



PennState
College of Engineering



JUNE 2022

EQUITY ACTION PLAN **OVERVIEW & BACKGROUND**

Fostering Equity and Inclusion in the Penn State College of Engineering

1

Letter from the Dean

Dear College of Engineering Community,

Engineering shapes our world and how we live in it. It is science with a mission: innovate solutions for society's greatest challenges. We use our individual perspectives of identity, culture, and life experiences to answer such questions, and we make the most impact when we harness the power of diverse engineering ideas and nurture talent from all groups. In the College of Engineering, we are different races, ethnicities, religions, genders, sexes, and orientations, and abilities. We are the first in our families to attend college, we are veterans, and we are active-duty service members. We are from different socioeconomic backgrounds. We are international, we are multi-generational Pennsylvanians, and we are more. We have all come together to impact the world and improve human lives.

But even after decades of efforts to address the challenges of inequity within the discipline, engineering continues to benefit and test individuals and communities in unjust ways. Too many are left out or pushed out, the impact of which limits personal and global advancement in significant ways. New solutions for equity and inclusivity are essential.

Through the Penn State College of Engineering Equity Action Plan—a strategic, sustainable iterative process to audit, evaluate, consult evidence, design, redesign, and implement interventions to foster equity in engineering—we are committed to addressing this critical challenge and to making significant strides toward a more diverse, inclusive community of belonging for all.

One of our strategic cornerstones is equity because it is essential to the long-term success of the college and every member of our community. Our college succeeds when our people—all our people—succeed. Equity is not an item to be checked off and then considered finished. It requires consistent attention and action, and the EAP is designed for action. Our other strategic cornerstones of excellence, sustainability, and social mobility directly influence and are influenced by equity: a more equitable climate advances excellence; iterative action helps achieve and sustain equity, which empowers more sustainable solutions for all challenges; and equitable opportunities for all lead to social mobility.

Serving as both a map for all members of the College of Engineering community and a model for equity in engineering education across the country, the EAP focuses on actions that advance inclusivity. By meeting community members where they are, it offers a real and actionable on-ramp in the pursuit of equity in engineering, organized under four main ideas: 1) engagement and mentorship; 2) deepening individual knowledge and leadership by participating in ongoing learning activities, including acknowledging and rectifying biases; 3) using data-driven,

Table of Contents

02	SECTION 1	Letter from the Dean
03	SECTION 2	Advancing Equity is a Critical Mission of Engineering Colleges
05	SECTION 3	Equity Action Plan Defines Projects for College of Engineering Stakeholders – Overarching Equity Action
08	SECTION 4	Equity Action Planning Process Engaged Diverse College of Engineering Stakeholders – Faculty Input – Student Support and Student Leader Input – IPAC and CEOI Board Input – Staff Advisory Council Equity and Inclusion Survey – Climate Survey Information
16	SECTION 5	Summary
17	References	

people-focused activities to support equitable retention and advancements; and 4) supporting equitable recruitment.

Every member of the engineering community is strongly encouraged to review the EAP to see how we are addressing issues relevant to their belonging and advancement. As leaders share annual updates and focuses of the plan, all community members will be able to identify actions they can take to contribute to equity in engineering. Also, please let us know if there are any areas that need to be addressed, added, or improved upon—the EAP is built to evolve as we assess, learn, and reassess. Iterative input is a part of the process.

We are all deserving of being met where we are to make an impact and inspire change, and we are all responsible for building a more inclusive, equitable community. I look forward to working with all of you to advance our equity culture.

For the Glory,



Justin Schwartz
Harold and Inge Marcus Dean
Penn State College of Engineering

2

Advancing Equity is a Critical Mission of Engineering Colleges

WHAT IS EQUITY?

