

Department of Materials Science and Engineering Strategic Plan

Vision

To become a national and international leader in both material's research and education, the Materials Science and Engineering (MTSE) department will recruit and reward faculty for both research and teaching excellence and recruit highly qualified undergraduate and graduate students from the US and abroad. We will develop long-term strategic research programs, that will be well-funded by government agencies and industry, thus developing niche areas of excellence within the broader materials community. These research activities will comprise an integral component of our undergraduate and graduate programs, since only through innovative research can we prepare our students for the ever-changing needs of careers in industry and academia.

Mission

Our mission is to provide our students with the training needed for the 21st century technological landscape which emphasizes a balance between experimental and computational approaches. For leading technological sectors, continuous innovation is a key element to sustained excellence and national and international competitiveness. Therefore, the students need a well rounded training in current practices and building blocks for innovation-based development of future technologies. In addition to developing technical competence, the department shall aim to develop and enhance the students' communication skills and teamwork engineering skills. Our department will build and maintain academic and research relationships with local and regional industries to continue to provide relevant curricula to enhance the employment opportunities for our students. Our department will maintain its position on the forefront of technological advancement through external research funding from federal, state, industrial and private sources.

Goal 1: Grow the undergraduate program to be at a robust level consistent with national demand for MTSE graduates.

- Grow the undergraduate program to >80 total students within 5 years
 - *Number of students- Such level of enrollment would put UNT-MTSE among the top MTSE programs on the basis of size of program.*
 - *Quality of incoming students- Target students with a math SAT 650. Identify students in top 25% of their high school class. Increase the scholarship pool to attract such students. Actively engage high school students from local programs such as TAMS and summer programs such as ASM summer camp. Create a pool of industrial sponsors who are engaged with all the aspects of core undergraduate educational mission. The success of this effort will also serve as a recruitment tool.*

- *Graduation rate- Target to graduate 50% students in four years. The four year window will be 'effective' years, discounting periods spent on co-op and internship.*
- *Non-classroom experience- Target to have 100% of students involved in non-classroom experience to enhance their experiential learning. Actively involve undergraduates in the research programs within department and encourage them to pursue internship and co-op opportunities. Encourage all sophomores and juniors to work with the internship/co-op office to find these opportunities.*
- *Senior design projects- Have at least 50% of senior design projects sponsored by industrial partners. The departmental Advisory Board (AB) can help on this.*
- *Employment or higher education placement- Target to have >90% students have employment offer or offer to go to graduate programs by the end of summer semester of their graduation year.*

Goal 2: Grow the graduate program to be recognized at national and international levels.

- Increase the overall enrollment of PhD+MS students to >100 students within 5 years.
 - *Target to achieve or exceed 65:35 ratio of PhD:MS students.*
 - *Increase the number of US students in the graduate program to 30% within 5 years.*
 - *Target to have >80% graduate students with GRE verbal+quantitative score of >1200 or equivalent in the new scale.*
 - *Mentor PhD students to present at least one paper in TMS or MS&T or other conferences starting from their second year. Create a departmental endowment fund in five years to support 20 students for such travel and have a large presence in society meetings.*
 - *Create a teaching mentorship program for at least 10 teaching assistantship. Teaching assistantship funds can be used to fast track admission and support of exceptionally qualified applicants.*
 - *Start an 'Industrial Mentorship' program with support from companies in Texas. Industries will participate in 'adopt-a-student' program and provide a semester of internship to graduate student to enhance their experiential learning. Target will be to create 3-5 such mentorships within 5 years.*
 - *Graduate >12 PhD students per year.*

- *Increase nationally supported graduate student programs like IGERT, GAANN, etc. that put emphasis on mentoring of future faculty. Start a graduate student seminar series.*
- *Encourage and mentor BS and MS students to apply for national fellowships from agencies like NSF, DOE, etc.*

Goal 3: Continue to build exceptional faculty and monitor progress through quantitative performatrics

- Continue the aggressive path of growth to recruit and retain exceptional faculty
 - *Increase the core departmental faculty to >21 within 5 years. Only 10 MTSE departments in the country are in this size range.*
- Monitor the progress of strategic plan through quantitative performatrics. Greater emphasis on the research side would be placed on the elements related to PhD level education.
 - *Emphasize all aspects of PhD student mentoring. Aim to have >3 PhD students/faculty.*
 - *Scholarly activities will be the main cornerstone of growth of faculty and mentoring of PhD students. Faculty will be expected to publish >5 peer-reviewed journal papers per year with the expectation that many will involve students and post-doctoral researchers.*
 - *Hirsch has produced an h-index to measure output of a researcher based on citations (Nature, Vol 436, page 18 August 2005; arXiv:physics/0508025 v3 17 Aug 2005). A key definition is, “A scientist has index h if h of his/her N_p papers have at least h citations each, and the other $(N_p - h)$ papers have fewer than h citations each. The m value of a researcher normalizes the contribution with number of years after PhD, $m=(h/n)$. The progression of a faculty through the rank and impact on the field will be judged by h and m values. Department will aim to have a collective average ‘m’ value of >1.25 and an average ‘h’ value of >15 considering faculty at all ranks, within 5 years.*
 - *Aim to have departmental research expenditure of \$5M/year. Although the research expenditure is not a direct indication of quality of research, it provides means to support graduate students and is an essential component of vibrant research environment in an academic setting.*

Goal 4: Establish major research clusters to generate transformative societal impact

- Establish collaborative and cooperative research centers, laboratories and clusters to enhance the contribution to specific national and societal needs.
 - *Increase the number of experimental-computational research efforts among the MTSE faculty such that 2/3's of all funded projects include each aspect within 5 years.*
 - *Leverage the coupled experimental-computational research activities developed under ISES by developing a collection of targeted research programs in niche areas, with funding from federal, state, and industrial sponsors. Aim to be a national/international leader in ICME-based research within 5 years.*
 - *Continue the growth of excellent characterization infrastructure under CART.*
 - *Establish coordinated materials synthesis, processing and testing infrastructure to put the department at par with major MTSE departments. This will serve the dual missions of teaching and research.*
 - *Strengthen and grow the NSF-IUCRC centers. The department currently has two centers, CANFSA and CFSP. The department should aim to grow these into strategic national centers with emphasis on structural materials.*
 - *Create a directed effort towards integrating modules to formally train and educate future engineers and researchers in 'innovation'. The goal would be to get a successful IGERT or GAANN in 5 years.*
 - *Establish a center focused on developing materials and processes for next generation energy systems.*