MSE Strategic Plan

2024-2029

Materials Science and Engineering is shaping our Nation's next-generation engineers and scientific leaders. We are achieving our goal through excellence in teaching, research, and an experiential learning environment.

Our interdisciplinary curriculum is engaging, comprehensive, rigorous, and adaptive. Students are prepared for industry, government, and academic careers. Classroom instruction and hands-on laboratory experiences are combined to foster active learning, creativity, and innovation. Outreach spans K-12 to industry and National Laboratories to advance forward-looking science, engineering, and technology for Iowa and the world.

We are committed to inspiring future leaders entering a materials-related world spanning fundamental science to the future technologies of tomorrow.

Vision

Iowa State Materials Engineering will foster interdisciplinary collaborations to advance societal prosperity through scientific and technological endeavors. We strive to be a premier engineering program among land-grant institutions, recognized for excellence and value in education, research, and dynamic partnerships.

Mission

MSE prioritizes its people and the fundamental responsibility of bettering our world through teaching, scholarship, and collaboration. The scholarship of discovery is used to expand knowledge, nurture learning, and catalyze engagement for societal solutions. We will achieve our broad-based mission using the following *strategic objectives*:

- *Recruit, develop, and retain everyone through a community that embraces the individual and fosters their professional development.*
- *Merge scientific discoveries and fundamental knowledge into a forward-focused educational program to increase undergraduate and graduate student success.*
- *Student-centric research, innovation, and discovery for society's ever-changing material science needs that impact a multidisciplinary world.*
- *Outreach with local schools, universities, and community colleges.*
- *Provide technical leadership for new material and technology utilization.*

Core Values

MSE values an environment where individual ideas are fostered and respected. Collaboration and diversity are promoted with unwavering ethical standards. A community will be cultivated where innovation thrives to better our next generation.

Scope and Purpose

The MSE Strategic Plan is designed to achieve our core mission, creating our Nation's next generation engineers and scientists. It proactively positions us for continuous improvement to adapt and grow. The plan identifies critical strategic actions to prioritize over the next 5 years with measurable quantities to assess our annual progress.

Strategic Objective 1

Recruit, develop, and retain everyone through a community that embraces the individual and fosters their professional development.

Motivation:

Recruiting, developing, and retaining faculty, staff, and students is vital to building and promoting our external visibility and reputation. A community recognized for empowering people to thrive beyond the university and cultivating their success through intra- and interdepartmental collaborations is fundamental to a culture of mentorship and inclusivity.

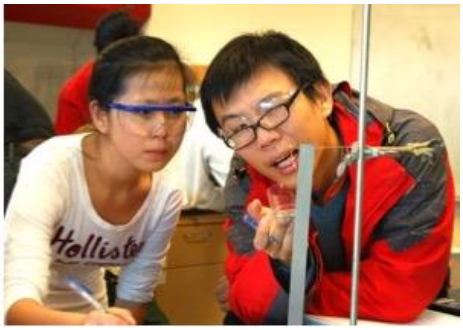
Subgoals:

1. Foster a culture where diverse perspectives are welcomed and encouraged.
2. Proactively seek national awards and recognition for faculty and students.
3. Broaden intra- and interdisciplinary collaborations with funded students from industry and government agencies.
4. Improve faculty and staff professional development through career training, mentoring, and awards recognizing their achievements.

Metrics:

1. Faculty publications, invited seminars, society talks, and collaborative efforts.
2. Increased university and professional awards using Academic Analytics.
3. Department-funded student positions to improve strategic recruiting.
4. Improved women and underrepresented minority student enrollment.





Strategic Objective 2

Merge scientific discoveries and fundamental knowledge into a forward-focused educational program to increase undergraduate and graduate student success.

Motivation:

A top-tier MSE program is grounded in fundamental science, well-known for its adaptive curriculum, and highly sought-after students in today's multidisciplinary landscape. Undergraduate and graduate students are being prepared to apply their knowledge and technical skills to advance research, industry, government, and educational initiatives.

Subgoals:

Undergraduate Program

1. Develop a dynamic undergraduate curriculum using an appropriate balance between fundamental science, engineering practice, and emerging technologies.
2. Integrate contemporary research challenges into course and online content to improve our student educational outcomes and external impact.
3. Facilitate interdisciplinary collaborations among faculty and students.

