0	16.0	18.0	24.0	25

	8.0%	4.4%	3.1%	2.3%	2.4%	2.3%	2.3%	2.6%	3.2%	3.1%

Table E.4. SET Enrollments (number of students and percent of students) by Race/Ethnicity (Graduate).

	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
Am. Indian										1
										0.6%
Asian	19	25	19	20	29	20	30	30	22	19
	16.4%	14.4%	11.2%	12.2%	15.8%	11.3%	18.0%	17.0%	12.0%	10.1%
Black or Afr. Am.	1	6	7	9	6	4	6	6	9	15
	0.9%	3.4%	4.1%	5.5%	3.3%	2.3%	3.8%	3.4%	4.9%	7.9%
Hispanic	2	5	1	5	6	5	5	3	5	5
	1.7%	2.9%	0.6%	3.0%	3.3%	2.8%	3.1%	1.7%	2.7%	2.6%
Hawaiian									1	1
									0.5%	0.5%
White	35	29	25	34	37	38	27	41	42	46
	30.2%	16.7%	14.8%	20.7%	20.2%	21.5%	17.0%	23.3%	22.8%	24.3%
Two or more races		5	4	2	2	7	1	6	4	2
		2.9%	2.4%	1.2%	1.1%	4.0%	0.6%	3.4%	2.2%	1.1%
International	41	93	99	77	84	93	75	79	90	92
	35.3%	53.4%	58.6%	47.0%	45.9%	52.5%	47.2%	44.9%	48.9%	48.7%
Not Indicated	18	10	14	17	17	10	14	11	11	9
	15.5%	5.7%	8.3%	10.4%	9.3%	5.6%	8.8%	6.3%	6.0%	4.8%

Table E.5: Number (and Percent) of Women and URM students in Undergraduate and Graduate programs.

	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
Women (UG)	90	103	111	107	97	118	123	123	133	166
	16.7%	17.3%	18%	16.7%	15.4%	18.3%	18%	17.9%	17.9%	20.5%
Women (Grad)	56	71	68	67	85	79	62	59	57	69
	48.3%	40.8%	40.2%	40.9%	46.4%	44.9%	39%	33.5%	31%	36.5%
URM (UG)	80	92	99	132	125	126	143	166	186	229
	14.8%	15.5%	16%	20.6%	19.8%	19.6%	20.9%	24.1%	25.1%	28.3%
URM (Grad)	3	16	10	15	15	13	13	12	19	23
	2.6%	9.2%	5.9%	9.1%	8.2%	7.3%	8.2%	6.8%	10.3%	12.2%

Table E.6: Number of Faculty by Rank (# of female faculty in brackets)

	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23
Professor	6	6	7 (1)	8 (1)	8 (1)	9 (2)	11 (3)	12 (4)	13 (4)
Assoc. Prof.	6 (3)	7 (4)	5 (3)	6 (3)	7 (3)	6 (2)	5 (2)	6 (2)	8 (2)
Asst. Prof.	3 (2)	5 (2)	6 (1)	6 (1)	8 (2)	10 (2)	13 (2)	15 (3)	13 (2)
Research Asst. Prof.								1	1
Teaching Prof.									1 (1)
Teaching Assoc. Prof	2			2 (2)	4 (3)	5 (3)	5 (3)	5 (3)	4 (2)
Teaching Asst. Prof.	10 (4)	10 (4)	14 (5)	12 (3)	11 (2)	10 (3)	12 (3)	13 (3)	13 (3)
Total	27 (9)	28 (10)	32 (10)	34 (10)	38 (11)	40 (12)	46 (13)	52 (15)	53 (14)

Table E.7: Faculty Demographic Trends

	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23
Asian	8	11	11	10	13	14	18	21	20
Black or African American		1	1	1				1	1
Declined to Disclose		2					2	2	2
Hispanic or Latino	2	2	3	3	3	3	3	3	2
Not Declared	4	2	3	5	5	6	3	1	1
Two or more Races								1	1
White	13	10	14	15	17	17	20	23	26

Time to Degree

Table E.8. Time to Bachelor's Degree - Academic Origin, High School

	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	5-year totals
2 Years	4	8	6	5	13	**36**
3 Years	14	20	24	21	17	**97**
4 Years	43	32	44	55	26	**200**
5 Years	24	21	20	18	15	**98**
6 Years	5	6	5	4	11	**31**
> 6 Years	7	3	4		4	**18**
Total	97	90	103	103	86	**480**
Avg. Time to Degree	**4.34**	**4.07**	**4.06**	**3.95**	**4.07**	**4.09**

When calculating averages, 7 years is used for all >6 year degree recipients.

Table E.9. Time to Bachelor's Degree - Academic Origin, Washington Community College

	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023	5-year totals
2 Years	71	76	89	82	61	**379**
3 Years	69	69	65	57	53	**313**
4 Years	21	22	22	14	10	**89**
5 Years	5	5	8	4	2	**24**
6 Years	1	1	1	4	-	**7**

> 6 Years	3	1	1	1	-	**6**
Total	170	174	186	162	126	**818**
Avg. Time to Degree	**2.85**	**2.79**	**2.76**	**2.73**	**2.63**	**2.76**

When calculating averages, 7 years is used for all >6 year degree recipients.

Table E.10. Graduation Rate: Junior Admits

Cohort Year (fall)	Total Head Count*	Degrees 4-yrs after Declaring Major**	4-Year Graduation Rate	Graduated	Graduation Rate
2014	113	72	63.7%	108	95.6%
2015	101	62	61.4%	93	92.1%
2016	111	68	61.3%	104	93.7%
2017	135	90	66.7%	120	88.9%
2018	138	89	64.5%	103	74.6%
5-yr Total	**598**	**381**	**63.5%**	**528**	**89.0%**

Table E.11. Graduation Rate: Transfer Admits

Cohort Year (fall)	Total Head Count*	Degrees 4-yrs after Declaring Major**	4-Year Graduation Rate
2014	166	145	87.3%
2015	166	147	88.6%
2016	156	128	82.1%
2017	171	156	91.2%
2018	154	138	89.6%
5-yr Total	**813**	**714**	**87.8%**

*All students, all majors, with an entry year in 2014-2018 where any degree-seeking major, at that time or later, was in SET
**Graduated within four years of their initial entry to UW

Appendix F: Educational Objectives, Learning Outcomes, and Results of Assessment for Undergraduate Programs.

