



**MEEN 2.1**

# Strategic Plan: 2014- 2019

Mechanical and Energy Engineering

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University of North Texas

## **Department of Mechanical and Energy Engineering**

### **Strategic Plan: 2014-2019**

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The strategic plan of the Mechanical and Energy Engineering is organized in tandem with the 4 bold goals enunciated by the University of North Texas.

#### **I. Vision**

The vision of the department is to be recognized for exceptional undergraduate and graduate education and excellence in research and services in mechanical and energy engineering locally, nationally and globally.

#### **II. Mission**

The mission of the department is to offer students nationally recognized educational opportunities grounded in the fundamentals of mechanical engineering and involving state-of-the-art technology with applications to energy. The department programs support technological development and innovation to meet the needs of society. Faculty and student engagement in design projects, research, or other similar activities is essential to their professional development. The department facilitates a continuous quality improvement process for programs and a collegial atmosphere that is conducive to intellectual and scholarly pursuits of faculty and students.

#### **III. The MEE Stakeholders**

The major stakeholders of the Department include the students, faculty, staff, the employers of our students, sponsors of our research, and the state of Texas.

#### **IV. Strategic Goals**

##### **IV.1. Goal 1: Provide an Excellent Undergraduate Educational Experience**

The undergraduate educational experience is designed to provide the students opportunities while enrolled at UNT for obtaining the career-related skillsets and lifelong learning capabilities. They will be organized under three themes:

1. Curriculum
2. Research Experience
3. Professional Networks and Student Life

##### **IV.1.1 Curriculum**

The curricular goal is to offer a contemporary curriculum with fundamental core knowledge acquisition and retention that is ABET accredited.

Actions to be taken are as follows:

- Continue the improvement of the undergraduate curriculum by implementing Continuous Quality Improvement (CQI) process, defined by ABET and developed by the MEE program faculty.
- Enroll and retain good quality undergraduate students.
- Ensure value and opportunities for faculty-student mentoring efforts.
- Partner with academic affairs at the college and University level to increase retention and graduation rate of all students.
- Offer study abroad programs that enable course credit in international locations.
- Incorporate online tools for group study, tutorials and complete courses for students to learn in flexible environments.

#### **IV.1.2 Research Experience**

The research experience goal is to engage qualified undergraduate students individually and in teams within and among disciplines to apply curricular knowledge to problems in laboratory environments to foster peer-peer and faculty-student mentoring.

Actions to be taken are as follows:

- Encourage undergraduate research through enrollment in the independent study course MEEN 4900 and engaging in faculty research laboratories.
- Expand research opportunities for undergraduate students through external funding that offers research assistantship for undergraduate students.
- Develop and network with other universities for Research Experience for Undergraduates (REU) support, which both enhances the visibility of MEE department and recruits quality students to the MEE program.
- Adopt Honors College research program to engage freshmen in undergraduate research.
- Actively engage in the college of engineering's Summer Undergraduate Program in Engineering Research (SUPER) to retain existing students and recruit new students.
- Increase the percentage of undergraduate senior design projects with the interdisciplinary requirements.

#### **IV.1.3 Professional Networks and Student Life**

The goal of the actions is to graduate students with lifelong learning and communication skills enabled through research, association with professional networks, and enhanced extracurricular experience.

Actions to be taken are as follows:

- Support student involvement in professional societies (e.g., ASME, ASHRAE, SAE, etc.) which both improve the student engineering experience and increase the attractiveness and reputation of the undergraduate program.
- Offer regular networking meeting with industries at Discovery Park.
- Engage students to participate in ASME student design contests and other national or international competitions.
- Enhance the student experience through improved faculty and alumni interactions:
  - Utilize alumni or industry presenters in seminars or lectures.
  - Establish an "MEE Day" to increase interactions between students, advisers and employers (i.e., industry representatives).
- Improve departmental advising and related student services for student success.
- Increase foundation and engineering education grants supporting enhanced student learning.
- Increase accessibility of opportunities for student awards, scholarships, research experiences through creation of a website for current students indexed by application date and listing websites.

#### **IV.1.4 Metrics to Accomplish the Plan:**

The following measures will be used to evaluate the successful implementation of the action plan:

- Reduce the undergrad-student/faculty ratio from 29.4:1 to 25:1 with a 5% annual enrollment increase on average within five years.
- Students achieve an FE pass rate of 90%.
- Improve the 4-year graduation rate by 15% above the 2013 level and the 6-year graduation rate by 25% above the 2013 level
- Initiate and sustain the student-driven teaching award nominations of faculty.
- Increase elective courses by one per year.
- Increase the number of students receiving student awards, scholarships, or research experiences by 5% per year.
- Increase the number of students engaged in alumni, professional society, and IAB activities by 5% per year.