The National Association of Colleges and Employers defines equity as “fairness and justice.”¹

Equity is for everyone, and everyone has a role to play. Enacting equity is making sure that all qualified individuals have access, resources, and opportunities to thrive. Equity is advanced through organizational decision-making, policies, and procedures, and through supportive programming. Following these definitions, enacting equity is an ongoing process of recognizing that all people do not start from the same place. It is distinguished from giving everyone the same thing. Equity considers universal² as well as individualized designs and interventions. Enabling equity requires innovators to examine imbalances and adjust approaches to meet the needs of clients, community members, citizens, and stakeholders.

Framing equity is inherent to engineering design for impact. Within engineering education, this means designing instruction and support such that all students reach and exceed program outcomes, irrespective of their social circumstances. Equity in entry and persistence means that engineering talent is identified and nurtured from a broad spectrum of people across society. Beyond the classroom, equity requires attention to the variability of access and opportunity and cultures of communities such that talent, innovation, and adaptation to engineering solutions can be realized. This framing aligns with the broader definitions of inclusion, equity and diversity set for the Penn State Strategic Plan:

“Inclusion refers to the respectful treatment of all people with recognition for the multiplicity of identities and perspectives present in a diverse community. Equity requires attention to disparate impact, differential access and opportunities afforded to various communities, as well as structural and systemic barriers that limit potential and possibilities. Diversity refers

to the numerical representation of faculty, staff, and students who hold different social identities, backgrounds, and experiences.”

The Penn State College of Engineering recognizes that diversity is broad in scope and represents the range of humanity. Individuals hold multiple facets of identity that are inclusive of and not limited to gender, race/ethnicity, socioeconomic, LGBTQIA+ status, ability/disability, neurodiversity, political affiliation, immigrant status, and other characteristics. We are steadfast in our commitment to benefit from this diversity in the advancement of the College of Engineering.

WHY DOES THE PENN STATE COLLEGE OF ENGINEERING NEED TO ADDRESS EQUITY?

The college seeks to create a more equitable environment out of both an ethical orientation to make a positive impact on society and from enlightened self-interest. In alignment with Penn State’s land grant identity and mission, the college provides access to education and public service. At the same time, as stewards of the land upon which we carry out public engagement, we join the greater Penn State community in acknowledging and honoring “the traditional caretakers of these lands and strive to understand and model their responsible stewardship.”* This historical perspective, understanding the longer history, and knowing our place in that history, is one component of our efforts to make a positive impact.

The primary mechanism for advancing a more diverse and inclusive engineering community is through developing students, staff, and faculty to welcome others into engineering fields. Graduating diverse communities of people to address the grand challenges facing the world will make global impact. Graduating more people who create welcoming environments in the workforce such that American innovation capacity is sustained is also important for U.S. national interests. Employing and educating a diverse community of faculty, staff, and students will enable the college to attract interest from corporations, foundations, and agencies seeking to advance

*The Pennsylvania State University campuses are located on the original homelands of the Erie, Haudenosaunee (Seneca, Cayuga, Onondaga, Oneida, Mohawk, and Tuscarora), Lenape (Delaware Nation, Delaware Tribe, Stockbridge-Munsee), Shawnee (Absentee, Eastern, and Oklahoma), Susquehannock, and Wahzhazhe (Osage) Nations. As a land grant institution, we acknowledge and honor the traditional caretakers of these lands and strive to understand and model their responsible stewardship. We also acknowledge the longer history of these lands and our place in that history. (Penn State Educational Equity, 2021, <http://equity.psu.edu/acknowledgement-of-land>)

sustainable development goals and to broaden participation in science, technology, engineering, and mathematics (STEM).

Engineering and science degrees have the potential to change the socioeconomic trajectory of families. Because colleges of engineering are about the business of discovery, design, and solving critical problems that require our best work, the College of Engineering needs to create an environment where hard-working people of all walks of life can enter and advance.

As a community led by scholars, we also have seen the evidence from scholars who have shown us that climbing the ladder to educational attainment is fraught with entry points that are uneven due to societal factors. We have heard the voices of College of Engineering community members who have at times experienced harassment and exclusion as well as stereotypical comments and bias from others in the college, from people across Penn State's campuses,

and from communities surrounding our campuses. We take these reports seriously and we commit to applying our ingenuity and innovative mindset to address these issues that undermine the hard work of minoritized and marginalized community members.