BS Mechanical Engineering

Program Educational Objectives

The faculty of the University of Washington Tacoma Mechanical Engineering program strive to serve our students and other constituents by continuously improving our educational program. We envision that:

1. Our graduates will thrive in careers that utilize scientific principles, professional skills, and technical innovation.
2. Our graduates will be prepared to advance their studies through professional development, certifications, or postgraduate degrees.

3. Our graduates will pursue excellence in collaboration and leadership with an emphasis on the importance of transformational diversity/equity, integrity, and respect as they create work of value for their communities and society.

Student Outcomes

Prior to graduation, we have assessed and evaluated that each ME student has:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Continuous Improvement

The Mechanical Engineering (ME) Program has a process in place to regularly assess and evaluate the degree to which our Student Outcomes (SOs) are being attained. Figure F-1 provides a flowchart overview of the overall process of Continuous Improvement used by the

program to ensure the attainment of our SOs.

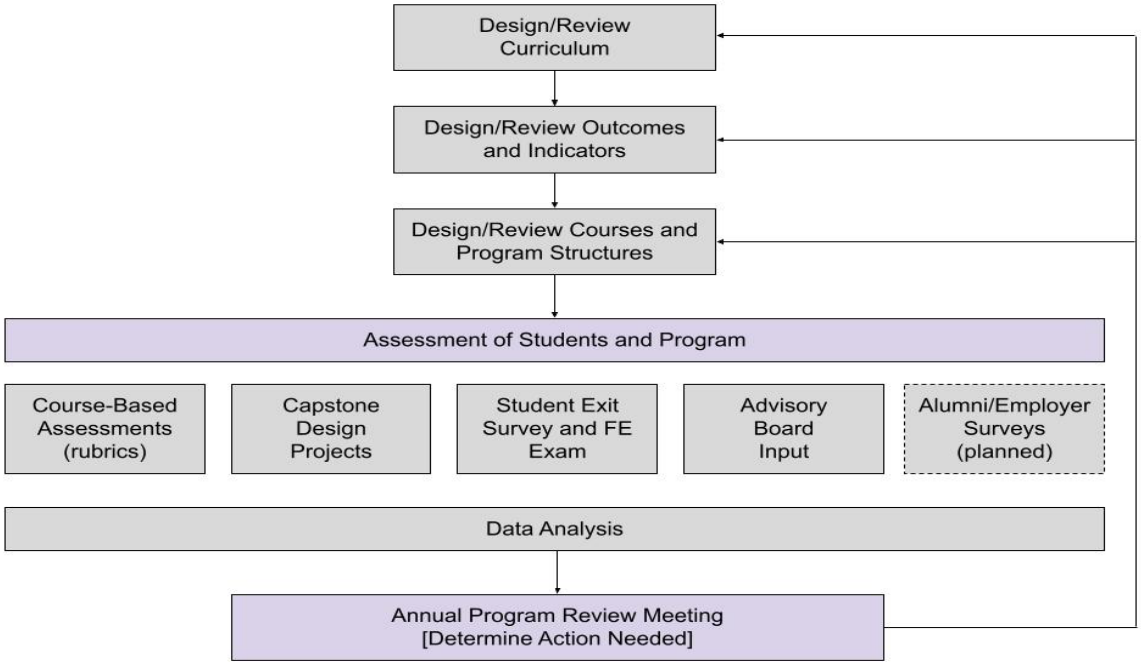

Figure F-1. Flowchart of the annual assessment and review process of the program. Each part of the process is completed annually, although some elements will move to a two-year cycle in the future.

The mechanical engineering faculty serve at the core of the continuous improvement process. Assessment of student outcomes in each course serves as a key element in the program's continuous improvement. As a new program, our first few years of courses with a strong assessment process in place have provided opportunities for fast adjustments and improvement. In future years, we will strengthen our process using additional data from employers and alumni groups.

Recent changes in the curriculum resulting from the evaluation processes include the following (for a full list of changes see BS ME ABET self-study report):

- New courses created: ME 402 FE review (new course (1 credit) for structured review of material for the Fundamentals of Engineering exam), new electives that align with faculty research (TME 489 Engineering Research Methods, TME 436 Power Plant Systems), and TME 491 Seminar in ME (new optional course (1 credit) that will provide a structured way to provide support to the senior students on career progression).
- For improving student writing quality: Created a plan for how to adjust laboratory reports and better communicate expectations to students. This included moving most of the laboratory classes to use the same report template and grading rubrics so students could practice with the same criteria over time.
- Lab experience: In Fall of 2023 we decided to streamline the laboratory course experience so students are taking no more than one laboratory class at a time. This would allow flexibility in

course scheduling and better utilize faculty and student time. The change will also allow the students to focus more completely on the laboratory work they are completing, and increase the quality of their work. We shifted key parts of the laboratory experience so no content was lost, and changed the order of class offerings. This curriculum change took a full academic year to complete, and we will offer the revamped classes in AY23-24.

BS Electrical Engineering and BS Computer Engineering

Program Educational Objectives

Within three to five years of graduation from the EE program, it is expected that many graduates will have:

1. Developed a complex product or process by applying their knowledge of engineering principles, science, mathematics, design and product life-cycle management.
2. Applied the principles of mutual respect, safety, quality, integrity and inclusion as a member of a multi-disciplinary development team and undertaken a leadership role when appropriate.
3. Improved their skills and abilities by taking graduate courses, professional development training, or voluntary experiential learning opportunities.
4. Made positive contributions to their community and society by applying skills and abilities learned during their undergraduate program in electrical/computer engineering.
5. Made decisions related to their work that demonstrate an understanding of the importance of being an ethical engineering professional.
6. Undertaken a leadership role applying technical communication skills to effectively promote their ideas, goals, or products.