#### **Annual metrics to monitor:**

The following data set will be collected to measure the successful implementation of the actions:

1. Metrics for quality of freshmen (e.g., SAT scores) and transfer students (e.g., GPAs).
2. Retention rates: monitor FITC, transfer, and underrepresented minority group statistics
3. Diversity/cultural based data assessment of GPA, grades of D or lower, participation in student competitions and teams, recommendations and citations for awards.
4. Cooperative/collaborative agreements with community colleges through the college academic affairs.
5. Participation data for the REU and SUPER-type experience by MEE students within UNT and with other Universities.
6. Student achievement records.
7. The participation data for student professional society.
8. Records of ABET accreditation maintenance process.
9. Award applications and success rates.
10. Records for student employment or graduate schools 6 months after their graduation.
11. Mentor awards and teaching awards from students to alumni, IAB, working engineers and faculty.
12. Post to the website and in newsletter, students receiving internships, awards and permanent positions.

#### **IV.2. Goal 2: Provide Superior Graduate Education, and Achieve Research Productivities Comparable to ME Departments with Very High Research Activities (RU/VH)**

MEE will graduate quality MS and Ph.D. students supported through graduate assistantships and fellowships, enabled by intensive efforts for research funding by all faculty who have, or will have, reputations among the nation's competitive researchers.

Actions to be taken are as follows:

1. Increasing M.S. and Ph. D. student enrollments.
2. Recruitment of a quality and diverse student body.
3. Increasing scholarly activities.
4. Increasing external grant proposal writing quality and success, and research expenditures.

#### **IV.2.1 Increasing M.S. and Ph.D. Student Enrollments**

The goal of the actions is to provide more options for graduate studies and have sufficient number of graduate students to support faculty-led research programs.

Actions to be taken are as follows:

- Offer a Ph.D. program in Mechanical and Energy Engineering.
- Offer a new Masters in Energy program (fully online).
- Offer BS/MS fast track program to retain outstanding UNT MEE graduates.
- Offer an option for the online MS program to attract more part-time students.
- Offer more flexible non-thesis option for MS students.

#### **IV.2.2 Recruitment and Retention**

The goal is to improve the quality of the graduate students by implementing quality recruitment efforts.

Actions to be taken are as follows:

- Increase the quality of admitted graduate students as measured by average GPA and GRE scores
- Increase graduate student population in under-represented groups. Actively recruit students in under-represented groups to apply for the graduate program, for example, students from Historically Black Colleges and Universities (HBCUs), Society of Women Engineers (SWE), and Hispanic-Serving Institutions (HSI).
- Identify and recruit top undergraduate students for graduate study through undergraduate research (e.g., applying for REU sites and REU programs).
- Identify and implement key strategies in best practice recruitment of graduate students from leading colleges.
- Ensure the Department's web site on student scholarships and opportunities for graduate fellowships, teaching and research assistantships is up-to-date and informative.
- Increase Department TA and grader positions to give sufficient supports for all lower-level MEE undergraduate courses and labs.
- Establish departmental teaching and research awards for graduate students.

#### **IV.2.3 Scholarly Activities**

This goal is to achieve the faculty scholarly activity level that is comparative to the tier-one research institutions.

Actions to be taken are as follows:

- Increase the number of peer reviewed journal publications co-authored by both faculty and graduate students during their program period.
- Organize graduate student writing group to promote journal paper publication.
- Have Ph.D. students and MS thesis students to present research results in department seminars.
- Provide matching travel fund for graduate students to attend technical conferences.
- Organize an annual graduate student seminar with the thesis/dissertation committee that is open to all audience.
- Organize an annual collection of graduate student technical paper publication and recognize the first paper of each student in the display case.

#### **IV.2.4 External Grants**

The goal of the actions aims at significantly increasing the amount of the external research funding to the level that is comparative to the ME departments in RU/VH: Research Universities (very high research activity.)

Actions to be taken are as follows:

- Increase the success rate of research proposals:
  - Develop annual strategy for success for grant proposals through assessment of common themes emerging from proposals not funded, timelines to proposal submission, and support for graphic design and technical writing for faculty.
  - Focus faculty research workload and future hiring on diverse federal funding sources and their strategic areas in both fundamental and applied research such as, but not limited to, energy (renewable and clean energy), sustainable manufacturing, bio-inspired materials, national security and infrastructure.
  - Enable visibility of faculty success through development of faculty research websites to disseminate videos, PowerPoints and publication lists to communicate capability to industry and government funding agencies.
- Increase the graduate student financial supports in the Department:
  - Overwhelming majority of Ph.D. students and MS thesis students will be supported through fellowship, research assistantships, teaching assistantships and hourly positions such as graders.