We depend on the positive energy of the majority of our community as we strive to live up to the Penn State Values. We engage stakeholders through four frames to honor this legacy:

1. Equipping individuals with community experiences, knowledge and skills that build belonging;
2. Creating equal opportunities in our recruitment, hiring, and retention;
3. Valuing difference by regularly celebrating the excellence that diversity brings to engineering and science; and
4. Managing culture by embedding diversity, equity, inclusion and belonging into decision making.

3 Equity Action Plan Defines Projects for College of Engineering Stakeholders

The Penn State College of Engineering Equity Action Plan will advance a diverse and inclusive academic community of students, faculty, and staff. The college is committed to inspiring change and impacting tomorrow by engineering solutions for a better future, making an impact around the world, and building well-rounded future leaders. This plan for equity and inclusion aligns with the overall University [commitment to impact](#),³ which prioritizes four planning goals related to inclusion, equity, and diversity:

1. Foster a culture of respect and inclusion that values the experiences and perspectives of faculty, staff, and students;
2. Develop and implement curricula and scholarship that interrogate social issues and inspire social responsibility;
3. Evaluate and rectify organizational structures, policies, and practices that cause differential impact and limit access and opportunities for faculty, staff, and students at Penn State; and,
4. Recruit, support, and advance a diverse student body, faculty, and staff.

The college identifies four cornerstones that guide our actions in engineering research, education, service, and operations: **Excellence, Equity, Sustainability, and Social Mobility**. In honoring these guides, the EAP will support the goals articulated in the strategic plan. The primary purpose of this plan is to set the college on the path for achieving these strategic goals.

1. Grow a pervasive, welcoming, equitable and inclusive culture and climate throughout the college's students, faculty and staff that exemplify the Penn State values.
2. Assure equitable access for students to enter and persist in world-class undergraduate and graduate engineering programs; and increase the recruitment, retention, and success of a demographically balanced undergraduate and graduate student body by the end of 2025.
3. In furtherance of Penn State's collaborative culture, expand the college's leadership and participation in intra-institutional partnerships that drive global impact in research and scholarship.
4. Offer undergraduate and graduate educational programs that prepare students for success in careers and life through engaged learning; that develop deep commitments to integrity and inclusivity; that

reflect current and anticipated trends in industry and research, including the criticality of sustainability; that expand the reach of engineering through intersections with other academic disciplines; and that leverage technology and multiple modes of delivery to meet the varied needs of our students to continue learning throughout their lifetimes and to ensure program resilience in the face of crises.

5. Enable and encourage all members of the faculty and staff to contribute to the governance of their units, the college, the University, their professions, and their communities in a way that recognizes the value of diverse perspectives.
6. Improve the administrative and service organizational structure—with a commitment to operational excellence and staff professional development—to further enable the college to accomplish its missions, attain its visions, and achieve its goals such that every employee understands the invaluable role they play in the college's overall success.

The EAP has been initiated and will sustain an iterative process to audit, evaluate, consult evidence, design (or redesign), and implement interventions that foster a more equitable and inclusive engineering community. Newly designed or reimagined interventions and experiences for students, faculty, and staff communities will enable the college to expand best practices in advancing sustainable diversity and to demonstrate more equitable educational attainment and career advancement.

Figure 1: Iterative equity action process



Overarching Equity Action

Equity action projects are categorized for executive leaders, faculty, postdocs, staff, graduate students, and undergraduate students underneath each of four overarching actions.

- **Engage** college community in continuous equity action process.
- **Deepen** knowledge and leadership to advance equity and inclusion within the college and in partnership with engineering professional communities by providing educational and professional development opportunities for administrators, faculty, staff, and students.
- **Retain and Advance** community members equitably, by providing equitable and inclusive access to career advancement, engineering facilities, programs, resources, and services, and by being responsive to the needs of diverse engineering constituents.
- **Recruit** individuals who contribute to sustaining diverse and inclusive community in all units and programs.