Student Outcomes

The Student Outcomes of the Electrical Engineering Program are as follows:

(1) An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
(2) An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
(3) An ability to communicate effectively with a range of audiences.
(4) An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
(5) An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
(6) An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
(7) An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Continuous Improvement

Assessment of the SO's involves both *Direct Measures*, which includes organizing and analyzing the samples of student achievement (i.e., assignments, exams, reports, etc.) for student performance, according to a 6-year timeline, and *Indirect Measures* (Senior exit interviews, Alumni Surveys), which are collected and analyzed from graduating seniors on a yearly basis. Alumni are surveyed every few years.

Figure F.2 provides a flowchart overview of the overall process of Continuous Improvement used by the EE Program especially to ensure the attainment of our SO's. As seen in the figure, the ECE faculty, including the computer engineering faculty, are at the core of the process and are viewed as concierges to the EE Program and to its students as they interact directly with students and strategize and execute continuous improvements based on assessments and evaluations. The ongoing contributions to the process by our constituent groups are also essential to the continued relevance of our academic goals and to the strength and integrity of our EE Program.

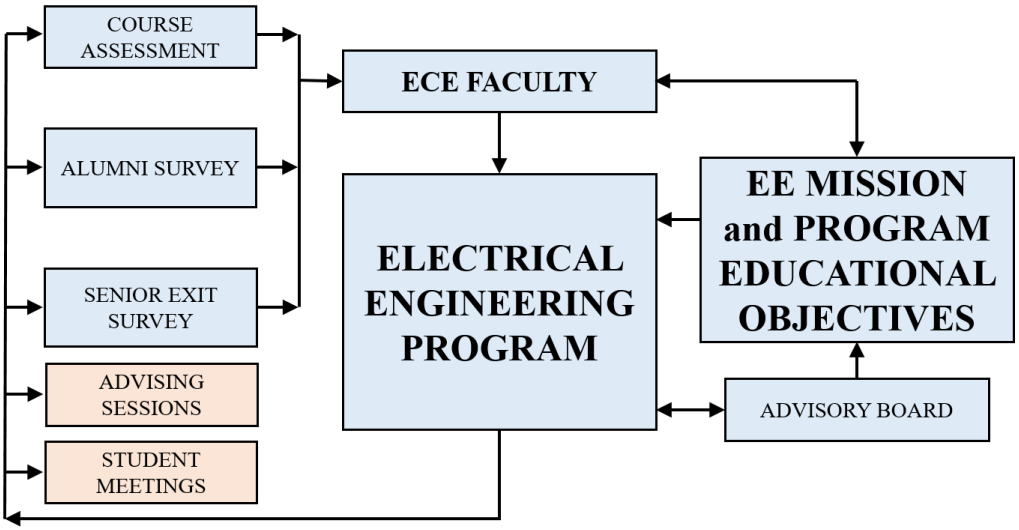

Figure F.2: Process Flowchart of the Electrical Engineering Program for Continuous Improvement

The processes that are used in the ongoing review and revision of the SO's, including involvement of the constituent groups, can be seen in the three upper-left most process boxes in Figure F.2. Also seen in Figure F.2 are the process boxes for advising and student meetings, which are not a part of the assessment process as detailed in this section but are here to identify a mode of communication with the students for presentation and discussion of the ongoing continuous improvements of the EE Program.
Recent changes in the curriculum resulting from the evaluation processes include the following (for a full list of changes see BS EE and BS CompE ABET self-study reports):

Electrical Engineering: Recent Changes in the Curriculum

Autumn 2019
In response to a thorough assessment of the assessment data collected during the past academic year, the ECE Curriculum Committee discussed and approved the following changes:

- TCES 310 Linear Systems and Transforms has been replaced by TCES 310 Signals and Systems as a required course for the Electrical Engineering and Computer Engineering and Systems programs, and laboratory sessions have been added to the course delivery format.
- The title for TEE 431 Electric Power Engineering has been changed to TEE 431 Power Systems in line with national practice so as to simplify transfer course credit for transfer students.
- A new required, junior-level course TEE 317 Electric Machines replaces the required course TCES 430 Microprocessor system Design, which has been made elective for the BS in Electrical Engineering.
- Another change is the introduction of a new elective, senior-level course, TEE 417 Power Electronics, to increase the breadth of senior electives of choice for the electrical engineering students.
- Last change is the removal of the prerequisites TCSS 142 Introduction to Programming and TCSS 143 Object Oriented Programming to be admitted to the Electrical Engineering major. The new requirement will be
    - 10 credits of computer programming courses
- The rubrics used to assess student outcomes 1 through 7 were revised so as to introduce performance indicators and make the overall assessment process consistent across the curriculum.

Winter 2021

The ECE Curriculum committee discussed and approved the revision of the prerequisites for TEE 480 Senior Design I. With this change, electrical engineering students must pass TCES 230 Logic Design, TCES 310 Signals & Systems, TEE 315 Electrical Circuits II, TEE 316 Electronics & Analog Circuits II, and TEE 317 Electric Machines with minimum grade 2.0 in order to be able to register for TEE 480 Senior Design I.

The ECE Curriculum committee approved a new elective course, TEE 433 Sustainable Energy, for electrical engineering students who have passed TEE 317 Electric Machines (prerequisite) with minimum grade 2.0.

The ECE Curriculum committee discussed and approved a new conditional admission process for Electrical Engineering applicants. In order for a prospective student to be admitted to the Electrical Engineering program conditionally, they must have passed the following prerequisites

- Calculus I, Calculus II, Calculus III
- Physics I, Physics II
- Differential Equations
- 5 credits of computer programming coursework

Required: minimum grade of 3.0 in each individual prerequisite course for conditional admission.

Computer Engineering: Recent Changes in the Curriculum

- 2017: Replaced TMATH 390 Probability and Statistics with TCES 380 Stochastic Signal Theory in order to expose students to advanced concepts such as random processes.
- 2018: developed a new elective TCES 425 Intro to Computer Communication Networks.
- 2019: The ECE faculty decided to develop a new course TCES 310 Signals and Systems to replace TCES 310 Linear Systems and Transforms. The goal is to add a laboratory component where MATLAB is introduced to new junior students early in the junior year.
- 2021: The ECE faculty discussed the option to add additional prerequisites for senior design 1 (480) for the Computer Engineering program. This will help with the requirement of students to have certain skills and knowledge based on coursework taken before the senior design course.
- 2021: replacement of TCES 455 Devices and Controls with TEE 451 Control Systems.