#### **IV.2.5 Increasing Research Recognition**

The goal is to increase the dissemination efforts for faculty and graduate student research reputation in the national and international scales.

Actions to be taken are as follows:

- Have all the research faculty engaged in one or more of the following activities
  - Organizing workshops
  - Being on journal editorial boards, conference committees, review panels, etc.
  - Giving invited speeches and lecturers
  - Other national or international activities that enhance the program reputation
- Encourage graduate students to apply for external fellowships.
- Establish and maintain web links to all theses and dissertations on the website and hard copies in the department.

#### **IV.2.6 Metrics to Accomplish the Plan**

The following measures will be used to evaluate the successful implementation of the action plan:

- Creation and offering of all the on-line courses and degrees/certificates with the enrollment numbers that generate the healthy return on investment.
- Increase the graduate student enrollment numbers to achieve:
  - Ph.D. student/faculty ratio: 2:1
  - M.S. student/faculty ratio: 5:1
- Increase the quality of admitted graduate students as measured by:
  - Average GPA: 3.5
  - Average GRE score : Quantitative: 159 (750 in old scale), Verbal: 150 (450 in old scale)
- Increase graduate student population in under-represented groups to 15% of the total number of graduate students.

- Target the number of published peer reviewed journal publications, co-authored by both faculty and graduate students during their program period, to be 3 papers per Ph.D. student, and 1 paper per MS thesis student.
- 70% of Ph.D. students and MS thesis students will be supported through fellowship, research assistantships, teaching assistantships and hourly positions such as graders.
- Sufficient support for the departmental TA and grader positions for all lower-level MEE undergraduate courses and labs.
- Maintain the annual scholarly publication rate per tenure or tenure-track faculty in the Department as defined by National Research Council (refereed journal publications) at no less than 3.5 publications per year on average.
- Increase the percentage of faculty in the Department with external grants and contracts as PI or Co-PI to exceed the 50% national average percentile as defined by Academic Analytics, an academic data analyzer.
- Increase the amount of external research awards per faculty to at the 50% national average percentile as defined by Academic Analytics.
- Increase the number of faculty members holding rank of "fellow" in professional organizations and national academy of engineering or science from 2 to 4.
- Increase the number of faculty members serving on editorial board of technical journals from 3 to 6.
- Make all graduate theses and dissertations public and available to students with clear expectations.

#### **Annual Metrics to Monitor**

The following data set will be collected to measure the successful implementation of the actions:

- Number of applicants and their demographic data..
- Number of new and continuing graduate students offered assistantships.
- Number of new and continuing graduate students self-supported, and supported through scholarships.
- Graduate student population (new and existing), publications in journals, publications in conferences, participation in department seminar.
- Means by which they were recruited/applied to UNT (efficiency of recruitment methods).
- Student demographic information, part time, and full time enrollments.
- Publications in peer reviewed journals by student authors.
- Publications in peer reviewed journals by faculty.
- Publications in conferences by student authors.
- Publications in conferences by faculty.
- Successful external grant awards by faculty, separated by industrial origin, federal government, international.
- Research expenditures by faculty, separated by industrial origin, federal government, international.
- Magnitude of contributions to department returned indirect funds relative to start up, department, college, and university student researcher support.

#### **IV.3. Goal 3: Providing Excellent Student Support, Employee Relations, Operational Effectiveness and Service to Constituencies**

MEE will excel in establishing and maintaining a high quality, efficient and effective administrative support that is adaptive to the dynamic progress of university administrative tasks towards the service-

orientated working environment. Actions will be directed towards to having an efficient and effective administrative support system.

#### **IV.3.1 Efficient and Effective Administrative Support System**

The goal is to have an administrative support system that include the excellent customer service to students, faculty, industrial advisory board and other important constituents, faculty-staff team working environment, and student-friendly, and safe facilities.

Actions to be taken are as follows:

- Create a streamlined student support system for their easy access to training and lab facilities.
- Create a team working environment that integrates various communication and functional channels for students, faculty and staff within the department.
- Create a facilitative environment for processes that support student learning, research, recruitment, classroom access and laboratory support within the constraints of available resources.
- Implement an optimized process that facilitates the efficient grant applications while working effectively with college and university research offices.
- Develop an effective mechanism to implement efficient university administrative tasks as part of chains of actions, ranging from hiring, space, equipment, budgeting, purchasing and facilities to curriculum revisions/introductions, events and other outreach activities.
- Recruit and retain high quality staff members.

