Michigan State University

College of Engineering
Strategic Plan

(2016-2021)

“...in pursuit of leadership in research, education, and technology transfer”
What We Stand For

Mission (where we are and what we do today)

At Michigan State University, the mission of the College of Engineering is: "To deliver the highest quality engineering graduates, cutting-edge research and innovative technology for the benefit of society locally and globally."

Core Values (basic, sustaining beliefs)

The College of Engineering is guided by the following core values in delivering its mission and pursuing its vision.

*We believe, as a land-grant university, in educating people with the necessary skills to advance the engineering "state of the art." Imparting knowledge to students at all levels including secondary, undergraduate, graduate, and lifelong learning is implicit in this core value.*

*We believe in the discovery of new knowledge through innovative research that encourages entrepreneurship and economic development to benefit our global society.*

*We believe in inclusiveness and collaboration on a worldwide basis. We both teach and follow ethical, environmentally responsible engineering practice.*

Vision (where we want to be in five years)

The Vision of the College of Engineering is: "To be recognized as the fastest rising College of Engineering in the nation."
Executive Summary

The College of Engineering is entering an exciting period of expansion fueled by investments by Michigan State University as well as increased student interest in Engineering as a career. To become clearly recognized as “the fastest rising College of Engineering in the nation” the college commits to the following strategic imperatives. In the end, rather than be a gathering of individual disciplines and programs, we will pursue the culture of “One Engineering”.

Education – Ensure that the education offered to our students prepares them for the opportunities of the 21st century workplace recognizing that that workplace is technology-centered and rapidly evolving. Hence all of our students will participate in experiential educational programs, have peer mentors early in their academic career, and have educational experiences that are consistent and equivalent regardless of whether they are on-campus, off-campus, in small sections, or large sections. Excellence in teaching will be recognized and rewarded.

Research – Expansion of the research enterprise is essential for enhancing the impact and reputation of the college. The faculty strength will be expanded mindful of emerging areas of research that have particularly high potential impact. Research funding per capita will be increased through proactive marketing and stronger ties to industrial partners. The college will become an engine for economic development with particular attention paid to preparing students for entrepreneurial ventures.

Enhancing Inclusiveness and Diversity – The College of Engineering commits to increasing the percentage of underrepresented minority (URM) and women engineers by five (5) percentage points during the period of this plan. This will result in an increase of URM students from 8% to 13% and women from 20% to 25%. Particular attention will be paid to increasing URM and women percentage of the graduate student population by 5% as well. Increased visibility of inclusivity and diversity programs will be made in the Engineering Building as well as in communications material. Opportunities for cultural competency training will be provided to all member of the Engineering community. Improved resources for students with disabilities will be provided to facilitate learning in concert with the Resource Center for Persons with Disabilities (RCPD)

Fundraising – The emphasis on securing donations of endowed faculty positions will continue beyond the Empower Extraordinary Campaign with the goal of matching the success of the college in that campaign between 2016-2021. A renewed emphasis on securing donations of endowed and expendable fellowships to enhance the graduate and research programs will be undertaken. Academic department chairperson will have a greater role in fundraising for their units. Particular emphasis on building a culture of “giving back” among current students and recent alumni will be pursued to establish the basis for successful future campaigns.

High Performance Operations – The College of Engineering recognizes the limited resources available to it even in this time of expanded interest in the field. Therefore the college will engage in initiatives to more efficiently utilize assigned space through improved management. This will include computer as well as physical assets. Additional staff will be added to department and support units as needed and possible as well as redefinition of duties for key staff with the intent of making the College of Engineering both more efficient and encouraging for staff. We must be the most desirable unit on campus for faculty, staff, and students. The college will review the organizational structure and make changes as warranted and possible.
Strategic Plan Development Process

Themes

During this quinquennium, the College of Engineering is experiencing unprecedented growth in faculty strength based on opportunities in research and strong student interest in the academic programs offered by the college. The Dean of Engineering defined four themes for this strategic plan based on an assessment of the opportunities and challenges projected for the next five years. These are:

1. **Education**: How can we improve both effectiveness and efficiency of student learning in the face of technology transformation and an increasing student base? How to educate the next generation of engineering students to be the innovators of the 21st century?

2. **Research**: What investments will maximize the impact of our research over the next 10 years?

3. **Establishing a More Inclusive Culture**: How can the College of Engineering improve its culture to ensure that students, faculty, and staff from all backgrounds are productive and energized by being part of the college?