BS Civil Engineering

Program Educational Objectives

Within three to five years of graduation from the CE program, graduates will have:

1. Applied their knowledge of engineering principles, science, mathematics, design and implementation to solve civil engineering challenges.
2. Participated effectively as a member of a multi-disciplinary project team, demonstrating leadership and project management skills when appropriate.
3. Made positive contributions to their community and society through involvement in community and professional organizations.
4. Made decisions related to their work that demonstrate an understanding of the importance of being an ethical engineering professional.
5. Applied communication skills to effectively promote ideas and goals.
6. Made progress toward certification as licensed Professional Engineers and/or pursued graduate studies.

Student Outcomes

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Continuous Improvement

Assessment focuses on gathering data from stakeholders (students, alumni, faculty, and the advisory board) via evaluation of student work, senior student exit surveys, alumni surveys, and student performance in the FE exam. Since the program is new, no recent changes have been made to the curriculum.

BS Computer Science and Systems

Program Educational Objectives

- Developed a product or process by applying knowledge of mathematics, computing, systems and development tools.
- Participated effectively as a member of a development team and undertaken leadership roles when appropriate.
- Taken graduate courses or continuing education classes to improve skills and abilities.
- Made positive contributions to community and society by applying skills and abilities learned during undergraduate program in computing.
- Made decisions related to work that demonstrate understanding of the importance of being an ethical computing professional.
- Applied communication skills to effectively promote ideas, goals, or products.

Student Outcomes

- Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
- Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
- Communicate effectively in a variety of professional contexts.
- Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
- Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
- Apply computer science theory and software development fundamentals to produce computing-based solutions.

Continuous Improvement

Assessment focuses on gathering data from stakeholders (students, alumni, faculty, and the advisory board) via evaluation of student work and senior student exit surveys.

Recent changes in the curriculum resulting from the evaluation processes include the following (for a full list of changes see BS CSS ABET self-study report):

After our Oct 2016 visit, we made several curriculum changes. The first was to make TCSS 343 Design and Analysis of Algorithms a required course in December 2016. In April 2018 we make:

- TCSS 380 Fundamentals of Programming Language Concepts
- TCSS 360 Software Development and Quality Assurance Techniques
- TCSS 372 Computer Architecture
- TCSS 422 Computer Operating Systems

mandatory to strengthen our weaknesses in Criterion 5 Curriculum. TCSS 380 is a new course designed to provide a more in-depth coverage of Python, Java and C.

The CSS Honors Thesis program is now in its third year and is designed to prepare our high achieving students for graduate schools or strengthen their skills for further advancement. The honors program should:

- Develop your ability to understand, analyze, and synthesize scholarly work
- Practice the work of scholars
- Develop and practice skills as an independent and critical thinker
- Improve your written and oral communication skills

CSS Honors students write a culminating thesis that clearly demonstrates original and creative thinking as judged by a faculty member and the program chair. Meeting all the CSS Honors requirements will result in earning "With Honors in Computer Science and Systems."

Under II.5.a of the CSAB criteria, the curriculum requirements now specify that the curriculum must include a major project that requires integration and application of knowledge and skill acquired in earlier course work. The CSS faculty has reviewed the curriculum and determined that a separate capstone design course is not required because existing courses with a major project contain the required design content. TCSS 422 Computer Operating Systems is a required course and possesses extensive design requirements. TCSS 437 Mobile Robotics, 445 Database System Design, 450 Mobile Application Programming, 465 Embedded Systems, and 491 Computational Worlds are also electives that have extensive design, but it is possible for a student to miss taking one of these electives. This group of five electives has now become a selected elective requirement, where a student has to choose at least 1 from this group along with 4 other 5-credit elective courses.

<u>BS Information Technology</u>

Program Educational Objectives

- Developed a product or process by applying knowledge of programming, web, database, human computer interaction, networking and security tools

- Participated effectively as a member of a development team and undertaken leadership roles when appropriate
- Taken graduate courses or continuing education classes to improve skills and abilities
- Made positive contributions to community and society by applying skills and abilities learned during undergraduate program in information technology
- Made decisions related to work that demonstrate understanding of the importance of being an ethical computing professional
- Applied communication skills to effectively promote ideas, goals or products

Student Outcomes

- Analyze a complex computing problem and to apply principles of computing and other relevant disciplines to identify solutions.
- Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
- Communicate effectively in a variety of professional contexts.
- Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.
- Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
- Use systemic approaches to select, develop, apply, integrate, and administer secure computing technologies to accomplish user goals. [IT]

Continuous Improvement

Assessment focuses on gathering data from stakeholders (students, alumni, faculty, and the advisory board) via evaluation of student work and senior student exit surveys.

Recent changes in the curriculum resulting from the evaluation processes include the following (for a full list of changes see BS IT ABET self-study report):

The goal of our monthly curriculum meetings is to improve our program. Our assessment processes have resulted in the following changes:

TINFO 481 Information Technology Design Project: Normally Internship is a requirement for an IT Major to graduate. Due to the COVID-19 pandemic and international students having difficulties finding Internships, TINFO 481 is a viable alternate option. Each student prepares a plan for the individual capstone project. This plan includes project definition, project requirements, preliminary design, and schedule. Design requirements address human factors, safety, reliability, maintainability and scalability. Students focus on developing detailed designs to enable effective implementation, testing deployment and maintenance. Exhibition of the design requires formal demonstration of the product. About 1/3 of the students participate in TINFO 481. Internship is still highly encouraged. Students like this option because this gives them more flexibility.

System Administration Course: A systems administration course was deemed required for every IT major. Before Spring 2019, students could take TINFO 452 Windows Systems Admin or

TINFO 457 Unix/Linux Systems administration or neither since they were both electives. A form 1503 was submitted to make taking at least one of these courses mandatory. This action strengthens our program and students often take both courses now.