Graduate Program

1. Develop an excellent and highly-rated graduate curriculum.
2. Attract quality graduate applicants through an impactful educational program, cutting-edge research, and dynamic employment opportunities after a degree.
3. Prepare M.S. and Ph.D. graduates for successfully making significant research and educational contributions in their chosen careers.

Metrics:

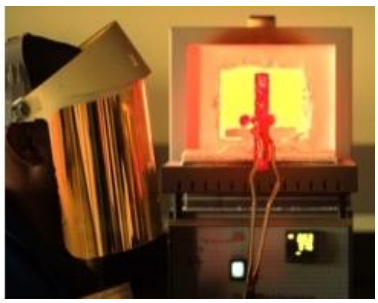
Undergraduate Program

1. Annual number and percentage of students entering a top 10 graduate program.
2. Number and percentage of graduates placed in Fortune 500 companies.
3. Total students who translate laboratory research into innovation and entrepreneurship through commercialization and startup companies.

Graduate Program

1. Applicant and enrolled graduate student numbers from top universities.
2. Graduate student placement in academia, national laboratories, and industry.





Strategic Objective 3

Student-centric research, innovation, and discovery for society's ever-changing material science needs that impact a multidisciplinary world.

Motivation:

A student-centric education program focusing on the interfaces between metals, ceramics, and polymers to solve our society's ever-changing multidisciplinary challenges. Students will be equipped with the knowledge, problem-solving skills, and training to excel in this dynamic field with an appreciation of their career's societal impact.

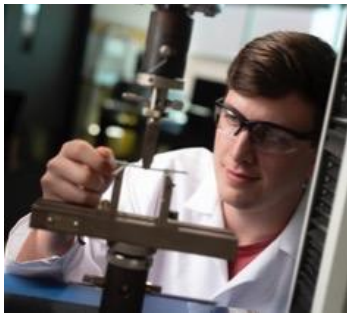
Subgoals:

1. Create student opportunities to engage in multidisciplinary faculty research, industry-relevant experiments, and pedagogical endeavors.
2. Nurture a culture of collaboration between different departments, fields of study, and Ames National Laboratory that produces scholarly presentations, peer-reviewed publications, and funded joint-research projects.
3. Engage in research benefiting industry and society through advanced materials, innovative manufacturing techniques, and sustainable practices.

Metrics:

1. Graduating class percentage that participated in an “enrichment” program (international study, industrial internship, laboratory research experience).
2. The number of students starting careers in academia, industry, and beyond.
3. The number of students enrolled in extracurricular groups addressing societal issues through materials innovation.





Strategic Objective 4

Outreach with local schools, universities, and community colleges.

Motivation:

A comprehensive outreach effort spanning K-12 education to industry is being used to guide educational objectives, pedagogical innovation, and create dynamic partnerships with educational institutions. We seek to inspire and prepare younger students for future studies and careers directly addressing our societal challenges.

Subgoals:

1. Establish and grow an educational outreach effort that offers training and services to local K-12 schools, community colleges, and industry.
2. Create funded outreach collaborations through educational grants designed to improve STEM outcomes with state, industry, and government agencies.
3. Promote MSE undergraduate outreach efforts such as Gaffer's Guild, Materials Advantage, Engineers without Borders, and after-school student mentoring.

Metrics:

1. The yearly number of K-12 presentations and partnerships created by faculty, staff, and students.
2. Educational proposals submitted with K-12 school science teachers focusing on student success in STEM careers.
3. Students involved with Engineers without Borders, Engineers for a Sustainable World, Materials Advantage, and organizations promoting global awareness.

Strategic Objective 5

Provide technical leadership for new material and technology utilization.

Motivation:

MSE faculty and its future graduates will produce the knowledge and technical leadership needed to improve our world through materials science. Our next-generation workforce is being created for tomorrow's technologies through multidisciplinary collaborations that consider the ethical impact of new technologies on our global society.

Subgoals:

1. Nurture a cross-disciplinary culture that combines diverse perspectives and expertise to advance innovation, creative thinking, and unconventional solutions.
2. Develop and grow collaborative partnerships with industry and scientific agencies that better serve society through new materials and processes.
3. Redesign courses to give students the necessary knowledge and skills to enter a multidisciplinary workforce in various technical career paths.

Metrics:

1. Research active faculty measured by graduate students, external collaborations, and total research expenditures.
2. On-site workshops, conferences, and symposia that provides collaborative and networking experiences between our department and industry.
3. Undergraduate student growth and placement within various technical disciplines, from biomedical sciences to traditional MSE careers.