4. **Fundraising**: How can the college enhance fundraising activities to have the maximum impact on the expanding activities of the college?

5. **High Performance Operations**: How can the college make more efficient use of both physical resources (space, etc.) and human resources?

Thematic planning committees were defined for each of these areas (see Appendix A for composition). The Dean of Engineering nominated the chairperson for each thematic committee; the remaining members of the committees were self-nominated. These committees met from Jan-May 2016 to define candidate priorities and strategies. This material was used as primary source material for this present plan. Prof. Ronald Rosenberg served as overall coordinator for the thematic planning committees.
Summary of Education Thematic Committee Recommendations

The final outcomes define commitments to education across four levels:

1. **Undergraduate Students**
   a. All undergraduates participate in experiential education prior to graduation.
   b. All undergraduates are assigned a peer mentor in their first year.
   c. Learning in large classes (>75) will match that in smaller classes (<30).
   d. Authentic assessment and computational applications will be adopted broadly across the curricula of the College.

2. **Graduate Students**
   a. All graduates are aware of the variety of professional opportunities available.
   b. Intentional cross-disciplinary networking opportunities are required for students.

3. **Faculty**
   a. Excellence in instruction among faculty and teaching-focused specialists/staff will be recognized and rewarded.

4. **College**
   a. The College will establish a strategy for the creation and use of online/hybrid courses and assessment of their effectiveness.

For each of these levels, we have identified a rationale, action items, resource requirements, and a timeline for achieving the desired outcomes (See Appendix B). While we acknowledge that these goals are difficult, we believe they are achievable and, if achieved, will distinguish the College of Engineering as a model for engineering education in the 21st century.
Summary of Research Thematic Committee Recommendations

The research thematic committee discussed a number of objectives and initiatives to strengthen both the research enterprise in the College of Engineering as well as recognition of the accomplishments of the faculty and students. These are summarized below with details presented in Appendices C and F (additional background material).

Research Initiatives:

1. **Recognition of Faculty and Students**: To enhance the reputation and visibility of the constituent departments and college as a whole, increasing the number of endowed chairs/professorships is crucial. During the Empower Extraordinary Campaign, an expected addition of at least 10 new endowed positions is expected. For the post Empower Extraordinary period, an additional 10 positions should be secured within the period of this Strategic Plan. In addition, extra effort must be made to nominate and celebrate the achievements of our students and faculty in research.

2. **Recruitment, Mentoring, and Faculty Development**: During this period of increased faculty recruiting it is important to streamline the approval processes for search committee formation and the decision process for the extension of offers from the department chairperson. Considering the increased number of junior faculty expected during this period, a robust faculty mentoring and professional development program is critical to maximize the impact of the investments made in the College of Engineering.

3. **Increase External Funding**: The average research expenditures per tenure-system faculty member should be increased to over $400,000/annum. This will be accomplished by increasing proactive proposal marketing, increasing the size of the research-intense faculty, and ensuring sufficient research facilitation infrastructure is in place as the college grows.

4. **Recruiting and Retaining Excellent Graduate Students**: The heart of the research enterprise are faculty and graduate students; especially PhD students. The college will work with departments to promote opportunities for students, increase fellowship resources, and develop key international partnerships including dual PhD programs.

5. **Strengthen Industrial Collaboration**: Engineering has always had a symbiotic relationship with industrial partners given the translational nature of basic to applied research and development inherent in much of engineering. The College of Engineering will expand our collaborations with industry by: (1) leveraging contacts made through Design Day and the Center; (2) increasing applied research activities; and (3) strengthening the connection and collaboration with other colleges and units at Michigan State university.

6. **Enhance Economic Development Activities**: Working with local, regional, state and national economic development programs and organizations has been at the heart of the Land Grant mission from its inception. The College of Engineering will continue to facilitate the translation of innovations from the laboratory to the market. This will include educational opportunities for students and greater collaborations with Spartan Innovations.
Summary of Inclusive Culture Thematic Committee Recommendations

The MSU College of Engineering believes that inclusiveness enhances the art and science of discovery. We must leverage the diversity of our college, campus and community in order to continue in our mission to engineer a healthier, safer and more sustainable world. We welcome and encourage the sharing of differences to power the College’s intellectual vitality, inventive spirit, fiscal strength and operational flexibility. We believe that inclusiveness creates an environment of success for all of our shareholders: students, faculty, staff and the companies and communities that benefit from our innovation, our diversity and our Spartans’ Will!