TINFO 476 Threat Modeling: An excellent hands-on course was designed around the Microsoft Threat Modeling tool. It gives our students excellent skills that are valued by future employers.

New Servers for Virtual Environment: We spent over $100k for servers for our expanded virtual environment. Our old environment became overloaded with our increasing student numbers.

New Network Lab: A new network lab was created in CP206 from donated equipment from Boeing, NAVSEA, and Cisco. It provides our students much more access to networking equipment and training.

Appendix G: SET Research Grants, Number of Publications by Year (2014-23), & Patents

2014-15

The school faculty published 53 refereed conference papers and 16 journal papers in 2014-15 (this is an average of 3.6 conference papers per tenure-track faculty member and 1 journal paper per tenure-track faculty member). In 2014-15 the Center for Data Science obtained $1.18 million in grants and gifts. In addition to this one NIH sub-grant of $506,079 was also funded.

2015-16

The school faculty published 36 refereed conference papers and 22 journal papers in 2015-16 (this is an average of 2.2 conference papers per tenure-track faculty member and 1.4 journal papers per tenure-track faculty member). In 2015-16 the Institute faculty received approximately $735,624 in grants and gifts.

2016-17

The school faculty published 37 (36 in the prior year) refereed conference papers and 22 (22 in the prior year) journal papers in 2016-17 (this is an average of 2.3 conference papers per tenure-track faculty member and 1.4 journal papers per tenure-track faculty member). In 2016-17 the Center for Data Science research expenditures were $332,109 with several faculty obtaining research grants from NIH ($260,000 2-year grant), Madigan ($75,000 1-year grant), NSF ($174,000 3-year grant), Infoblox ($240,000 2-year gift), and KenSci ($40,000 1-year gift).

1. Infoblox - Applied Machine Learning, Network and Information Security –$240,000.00 (PI: Anderson Nascimento; CoPIs: Martine de Cock and Matt Tolentino)

2. KenSci - predictive analytics for healthcare, and privacy preserving machine learning –$ 40,000.00 (Co-PI: Anderson Nascimento) PI: Martine de Cock

Data Coordination and Integration Center for LINCS-BD2K (NIH U54-HL 127624), 2016-18, $260,000.

AMEDD Advanced Medical Technology Initiative (AAMTI), Prospective validation of a genomic classifier for the early detection of ectopic pregnancy. Sub-contract from the Madigan Army Medical Center (MAMC) at the Joint Base Lewis McChord. $75,000, 2017-18.

2017-18

The school faculty published 33 (37 in the prior year) refereed conference papers and 14 (22 in the prior year) journal papers in 2017-18 (this is an average of 1.8 conference papers per tenure-track faculty member and 0.8 journal papers per tenure-track faculty member). In 2017-18, several faculty obtaining research grants from:

- NIH: R01 Intelligent deployment of containerized bioinformatics workflows on the cloud, $1,032,263- first year of the 3-year grant; LINCS-BD2K $260,000-second year of the 2-year grant, the NIH LINCS project generates millions of experiments, measuring the cell's response to drug and genetic perturbations. We work with other investigators in the LINCS consortium to develop computational methods and tools to build predictive models of complex diseases and drug responses.
- NSF: SSTEM for $649,994 with IAS- first year of a four-year grant; NSF EAGER $174,000-second year of the 3-year grant;
- Infoblox: $240,000- first year of a new 2-year gift

2018-19

The school faculty published 51 (33 in the prior year) refereed conference papers and 27 (14 in the prior year) journal papers in 2018-19 (this is an average of over 2 conference papers per faculty member (21 tenure track and 2 lecturers published papers) and over 1 journal paper per faculty member). In 2018-19, several faculty obtaining the following research grants:

- Enhancing Maps and Transportation systems using Crowdsourced Vehicle Information, Microsoft, Mohamed Ali, PI, $120,000
- Coverage, Capacity, and Resilience Enhancement in Limited Public Safety Networks, *NIST, 06/01/2017-05/31/2019, $90,000. (Wei Cheng, PI)*
- BIGDATA: F: Collaborative Research: Acquisition, Collection and Computation of Dynamic Big Sensory Data in Smart Cities*, NSF, 01/01/2018-12/31/2020, $234,754. (Wei Cheng, PI)*
- CyberTraining: CIP: Collaborative Research: Enhancing Mobile Security Education by Creating Eureka Experiences, *NSF, 09/01/2018-08/31/2021, $100,000. (Wei Cheng, PI)*
- D. Dawn (PI) "Chip-based ADS-B for High Density, Low Altitude UAV Operations", NASA with industry partner KalScott Engg. Inc., $40,000.
- Infoblox - Applied Machine Learning, Network and Information Security –$240,000.00 (PI: Anderson Nascimento; CoPIs: Martine de Cock and Juhua Hu) (2018-2020) (renew)
- February 5, 2017, Title: Intelligent Deployment of Containerized Bioinformatics Workflows on the Cloud Program: National Institute of Health (NIH), Early-Stage Development of Technologies in Biomedical Computing, Informatics, and Big Data Science (R01), Role: Co-Investigator, with Dr. Kayee Yeung (PI), Request: $1,338,108, Status: Awarded $1,032,263 over 3 years
- August 8, 2018, Title: CRII: OAC: RUI: Improving Software Deployments to Serverless Computing Environments Program: National Science Foundation Computer & Information Science & Engineering (CISE) Research Initiation Initiative (CRII), Role: Wes Lloyd, PI, Request: $175,000, Status: Paneled Competitive, Awarded $175,000 over two years

- February 1, 2019, Title: Diversity Supplement for undergraduate student Christin Scott for NIH R01 GM126019-02S1 Role: Ka Yee (PI) and Wes Lloyd, Co-Investigator, Request: $36,510 Status: Awarded
- February 1, 2019, Title: Diversity Supplement for undergraduate student David Perez for NIH R01 GM126019-02S1 Role: Ka Yee (PI) and Wes Lloyd, Co-Investigator, Request: $43,405
- One grant, awarded by the National Security Agency (NSA), aims at providing a project-based cybersecurity learning summer program (GenCyber) for urban youth who are historically underrepresented in STEM fields (Yan Bai, PI). Our GenCyber team consists of DC Grant (Lead Instructor) and Amanda Figueroa (Program Co-Director). Our partners include South Puget Sound Boys and Girls Club of America, Tacoma Public School District, Franklin Pierce School District, and local organizations and industries, such as City of Tacoma and Microsoft. $50,000.
- NSF Grant (Yan Bai, PI): Collaborative Research: Colorado-Washington Security Scholars Program, University of Colorado, Colorado Springs and University of Washington, Tacoma. UW Tacoma portion of this award is $1,311,352 (plus ICR) and Colorado's portion is $1,132,119 (plus ICR). The total amount, including ICRs, will be $3,081,251 over five years.

