College of Science & Engineering
Strategic Plan 2017-2022

Over the next five years (2017-18 to 2021-22) the College of Science and Engineering will …

Imperative I: Nurture Student Success

CSE GOAL 1: Become a first-choice university for students interested in STEM careers.

Objective 1-a Recruit well-prepared students to our undergraduate and graduate programs.

Targets: Average ACT (SAT) score of entering undergraduate students increases from 24.0 (1180). Yield of undergrad applicants with ACT > 27 (SAT > 1290) increases from 30% to 45%. Enrollment of out-of-state & international undergrad students increases from 8.5% to 15%. Enrollment of in-state graduate students from outside CMU increases from 12.4% to 20%. The number of scholarships, the amount of funding designated for CSE students, and the proportion of scholarships that are awarded each year increase.

Actions: Secure financial support for tuition scholarships for high-achieving students

Develop a "CSE Dean Scholars" program that is competitive, is offered to top students who aren't selected for Centralis scholarships, and provides funding for studying abroad in specified programs (Waterford, Quito/Galápagos, Stellenbosch, *etc*.) among other things.

Enhance communication with prospective students in coordination with Admissions. Work with UComm on initiatives such as student-led videos for recruiting.

Develop strategies for attracting high-achieving students to our Master's programs.

Host annual recruiting days for prospective graduate students from Michigan, Ohio, Indiana, and Illinois; focus on doctoral programs (Mathematics, SAM, EES, BCMB); tie to campus events such as IGLR student research symposium.

Links to: CMU Student Success Strategy #5: Support strategic enrollment management practices and merit-based financial aid to recruit exceptional undergraduate and graduate students.

Objective 1-b Promote diversity and accessibility to ensure students in our programs are representative of the Michigan population.

Targets: Enrollment of students from under-represented populations increases from 35.9% to 50% female and from 12.5% to 17% minority.
Retention of at-risk students improves; the 4-year graduation rate increases from 8.8 to 15%

Actions: In coordination with Admissions, develop and implement a robust recruitment strategy to attract students from areas with significant under-represented populations; secure funding.

Ensure retention initiatives (Goal 2, below) include strategies tailored to at-risk students.

Links to: CMU Student Success Strategy #2 b: Provide courses, programs, co-curricular and extra-curricular experiences…for the diverse range and geographical locations of our students as well as their current and continuing educational and professional-development needs.

CSE GOAL 2: **Increase retention, graduation rates; reduce time to graduation for all CSE students**

Objective 2-a Provide the academic support CSE students need for success in their chosen degree programs and promote student use of these opportunities.

Targets: All students interested in CSE programs see a CSE advisor every semester during their freshmen and sophomore years to plan their academic progress. (from 38.8% to 100%).
All transfer students meet with a CSE advisor every semester until declaring a major.
All incoming students (freshmen and transfer students) participate in activities to help them develop the attitudes and habits necessary for academic success.
All students have access to academic assistance (tutoring, *etc.*) for CSE courses.
Retention of students in CSE programs (from interest at Orientation through signing a major) increases from 68.6% to 75%.

Actions: Assess the CSE Student Success Center (including advisor workload) in the context of this strategic plan and recommend any modifications needed to improve its effectiveness.

Expand the capacity of the Science & Engineering Residential College and enhance programming focused on academic success and career readiness.

Starting with SCI 109 as a model, develop programming for incoming students to impress upon them the attitudes and habits needed for success. Special focus on at-risk groups (first-generation, transfer, international students).

Assess effectiveness of the Reimagining First Year "Gateway Course" initiative and adapt successful approaches to all introductory CSE courses as appropriate.

Create a Science Tutoring Center modeled after the Math Assistance Center.

Work with ESS to track student progress from admission to orientation to enrollment to signing a major; identify stumbling blocks and devise strategies to obviate them.

Links to: CMU Student Success Strategy #2 c: Provide appropriate, adequate… student services.

CMU Student Success Strategy #3: Enhance infrastructure to support teaching and learning and to help undergraduate students develop college-going identities (*e.g.,* … writing and math centers, first-year gateway courses and experiences).

Objective 2-b Maintain and enhance the personnel, facilities, and technology to facilitate student success.

Targets: Proportion of 100- and 200-level courses employing active-learning strategies increases.
Instructional laboratories are adequately equipped (including technology) for effective instruction and career readiness.
Research facilities support excellent scientific/technical training of graduate students.
All graduate teaching assistants are trained in appropriate teaching methods.

Actions: Develop TA training program focused on the needs of CSE departments.

Assess the uses and effectiveness of CSE's Active-Learning Classrooms and expand faculty development activities to facilitate active learning in all classrooms.

