

Materials Science and Engineering 2025–2030 Strategic Plan

Vision Statement

Innovate. Educate. Materials that Matter.

Mission Statement

Develop leaders in materials science and engineering, generate scientific discoveries, and enable new opportunities that serve 21st century societal needs through educational innovation, groundbreaking research, entrepreneurial pursuits, translational impact, and community outreach.

2025–2030 University Goals and Objectives

The Penn State University leadership identifies the 2025–2030 University goals and objectives as follows:

Goal 1: Enhancing student success

- Academic advising, research advising, mentoring, and class experiences that prepare students for their academic and professional futures.
- Students' co-curricular experiences align their passions, aptitudes, and ambitions to lead them to successful next steps. Students, staff, and faculty health and wellness are cultivated in a caring community focused on flourishing.

Goal 2: Growing interdisciplinary research excellence

- Grow research that positively impacts lives in the Commonwealth, the nation, and the world.
- Become a top 15 research university.

Goal 3: Increasing land-grant impact

- Leverage our assets and strategic partnerships to build resilient, sustainable communities for the betterment of the Commonwealth.
- Amplify our academic enterprise through partnerships with business and industry, non-profit groups, communities, and residents. Galvanize an engaged and effective network of advocates and investors in Penn State.

Goal 4: Fostering diversity, equity, inclusion and belonging

- Address institutional barriers to close student outcome gaps.
- Cultivate a deep sense of belonging for faculty and staff, with opportunities for professional development and an employee population that reflects the classrooms of tomorrow.

Goal 5: Transforming internal operations

- Reimagine new ways of working to make Penn State easy to navigate for all students, faculty and staff.
- Identify opportunities to better serve students.
- Focus on effective and efficient fiscal stewardship as a modern university.

2025–2030 Department Strategic Initiatives

Faculty and staff in the Department of Materials Science and Engineering (MatSE), led by the Long-Range Planning Committee and aligned with the College of Earth and Mineral Science (EMS), developed the following strategic initiatives and key metrics critical to accomplishing the Penn State goals and objectives.

Strategic Initiatives and Metrics for Goal 1: *Enhancing student success*

A MatSE education at Penn State is marked by strong faculty/student interaction, hands-on experiences, and cutting-edge technologies and pedagogies. Sustaining this excellence in an increasingly complex and digital world requires adaptation to these social and technological trends while sustaining a strong educational foundation.

- **Enhance students' digital competency (e.g., artificial intelligence software, computer-aided design (CAD), Excel, python)** through distributed activities including: AI training workshops for faculty, a standardized policy regarding AI use in coursework, developing course content where AI use is required, increasing course content that requires software, and adding a CAD component to an existing or new laboratory module. Student exit interviews and faculty surveys will determine the extent to which faculty and students feel that students have attained basic knowledge and competency of digital software tools.
- **Develop enhanced professionalism, ethics, and oral speaking skills in graduates to promote post graduate success** by offering a minimum of one professional development event each semester, embedding ethics, soft skills, and professionalism in at least one course each academic year including an oral presentation requirement in designated MatSE courses, and increasing the number of students giving posters and oral presentations at conferences and other platforms outside of the classroom and research groups while enhancing interactions between students and technical staff for design and engineering.
- **Optimize graduate program course offerings and scheduling** to ensure flexibility for students to take research specific courses in a timely manner and ensure adequate course enrollment in technical electives with fewer under-enrolled graduate level MatSE courses.

Strategic Initiatives and Metrics for Goal 2: *Growing interdisciplinary research*

Materials research in MatSE can contribute to and benefit from multidisciplinary research teams formed with EMS departments and other Penn State colleges.

- **Research** - Cultivate the next generation of MatSE faculty leaders for multidisciplinary research teams with large University centers that target national and international interests as well as multi-university proposals where Penn State MatSE is at the core. This initiative can be quantified by the number of research and center proposal submissions that include MatSE faculty who are either leading the effort or acting as collaborators.
- **Community** - Create interdisciplinary and multi-department team building opportunities using the strengths of MatSE to establish and create a culture of cross cutting research that focuses on team proposals. Efforts will include team-building workshops that integrate faculty research areas and strengths of Penn State facilities and institutes.
- **Partnerships** - Develop new and expand existing collaborations with other departments in EMS and across Penn State to strengthen the research impact of MatSE and EMS. Specific plans include collaborations with other departments in EMS and co-hires between the departments and institutes, increasing the number of MatSE faculty who are part of EMS collaborative teams.

Strategic Initiatives and Metrics for Goal 3: *Increasing Land-Grant impact*

Beyond teaching and research, a central mission of a land-grant university is extension and outreach. For MatSE, this includes promoting connections with alumni and materials-related organizations in Pennsylvania.

- **Recognize and feature MatSE alumni and their organizations** on our website and during on-campus events.

- **Enhance the Friends of MatSE program** with expanded membership, organization of student visits to members sites, and promotion of summer internship opportunities and pathways for research interactions.
- **Support entrepreneurship and technology transfer by faculty and students** to enhance the land-grant impact of MatSE research and help create new jobs in the Commonwealth.

Strategic Initiatives and Metrics for Goal 4: *Fostering Inclusion and Belonging*

Foster a culture of inclusion and create a deep sense of belonging in the MatSE community to enable the best possible outcomes for individual students, staff, and faculty and for the department as a whole.

- **Create and implement a social media strategy** for MatSE aimed at increasing the visibility of our diverse community.
- **Build partnerships with minority-serving institutions (MSIs)** by establishing formal relationships with MSIs through student and faculty exchange programs, joint research initiatives, collaborative workshops, and joint education initiatives.
- **Establish employee resource groups (ERGs)** by coordinating with other units within EMS and across Penn State to engage MatSE employees within multiple ERGs.
- **Implement a graduate student peer mentoring program** by encouraging student-peer interactions with all interested students.

Strategic Initiatives and Metrics for Goal 5: *Transforming Internal Operations*

MatSE will continue to reimagine, innovate, and evaluate new ways of making our department resources work effectively for our students, faculty, and staff; we will also focus on efficient fiscal stewardship as a world-leading organization in materials research and education.

- **Ensure consistent staff support** for faculty members and their research, particularly for those faculty with highly active research programs. We will work to ensure suitable promotion pathways for staff members within the department and streamline the process for faculty to obtain support and face-to-face meeting time with research staff members.
- **Improve support for proposal submissions** to reduce load on faculty members so they can use their time more effectively. We will ensure that research staff members receive appropriate training to provide this support.
- **Improve negotiation process** for sponsored research agreements (SRAs) to ensure these agreements can be made in a reasonable amount of time. We will work together with the Office of Technology Transfer, the Office of Sponsored Programs, and the Strategic Interdisciplinary Research Office to streamline and accelerate the negotiation process with the goal of minimizing the number of SRAs that fail to reach agreement by the intended project start date. We will also work to accelerate intellectual property (IP) negotiation time and ensure flexibility of IP arrangements based on faculty input.
- **Strategic implementation of the budgeting process** to preserve and enhance our leadership in research and education. We will engage in discussions about budgeting issues at faculty meetings, especially when budget decisions will affect the strategic direction of the department.

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