2019-20

SET faculty published 54 refereed conference papers and 27 journal papers in 2019-20. In 2019-20, on-going and new faculty research grants were the following:

- Enhancing Maps and Transportation systems using Crowdsourced Vehicle Information, Microsoft, Mohamed Ali, PI, $195,000 (on-going)
- NIH diversity supplement $34K (new)
- NSA/NSF Gencyber: Three-week cybersecurity summer camp for middle school students, $48K (new)
- D. Dawn (PI), Phase II NASA SBIR, $282K (new).
- Wei Cheng, PI of two NSF grants totaling $335K (on-going).
    - BIGDATA: F: Collaborative Research: Acquisition, Collection and Computation of Dynamic Big Sensory Data in Smart Cities*, NSF, 01/01/2018-12/31/2020, $234,754. (Wei Cheng, PI)*
    - CyberTraining: CIP: Collaborative Research: Enhancing Mobile Security Education by Creating Eureka Experiences, *NSF, 09/01/2018-08/31/2021, $100,000. (Wei Cheng, PI)*
- KenSci Research Gift (to Juhua Hu), Machine Learning Research, $60K (new).
- Multi-agent Robotic Systems, Mike McCourt PI, AFRL, $79,400 (2020-2021).
- DoD STTR Phase I, $70K, PI Matt Tolentino (new).
- Co-Motion, $15K, PI Matt Tolentino (new).
- Senior Design Projects funded by industry/organizations, $45K, PI Matt Tolentino, (new).

2020-21

SET faculty published 83 (54 in 2019-20) refereed conference papers and 33 (27 in 2019-20) journal papers in 2020-21. In 2020-21, on-going and new faculty research grants were the following:

- Enhancing Maps and Transportation systems using Crowdsourced Vehicle Information, Microsoft, Mohamed Ali, PI, $160,000 (2020-2021).
- Infoblox. “Data Analytics for Cybersecurity”; Martine DeCock, Anderson Nascimento, Juhua Hu, co-PIs; 2016-2020; $480,000.
- *KEEN Concept Mapping*, Kern Family Foundation, $72,162. Heather Dillon co-PI with Dr. Cheryl Bodnar. Awarded: October 2020. Senior investigators include Dr. Seung-Jin Lee and Dr. Thillainathan Logenthiran.
- A Precision Health Trial to Reduce Illness & Promote Resilience in Hospital Staff, The Geneva Foundation 11052- N21-14, $92,960, 2021, Yeung-Rhee, subcontract from Madigan Army Medical Center.
- D. Dawn (PI) “Chip-based ADS-B for High Density, Low Altitude UAV Operations”, NASA SBIR Phase-II with industry partner KalScott Engg. Inc., UW amount $281,961, 2020-2022.
- I-Corps Teams: Smart Street Parking Assistant, NSF, 07/01/2020 – 12/31/2021, $50,000. (Wei Cheng, PI, Juhua Hu, co-PI)
- Build A Smart Street Parking System, UW, 12/07/2020/ - 12/07/2021, $100,000. (Wei Cheng, PI)
- Juhua Hu, PI in “Phenotyping and Time Series Analysis in Healthcare”, KenSci, $150,000 (2020- 2021).
- Juhua Hu, “CRII: III: Rare Event Prediction in Time Series,” NSF, $174,850, 2021-23.
- Juhua Hu, PI in “Student Travel Grant of KDD”, NSF, $20,000 (2019-2021).
- ($341,226) DoD STTR Phase II Grant (US Army Research Office). PI: Matthew E. Tolentino. 2021-23.
- ($45,000) Boeing. *Status: Funded*. Matthew E. Tolentino for Engineering Senior Design Projects. 2020-21.

2021-22

SET faculty published 77 (83 in 2020-21) refereed conference papers (28 posters and 49 full length conference papers) and 49 (33 in 2020-21) journal papers in 2021-22. In 2021-22, on-going and new faculty research grants were the following:

- Enhancing Maps and Transportation systems using Crowdsourced Vehicle Information, Microsoft, Mohamed Ali, PI, $160,000 (2021-2022).
- Continuing NSF grant: The CyberCorps®: Scholarship for Service project funded by the National Science Foundation (NSF). It aims to ‘develop [a] superior cybersecurity workforce’ for meeting ‘the needs of the cybersecurity mission for federal, state, local, and tribal governments’ and is aligned with the U.S. National Cyber Strategy (https://www.whitehouse.gov/wp-content/uploads/2018/09/National-CyberStrategy.pdf).
- Continuing NSA/NSF grant: The GenCyber project funded by the National Security Agency (NSA) and the National Science Foundation (NSF). This aims to provide project-based cybersecurity learning for urban youth who are historically underrepresented in STEM fields.
- Facebook Research Awards. “Towards Privacy-Preserving and Fair Ad Targeting with Federated Learning”; co-PI Martine DeCock; PI is Dr. Golnoosh Farnadi (Mila/HEC Montreal); 100,000 USD (2021-2022).