The College is committed to building its capacity for inclusiveness and to evaluating its progress toward this vision on a continuous basis. To that end, the College of Engineering will address the following goals over the next five (5) years:

**Increasing Diversity**

1. Increase the number of underrepresented minorities (URM)* that complete Engineering bachelor’s degrees by:
   a. Increasing the number of diverse, high achieving students admitted to MSU Engineering
   b. Increase the number and amount of scholarships available to recruit diverse, high achieving students
   c. Explore the creation of a “pre-engineering” major option that would allow students to identify with CoE while remaining University No-Preference students, and/or would support a dual-enrollment program with Lansing Community College
2. Increase the diversity of the faculty “pipeline” by:
   a. Pursuing a 5% increase in the number of domestic MSU undergraduate students pursuing graduate degrees
   b. Pursuing a 5% increase in the number of domestic students enrolled in MSU Engineering graduate programs
   c. Pursuing a 5% increase in the number of MSU Engineering graduate students participating in future faculty training programs (e.g., MSU CAFFE, BEST, or CCT programs; external Future Faculty workshops)

**Increasing Support**

3. Assign one staff person to assist international students as they navigate the College and the University on things like: employment, enrollment, immigration issues, etc.
4. Mandate cultural competency training for all faculty, staff and students, either by tapping into an existing training resource or creating our own online module.
5. Provide a dedicated space for testing accommodations for those Engineering students who are registered with the Resource Center for Persons with Disabilities (RCPD).
6. Mandate the use of online learning materials to better support those students registered with RCPD.

**Increasing Visibility**

7. Adjust building décor, particularly on the first floor and in entrance areas, to illustrate diversity and inclusion. Examples include: adding welcome signage in different languages; developing a rotating display celebrating the cultural diversity of our students; highlighting diverse students, faculty and staff in “news” items on display monitors.
8. Implementation of two, new Diversity Awards - one for Faculty and one for Academic Staff. The nomination and selection process would parallel existing service awards and winners will be honored during the annual Dean’s Awards Luncheon.

9. Include the College’s statement on inclusion on our website and in printed recruiting materials, both at the undergraduate and graduate level.

*For the purposes of this document, URM includes students who represent diversity in one or more of the following areas: special needs, including learning disabilities; socio-economic background (e.g., Pell Grant recipients); sexual orientation; gender/gender identity; ethnicity and race.
Summary of Fundraising Thematic Committee Recommendations

The Fundraising Thematic Committee developed recommended priorities and initiatives to enhance the college’s ability to enhance resources for the betterment of the academic missions of the college. The recommended priorities are (in order):

1. Endowed chairperson and professorships: Even with the on-going success of the Empower Extraordinary Campaign and the eight (8) new endowed positions secured thus far, the college lags its aspirational peers in this important category of the faculty. Hence, the college will continue to emphasize the need to not only secure such endowments, but to also work to distribute them across the academic programs and accelerate the utilization of these positions as the faculty emerges into the second decade of the 21st century.

2. Fellowships: The College of Engineering is still short of fellowship funds to attract the very best and brightest. A specific campaign to increase such donations will be necessary.

The committee also recommended several initiatives to strengthen fundraising activities. These include:

1. **Early Engagement**: Programs to sensitize current students, especially upperclass and graduate students, with the need to give back as they mature as professionals. This includes the need for a robust system to identify and track our alumni as they navigate a lifetime of personal and professional change.

2. **Enhance Partnerships with Industry**: Industrial donors remain an underutilized source of support for student activities and research. Specific programs and opportunities should be developed that align with the interests not only of the college and departments but also the industrial partners.

3. **Branding and Social Events**: The College of Engineering should increase its presence at non-academic venues such as athletic events at Michigan State University. This could include the use of suites at football, hockey, and other athletic venues. It should also partner with the Department of Athletics on joint events to bring alumni together such as game watches, etc.

4. **Creative Opportunities for Established Donors**: The College of Engineering should expand the opportunities to give in non-traditional ways. As an example, an expendable (as contrasted to an endowed) term professorship can be established for bridging the needs of the departments for named faculty positions until sufficient endowed positions are available.

Additional details are presented in Appendix D.
Summary of Fundraising High Performance Operations Committee Recommendations

Overall, space and staffing resources need to reflect the pressures resulting from the over 100% growth in undergraduate numbers in the past five years and the anticipated 35% growth in tenure stream faculty in the next five years.

Space

- **Manage space allocation/assignment at the College level**
  Centralizing space allocation/assignment at the college level will result in more effective identification of underutilized space and facilitate synergistic space arrangements that will maximize the productivity of space by better matching specific needs to appropriate space.