Gather input from alumni and professional advisory boards about current standards for equipment and software in the various professions.

Links to: CMU Student Success Strategy #2 a: Provide faculty and staff who possess the necessary disciplinary and teaching expertise to help students meet learning outcomes.

CMU Student Success Strategy #3: Enhance infrastructure to support teaching and learning and to help undergraduate students develop college-going identities …

Objective 2-c   Offer undergraduate major programs that provide necessary knowledge and skills efficiently so that most students can graduate in four years.

Targets: Average time to graduation across the college decreases from 4.8 years to 4.6 years.
The median number of credit hours at graduation for CSE FTIACs decreases (from 138).

Actions: Review all major programs in context of full degree requirements and identify possible changes that would improve likelihood that students graduate in 4 years.

Develop realistic 4-year plans (degree maps) for all CSE programs; market those plans and focus advising efforts on keeping students on track for timely graduation

Recruit faculty to serve on relevant Senate committees (UCC, GenEd, DASH) that would review and propose modifications to general education and other degree requirements.

Departments work together to develop multi-year course schedules (avoid conflicts among courses that may be required at the same time, *e.g.,* calculus, physics, chemistry). Pending CMU's adoption of software, utilize that to make future schedules available to students.

Links to: CMU Student Success Strategy #1: Review and modify all undergraduate degree programs so that they require no more than 120 credits …

CMU Student Success Strategy # 7: Implement multi-year course schedules and multi-semester registration.

Objective 2-d Offer graduate degree programs that provide necessary knowledge, skills, and experiences efficiently so that students graduate in a reasonable time.

Targets: The % of students who complete and graduate from CSE master's programs increases.
Average time to graduation for CSE graduate students meets goals identified by programs.

Actions: Review graduation rates by program, define appropriate time-to-degree, and identify curricular requirements and departmental policies or practices that could be modified to improve degree completion.

Explore potential for feasible 5-year BS-MS programs to facilitate MS degree completion.

CSE GOAL 3: Ensure CSE students graduate and enter post-graduate education or the workforce with excellent education and essential skills for success in their chosen discipline.

Objective 3-a Offer academic programs that serve the interests of students and align with the needs of Michigan and the U.S. economy.

Targets: Program reviews demonstrate student demand for programs and employer demand for graduates remain strong (else programs are modified to meet changing demands).
80% of graduates who respond report a successful transition to career or further education.
25% of graduates (starting with class of 2018) remain engaged with CSE via professional networking (*e.g.,* Linked-In).

Actions: Departments and programs complete Program Review on schedule.

In collaboration with Enrollment and Student Services and the Alumni office, gather data from alumni at various points after graduation.

Develop a way to connect with alumni (*e.g.,* Linked-In) at the department/program level.

Use data from OIR and Career Services as input for evaluating how well CSE graduates are prepared for careers.

Links to: CMU Student Success Strategy #6: Conduct and review the results of program assessments, NSSE, exit and alumni surveys to ensure that courses, programs, co-curricular and extra-curricular experiences prepare students for their lives, careers, and career advancement.

Objective 3-b Ensure accreditation of programs that have external accrediting bodies.

Targets: Accredited programs maintain accreditation.
Approved programs (chemistry, meteorology) maintain approval of professional body.
Programs that can be accredited achieve accreditation.

Actions: Departments, the College, and Academic Effectiveness commit the resources necessary to obtain and maintain accreditation.

Programs that could be accredited (biochemistry, computer science, engineering technology) explore the possibility (including options, risks, benefits, costs) of accreditation.

Links to: CMU Student Success Strategy #6: Conduct and review the results of program assessments, NSSE, exit and alumni surveys to ensure that courses, programs, co-curricular and extra-curricular experiences prepare students for their lives, careers, and career advancement.

Objective 3-c Provide all CSE students with opportunities to engage in at least one high-level activity such as study abroad, research, design projects, or internships.

Targets: 33% of CSE undergraduates participate internships, independent research, or study abroad.
The number of students studying abroad for a semester or more increases from 11 to 30.
All CSE graduate students complete tangible research or professional accomplishments.

Actions: As part of the assessment of the CSE Student Success Center, and in collaboration with ESS initiatives, evaluate the need for a CSE internship coordinator.

Develop appropriate study-abroad programs for cohorts of students from all CSE majors.

Continue to support research productivity of graduate students (link to IMPERATIVE 2).

Links to: CMU Student Success Strategy #8: Make a more robust effort to prepare students for careers and career advancement (*e.g.,* internships, job placement assistance, *etc*.) and to identify and follow the employment of our graduates.