- KEENCOMPASS-Guiding Assessment of the 3Cs, Kern Family Foundation. Awarded: $631,628. August 2021. UWT PI Heather Dillon with Dr. Nicole Ralston, Dr. Viji Sathy and many others.
- A Precision Health Trial to Reduce Illness & Promote Resilience in Hospital Staff, The Geneva Foundation 11052- N21-14, $171,754, 2021-22, Yeung-Rhee, subcontract from Madigan Army Medical Center.
- Precision nutrition impact on health-related behavior change in active-duty service members *The Geneva Foundation* S-1056101, $21,482, 2022, subcontract from Madigan Army Medical Center.
- Accessible cloud-based multiomic and imaging software for the Cancer Research Data Commons, NCI SBIR contract 75N91021C00022, $425,588, 2021-22, co-PI Dr. Yeung Rhee.
- Low SWAP-C Remote ID Device for UAS, NASA SBIR Phase-II with Industry Partner KalScott Engineering Inc. $150,000, 2022-23.
- Juhua Hu, PI in "Sequential Modeling and Imaging AI in Healthcare", KenSci, $210,000 (2020- 2022).
- Juhua Hu, "CRII: III: Rare Event Prediction in Time Series," NSF, $174,850, 2021-23.
- Creating Equitable Pathways to STEM Graduate Education-Sloan Foundation Implementation, Sloan Foundation, Heather Dillon and Angela Kitali, $74,823, 2021.
- PI, Impact Assessment Program Support Planning for embodied carbon associated with building materials, Department of Energy Contract, Pacific Northwest National Laboratory (Award: $69,560), February-September 2022
- Long-term Cryopreservation of Organs by Vitrification and Electromagnetic Rewarming for Organ Banking and Transplantation, UW Royal Research Foundation. PI: Zhiquan Shu, Co-PI: Dayong Gao. 3/2022 - 2/2023.
- Development of an Organ Perfusion System and the Optimal Protocols for Cryoprotectant Addition/Removal, UW Tacoma RRF Pilot support, PI: Zhiquan Shu, 09/2021- 08/2022.
- ($341,226) DoD STTR Phase II Grant (US Army Research Office). PI: Matthew E. Tolentino. 2021-22.
- "Research for All: Expanding and Improving Undergraduate Participation in Research" Kern Family Foundation, $231,324, 2022-25.

2022-23

SET faculty published 56 (77 in 2021-22) refereed conference papers and 80 (49 in 2021-22) journal papers in 2022-23.

In 2022-23, on-going and new faculty research grants were the following:

- NSF. U.S.-U.K. PETs Prize Challenge reward for winning 2nd place and for making the solution open-source; jointly with A. Nascimento (UW Tacoma); PI; $70,000 (March 30, 2023)
- UW-GIF Global Innovation Fund. "Fair and Privacy-Preserving Machine Learning for Chronic Disease Symptom Management"; PI; $15,000 (2023-2024)
- Supported a student in their application for an NSF CSGrad4US PhD fellowship; 138,000 USD (2022-2027)
- Low SWAP-C Remote ID Device for UAS, NASA SBIR Phase-II with Industry Partner KalScott Engineering Inc. $150,000, 2022-23.

- Juhua Hu, "CRII: III: Rare Event Prediction in Time Series," NSF, $174,850, 2021-23.
- The Circular Home: Development and Demonstration of a Net-Negative-Carbon, Reusable Residence, United States Department of Energy, $5.14 million, 2022-2025 (UWT lead with PI Dr. Chrissi Antonopolous PNNL). Awarded Fall 2022.
- MorPhiC Data Resource and Administrative Coordinating Center, NIH U24HG012674, UW sub-contract $1,957,364, Total cost of award: $7,020,914, 2022-2027
- Integrative and interactive analyses of host transcriptional response to COVID-19 and other respiratory viral infections, *NIH R03 AI159286-01A1,* Total cost $155,488, 2022-2024
- Evaluation of Immunosequencing and Bioinformatics Methods for the Rapid Development of Neutralizing Antibodies, *FY22 Advanced Medical Technology Initiative (AMTI) Program* W81K022-23-Q-0148, $86,446, 2022-2023
- Rapid Acute Leukemia Genomic Profiling with CRISPR enrichment and Real-time long-read sequencing for Clinical Use, *NIH R21 CA280520-01,* $73,816, 2023-2024
- Promoting Early Retention of STEM Students: The Achieving Change in our Communities through Equity and Student Success (ACCESS) in STEM Program, Phase 2, *NSF (PI: Erica Cline at UWT),* Total costs $1,499,999, Scholarship support for CSS students, 2022-2028
- "Evaluation of Remote Sensing Based Monitoring of Lake Water Quality in WA State", funded by USGS via the State of Washington Water Research Center [E. Hadnagy (PI), J. Gawel, G. Mulukutla], Sept 2023 (duration: 1 year), $28,806.
- "Engineering Transfer Student Partnership Between Highline College and the UW Tacoma", funded by the UW Community College Research Initiatives (CCRI), STEM Transfer Partnerships [UWT team: E. Hadnagy (co-PI), K. King (co-PI), M. Ford, J. Sheng, M. Stevens], Jan 2022 (duration: 3 years), $50,000 ($25,000 for UWT team).
- USDA-ARS NACA: A Tool to Facilitate Model Calibration Using Cloud Enabled Multi-Group Particle Swarm Optimization, Wes J. Lloyd (PI), $25,000, 09/2022-12/2023.
- Lorne Arnold, "Investigating the use of sliding block methods as an index for seismically induced rock slope failure volume – a proof of concept study," UW Royalty Research Fund, $38k, 2023.
- Aldalbahi (PI), M. Jasim (Co-PI), "Design of Novel Prototypes for Camel-Vehicle Collision Avoidance (CVCA) Systems," CamelClub, KSA, Sept. 2022 - Aug. 2022, Co-PI amount: $210,000.
- Washington State Department of Transportation, *Equity Analysis of WSDOT's Toll Program*, UWT award ~$12,000, Spring 2022-Summer 2023.
- United States Department of Transportation, *Rural Equitable and Accessible Transportation (REAT) Center,* UWT award $450,000 annually (including $150,00 matching funds), 2022-2026.
- Seung-Jin Lee, Impact Assessment Program Support Planning for embodied carbon associated with building materials, Department of Energy Contract, Pacific Northwest National Laboratory (Award: $69,560), February-September 2022.
- UW RRF, *Long-term Cryopreservation of Organs by Vitrification and Electromagnetic Rewarming for Organ Banking and Transplantation,* $39,149, March 2022-September 2023.
- Institute of Translational Health Services-Pilot Funds, *Development of Novel Single-mode Electromagnetic Resonance (SMER) Rewarming Technology for Organ Preservation*, $25,000, March 2023-February 2024
- Murdock Charitable Trust, *SMER for cryopreservation,* $150,000, August 2022-July 2024.