#### **IV.3.2 Metrics to Accomplish the Plan**

The following measures will be used to evaluate the successful implementation of the action plan:

- The number of staff position will be proportional to the growth of faculty and student enrollment.
- Achievement of team evaluation scores of 4 out of 5 in the annual performance review for faculty and staff cross-evaluation.
- Establishment and execution of a continuous improvement process for the student support system by staff and faculty.
- Zero safety-related accident in teaching and research laboratories
- No more than three validated complaints from students regarding staff administrative supports within five years
- No more than three validated complaints from faculty regarding staff administrative supports within five years
- Zero tolerance to non-professional attitudes towards staff, faculty or students
- Establishment and execution of communication processes among staff, faculty and students for administrative functions.
- Establishment of a culture of finding an efficient, timely solution for any administrative tasks that could lead to a conflict.
- Reduction of inefficient handling of an administrative task that results in a prolonged pending status

#### **Annual Metrics to Monitor**

The following data set will be collected to measure the successful implementation of the actions:

- Number of suggestions for service improvements.
- Measurable outcomes for implementation of suggestions for service improvements.
- Annual team evaluation scores from faculty and staff cross-evaluation.

- Annual survey of administrative supports and communication effectiveness conducted by students.
- Number of safety-related accident in teaching and research laboratories.
- Record of student lab training.
- Number of validated complaints from students regarding staff administrative supports.
- Number of validated complaints from faculty regarding staff administrative supports.
- Number of validated incidents of non-professional attitudes towards staff, faculty or students.
- Number of validated complaints about inefficient handling of an administrative task that results in a prolonged pending status.

#### **IV.4. Goal 4: Building and Expanding Mutually Beneficial Partnerships and Resources**

The MEE department will engage local, national and international civil, industrial, and technical communities to facilitate the execution of Goals 1 and 2 by focusing on mutual benefits including financial resource development. Actions will be directed towards

- Building partnerships leveraging research and educational initiatives.
- Building large impact collaborations.
- Adding value for students.
- Engaging community outreach activities.

##### **IV.4.1 Building Partnerships Leveraging Research and Educational Initiatives**

The goal is to significantly enhance the visibility of MEE programs, faculty and students through both academic and non-academic partnerships.

Actions to be taken are as follows:

- Organize research themes with promotion media.
- Build affiliated company listings for senior design, research grants and contracts.
- Develop partnerships with UNT faculty of other disciplines, external large, mid and small businesses and governmental agencies for establishing centers of high research expenditures.
- Enhance engagement with local and regional communities to communicate energy conservation and sustainable technology.
- Disseminate seminar and networking opportunities to department, college, University and community groups.

##### **IV.4.2 Building Large Impact Collaborations**

The goal is to pursue the long-term collaborations that could lead to large-impact projects funded from various agencies.

Actions to be taken are as follows:

- Promote cross-college interactions and joint projects.
- Develop a global team on senior design collaboration utilizing existing MOUs with international institutions.
- Develop cross-disciplinary, cross-college design teams to participate in national and international competitions.
- Establish engineering-entrepreneurship themed projects through the Murphy Center grant.

##### **IV.4.3 Adding Alumni Values to Current Students**

The goal of the actions is to specifically establish a long-lasting mechanism for engaging MEE alumni to bridge the current students to the industries and communities.

Actions to be taken are as follows:

- Establish and support the MEE alumni network and organize informal and formal interactions between alumni, students, faculty and community.
- Work with the development office for fund raising from alumni to support student projects.

#### **IV.4.4 Engaging Community Outreach**

The goal of the actions is to increase the outreach activities that can produce financial resources supporting current students in the program.

Actions to be taken are as follows:

- Develop themed and innovative summer camps for K-12 students, especially in sustainability research areas.
- Increase engagements with the private foundation, municipal government, industries and professional societies for the department to provide consulting service that leverages the departmental research lab facility.

#### **IV.4.5 Metrics to Accomplish the Plan**

The following measures will be used to evaluate the successful implementation of the action plan:

- Increase the active participation of outreach events with University and College by 15% annually on average.
- Work with university administration to establish nonprofit mechanism for revenue generating through public-private partnership.
- Hiring support staff through self-sustained revenue generation.
- High quality outreach information on the MEE website.
- Increase in projects resulting from outreach actions outlined by 15% annually on average.
- Increase in the non-state, non-research revenues such as discretionary, gift, special project revenues by 15% annually on average.

#### **Annual Metrics to Monitor**

The following data set will be collected to measure the successful implementation of the actions:

- Number of outreach events both internally and externally.
- Number of new projects generated.
- Growth of self-sustained revenue such as non-state, non-research revenues.
- Number of staff hired from the self-sustained revenue.

- End -