- **Centralize conference room and off-hour classroom scheduling at the College level**
  An algorithm for scheduling conference rooms that priorities based on purpose and number of attendees should be developed, allowing more efficient use of conference rooms and identification of underutilized space. Off-hour classroom space should be scheduled through the College using a prioritization algorithm that allows student groups to reserve space on an as-needed basis, yet allow study groups and individuals to effectively utilize classroom when not needed for scheduled instruction or student group activities.

- **Increase flexibility in graduate student office space**
  Open/bullpen style office space, as is planned for the Engineering Library conversion, can be used flexibly for graduate student office space. When possible, traditional graduate offices space should be converted to open/bullpen style. Graduate student office space must be efficiently shared amongst faculty, with assignments coordinated at the department level to take advantage of underutilized space.

- **Open computer labs for use when not scheduled for classes**
  To optimize the use of computer labs and enhance opportunities for students across the College, it is critical that the College and DECS audit all of the computer labs in the College to identify underutilizations. These labs should be available for all College of Engineering students, regardless of course or major, during non-instructional times.

- **Shift towards use of centralized or cloud based software**
  As more centralized and cloud based software becomes more common, decrease the number of labs that provide computing hardware. Instead, require students to have a minimum capacity laptop or other system for computer lab based courses, providing monitors as appropriate. Use freed up resources to support laptop purchases for in-need students.
Operations

• *Assess varying staff levels between departments*
  The varying levels of staff in different departments should be critically analyzed to identify potential inefficiencies.

• *Share staff between departments and College*
  There is a potential for efficiencies to be gained by consolidating some routine functions, such as travel reimbursements and requisitions.

• *Increase DER staff*
  The number of proposals that DER can process in a given year is near capacity. Increases in faculty numbers will require enhanced staffing.

• *Increase advising staff with enhanced efficiencies*
  The large increase in undergraduate numbers, projected to continue to rise in coming years needs to be accommodated through increases in advising staff, but greater advising efficiencies can be achieved through use of software (developed or purchased), social media, and strategic group advising.

• *Hire technicians to support cross-department activities*
  Greater faculty productivity will result from optimized technical support personal. Such personal should work across the college to ensure expertise is used advantageously.

College Organization

• *Streamline organizational structure*
  The number individuals reporting directly to the Dean and the Associate Dean for Undergraduate Studies should be reduced. The organization of the Undergraduate Studies office should be assessed to clean up reporting lines. Having research center directors report to department heads reduces oversight load on the Dean. Similarly, DECS should be under the direction of the Associate Dean for Administrative Affairs.

Further information from this committee is presented in Appendix E.
Appendix A: Composition of Thematic Planning Committees

1. **Education**
   a. Pat Walton (Chairperson)
   b. Ron Averill
   c. Bernadette Friedrich
   d. Syed Haider
   e. Amanda Idema
   f. Anthony Ingle
   g. Geoff Recktonwald
   h. Tom Wolff (consultant)
   i. Neeraj Buch (Dean’s Office Liaison)

2. **Research**
   a. Subir Biswas (Chairperson)
   b. Annick Anctil
   c. Mahmood Haq
   d. Tongtong Li
   e. Richard Lunt
   f. Arun Ross
   g. Thomas Schuelke
   h. Teresa Thomas
   i. John Foss (consultant)
   j. John Verboncoeur (Dean’s Office Liaison)

3. **Inclusive Culture**
   a. Theo Caldwell (Chairperson)
   b. Amber Benton
   c. Sandra Christlieb
   d. Katy Colbry
   e. Carmellia Davis-King
   f. Susan Masten
   g. Nelson Sepulveda
   h. Teresa Vandersloot
   i. Mary Anne Walker
   j. Tom Voice (Dean’s Office Liaison)

4. **Fundraising**
   a. John Papapolymerou (Chairperson)
   b. Stephen Bates
   c. Judy Cordes
   d. James Klausner
   e. Garth Motschenbacher
   f. Matt Mutka
   g. Martin Hawley (Dean’s Office Liaison)

5. **Improving Operations**
   a. Martin Crimp (Chairperson)
   b. Jeff Curtis
   c. Craig Gunn
   d. Paula Holzheuer
   e. Linos Jacovides
   f. Joyce Samuel
   g. Nicole Shook
   h. Laura Taylor
   i. Mary Anne Walker
   j. Tom Voice (Dean’s Office Liaison)