CMU Student Success Strategy #6: Conduct and review the results of program assessments, the National Survey of Student Engagement, and exit and alumni surveys to ensure that courses, programs, co-curricular and extra-curricular experiences prepare students for their lives, careers, and career advancement.

Objective 3-d Leverage alumni relationships and expertise to help students and improve programs (link to IMPERATIVE 3, Strengthening Partnerships in Michigan and Beyond).

Targets: Network of engaged alumni established, including alumni from every department.
Career Mentoring program established.

Actions: Re-establish the CSE Alumni Board (or, alternatively, departmental alumni boards) to provide advice, mentor students and give financial support.

Establish Career Mentoring Network with special focus on connecting under-represented (women, minorities) and first-generation students with STEM workplaces.

Links to: CMU Student Success Strategy #8: Make a more robust effort to prepare students for careers and career advancement (*e.g.,* internships, job placement assistance, *etc.*) and to identify and follow the employment of our graduates.

Imperative II: Fostering Scholarly Activity

CSE GOAL 1: Increase research activity and its impact.

Objective 1-a Continue to increase the frequency of publication in well-respected journals.

Targets: Increase the number of peer-reviewed publications, as indexed in the *Web of Science*.
Increase the number of publications in Q1 journals.
Increase the ratio of (publications in Q1+Q2 journals)/(all indexed publications).
Increase the total number of citations over a 5-year period, as indexed in *Web of Science*.

Actions: Develop a periodic assessment of the publication record of each regular faculty member that will take into account frequency of publication, quality of journals, and differing publication rates between (sub)disciplines. The assessment, along with the record of external funding and publications with students, will be used as a factor in determining teaching workloads.

Continue to recruit faculty into research-intensive positions throughout the college, with low teaching loads in the first several years and higher expectations for research results.

Links to: CMU Target #2: In relevant fields…the average citation impact…will be greater than 1.0.

Objective 1-b Facilitate participation of more CSE faculty in research.

Target: Increase percentage of regular faculty publishing in peer-reviewed journals.

Actions: Develop a survey to learn about faculty research experiences, barriers to research productivity, and identify opportunities to increase research participation.

Links to: CMU Target #3: The number of research-active faculty who have at least one top-level publication…will increase annually.

Objective 1-c Increase publication of student research.

Target: The number of peer-reviewed publications with student authors increases.

Actions: Establish a competitive summer research scholar program to provide funds for undergraduate students to engage in research directly supervised by a faculty member.

Develop program to help faculty implement effective practices for mentoring student research.

Links to: *CMU Target #4: A systematic approach for tracking undergraduate and graduate student publications and presentations will be developed.*

CSE GOAL 2: Increase research funding in the college.

Objective 2-a Increase the total amount of external funding.

Target: Increase the dollar amount of annual expenditures on externally-funded projects.

Actions: Continue to recruit faculty into research-intensive positions with low teaching loads in the first several years and higher expectations for grants and research results.

Links to: CMU Target #1: The amount of federal expenditures will increase by $1.2M.

Objective 2-b   Facilitate participation of more faculty in externally-funded research.

Target: Increase percentage of regular faculty receiving external funding.

Actions: Develop a survey to learn about faculty research experiences, barriers to research productivity, and identify opportunities to increase research participation.

Promote faculty attendance at workshops for granstmanship and proposal writing; invite program officers from NSF and the like to CMU to hold workshops on campus.

Improve communication/publicity about externally-funded research.

Links to: CMU Targets #1 and #3

Imperative III: Strengthening Partnerships in Michigan and Beyond

CSE GOAL 1: Determine the baseline of CSE community partnerships

Objective 1:   Conduct a survey of CSE faculty, staff and RSOs to determine number and type of community and professional partnerships.

Metrics: Number of community and professional partnerships and assessment of benefit to CSE and external partners. Partnerships include: community service projects, advisory boards, internships, collaborative projects between CSE and government agencies and industry, service learning courses, profession service as editor, editorial boards, *etc*.

Actions: Appoint Strategic Partnership Committee (SPC) of faculty and staff to develop survey instrument to determine number and benefit of CSE partnerships.

CSE GOAL 2: Develop Plan to Enhance and Expand CSE Strategic Partnerships

Objective 2-a   Based on information from survey develop a strategic plan to guide investment in CSE partnerships. Coordinate with CMU's Carnegie Community Engagement initiative.

Objective 2-b   Explore options to create large-scale CSE-wide community partnership project to include faculty, students and staff.

Target: Creation of plan that includes goals that focus on defined areas that align CSE strengths with external needs. The plan will guide CSE investment and assessment via well-defined metrics to measure effectiveness.

Actions: The new Strategic Partnership Committee will determine appropriate actions.