- UW CoMotion GAP Funds, *SMER for cryopreservation,* $50,000, July 2022-June 2023.
- Matt Tolentino, DoD – Army Research Office, Position Navigation and Timing without the Global Position System (GPS), $394,565.70, August 2023-August 2025.
- Kern Family Foundation, "Research for All: Expanding and Improving Undergraduate Participation in Research", Full Grant: $2.01 million, UWT award: $231,324, May 2022-May 2025.

Recent Patent Applications Filed or Granted (two commercialization agreements have been signed)

1. US Patent #11,714,158 B: Position Determination Systems and Methods Utilizing Error of Multiple Candidate Positions, Innovators: Tolentino
2. US Patent 11,490,966: Method and system for modeling predictive outcomes of arthroplasty surgical procedures, Innovators: [redacted], [redacted], [redacted], A. Teredesai,[redacted] ,[redacted]
3. US Patent App. 16/396,482: Machine learning model repository, Innovators: A. Teredesai,[redacted], [redacted], [redacted]
4. US Patent App. 16/267,018: Cryptographically secure machine learning, Innovators: A Teredesai, M. De Cock, A. Nascimento, and students
5. Systems And Methods for Mapping and Distributing Data Requests, Innovators: Jasim, Siasi.
6. Rapid Computation of Hamming Distance to Accelerate Sequencing Data Workflows, Innovators Hung, Yeung
7. Position Determination Systems and Methods Utilizing Error of Multiple Candidate Positions, Innovators: Tolentino
8. Techniques For Improving Processing of Bioinformatics Information to Decrease Processing Time (01), Innovators: Yeung, Hung, Lloyd
9. System For Dynamically Deployed Indoor Positioning System and Method for Self-Localization, Innovators: Tolentino
10. Techniques For Improving Processing of Bioinformatics Information to Decrease Processing Time (02), Innovators: Yeung, Hung, Lloyd
11. Accelerating Nucleic Acid Sequencing Data Workflows Using a Rapid Computation Of Hamming Distance. Innovators: Yeung

Appendix H: Membership in the School's Advisory Boards

SET Advisory Board	
Martyn Adamson	Port of Tacoma
Layne Alfonso	GeoEngineers
Severn Allen	Boeing
Bill Andrews	Retired
Michael Brown	InfoBlox
Bob Burns	Avanade
Brian Chambers	UWT SET
Zaide Chavez	UWT SET
Van Collins	American Council on Engineering - WA
Heather Dillon	UWT SET
Alice Dixon	UWT SET
Eric Eid	Columbia Bank
Andrew Fry	UWT SET
Lloyd Fobi	Multicare
Brian Gosch	National Guard
Rick Griffith	Washington Attorney General
Lars Harvey	Retired InfoBlox
Ron Jimerson	Continuous Improvement – City of Tacoma
Raj Katti	UWT SET
Bruce Kendall	Economic Development Board Tacoma-Pierce County
Leslie Kinkade	UWT Advancement
Scott Klauminzer	Tacoma Power
Joel Larson	UWT SET

Don Lowney	Naval Undersea Warfare Center-Keyport
Don Mellott	Ethos Civil
Mari Orama	Parametrix
Rod Rasmussen	R2 Cyber
Devin Reilly	Columbia Bank
Carl Sweetland	Microsoft
Joe Tellez	UiPath
Michelle Tibke	
Patricia Thumann	
Mike Wark	Emeritus
Sharon Wong	Emeritus
Ka Yee Yeung	UWT SET
Civil Engineering Advisory Board	
Blake Doepker	Turner Construction
Andrew Fiske	WSDOT
Bekah Osterhaus	KPFF
Sara Ott	WSDOT
Brett Ozolin	Port of Tacoma
Stanley Ryter	Port of Tacoma
Jeffrey Schultz	David Evans & Associates inc.
Mike Slevin	City of Tacoma
Lyle Stone	GeoEngineers
Catrina Walter	WSP
Cameron West	Concrete Technology
Mechanical Engineering Advisory Board	
Aaron Darnton	Naval Undersea Warfare Center-Keyport

Faith Debolt	SBW Consulting
Megan Karalus	Siemens Digital Industries
Patrick McGah	TerraPower
Brian Pinkard	Aquagga
Justin Roberts	Blue Origin
Gus Takala	ATS Automation
Electrical and Computer Engineering Advisory Board	
Severn Allen	Boeing
Stephen Brooks	Peninsula Light and Power
Ozan Ferrin	Tacoma Power
Amy Grice	Peninsula Light and Power
Harry Hsiung	Intel Fellow
Kevin Kerstetter	US Naval Sea Systems Command
Scott Klauminzer	Tacoma Power
Mohan Kumar	Intel Fellow
Dieter Laskowski	Google
Daniel Lowney	UW Naval Sea Systems Command
Andrew Sloss	Arm Research
Dave Smith	ARROW
Kebra Thompson	Naval Undersea Warfare Center-Keyport
Chris Vishoot	Schweitzer Engineering Laboratories

Appendix I: ABET self-study reports

ABET self-study reports are provided at the links below. BS CSS, BS CompE, BS EE, and BS IT got accredited in 2022 and BS ME's accreditation visit was in 2023.

Computer Science and Systems
Computer Engineering
Electrical Engineering
Information Technology
Mechanical Engineering

Appendix J: 2023 School of Engineering & Technology Faculty and Staff Vision Survey – Results Summary

In September 2023, the School's faculty and staff were surveyed on the realization of the values of the school. The results show that the school is effective in research/teaching/service excellence, in increasing diversity of faculty/staff/students, and in providing access to engineering programs. The school is slightly to moderately effective in faculty and staff well-being and work/life balance. We attribute this to the increase in workload caused by the rapid growth of the school. The survey results can be found here.