Section 4 of the EAP describes the process by which issues important to leaders, faculty, staff, and students were raised, as well as the frameworks for “meaning-making” and action identification.⁴ The principles for plan development included heavy stakeholder engagement in developing the plan. The stakeholders need to see that the college has collected the input and is making plans to act on their input. Engaging the large number of faculty, staff, students, and other stakeholders will be a continuing challenge that is critically important to capture progress. In the action tables, the stakeholders are defined as shown in Table 3.1.

The action projects for each stakeholder group are listed in a series of tables separate from this document (Equity Action Tables). The action tables capture issues that each action project is developed to address. No one action project is expected to solely achieve the overarching action. It is the collective impact of implementing numerous action projects that is important to performing the broader action to advance equity.

Table 3.1: Stakeholder groups defined in the EAP

Executives	Department heads, center directors, deans
Faculty	Tenure-line faculty (all ranks), teaching, research, practice faculty (all ranks)
Post Docs	Postdoctoral scholars and fellows
Staff	Administrative staff, technical staff
Grads	Graduate students, doctoral students, research and professional master's students
Undergrads	University Park undergraduate students, pre-major commonwealth campus students

Action projects not only address activities that must be initiated but also include projects to build the infrastructure for sustained project execution, assessment, and continued improvement. This includes establishing and refining input and reporting infrastructure, building processes for new and continued communities of practice, and dissemination of identified promising practices to external stakeholders.

The action tables identify leaders and teams of leaders for stewardship and implementation. The tables also identify initial metrics and key performance indicators, key resources from the literature, and timelines for project initiation.

Baselines will be established based on the input from the range of stakeholder-engagement activities established in the development of this plan as described in section 4. Each EAP broad action table shows alignment with college strategic plan goals and University-level strategic plan foundations, thematic priorities, and supporting elements. Capturing the input of college stakeholders to identify issues has led to 217 currently recommended projects that will need some attention to advance equity, distributed as shown in Table 3.2 on page 7. An illustration of the action table format is provided in Table 3.3 on page 7.

Table 3.2: More than 200 EAP projects linked to equity issues raised for different engineering stakeholders

Overarching Actions	Executives	Faculty	Postdocs	Staff	Grads	Undergrads	Total
1: Engage	7	8	3	6	6	6	36
2: Deepen	12	16	8	12	11	9	68
3: Retain & Advance	8	19	3	10	14	20	74
4: Recruit	5	7	4	2	11	10	39
Total	32	50	18	30	42	45	217

While the plan has framed the “why” for advancing equity, there was a persistent need to frame “what” issues to address based on the community needs. The action tables provide references as an evidence base and starting point for “how” to address equity issues. Section 5 of the EAP provides a summary followed by a list of references and resources that can be leveraged for equity learning and action project design and implementation.

The EAP is structured to equip and empower leaders in every area of the college to model equity-minded practice and to be agents in transforming the collegiate vision of excellence in ways that elevate equity.

The plan acknowledges that equity efforts have been ongoing and attempts to capture the foundations for equity leadership that have been laid prior to the 2021-2022 launch year. These efforts are retrospectively shown in the 2020-2021 academic year.

To create momentum and focus for a successful beginning to EAP implementation, a launch theme has been identified as “Mentorship and Community Building.” Each year of the plan, a new focus will be identified to launch additional efforts. This will enable college stakeholders to organize cross-cutting activities and leverage shared resources within and beyond the Penn State community.

Table 3.3: Example table for equity action projects

Table XXX Stakeholder Group Engagement with EAP					
Group Action 1: Engage College of Engineering [Stakeholder Group] in Continuous Equity Action Process.					
Issues raised by {members of group} and stakeholders	Critical Intervention				Persons Responsible
Metrics	Outputs from activities-- structures, processes, documents, presentation, events.				
KPIs	% of stakeholders engaged in qualitative activities, Changes in perceptions, experiences within the college				
Mapping to college and University Strategic Plans	PS F3: Engaging Principles of Inclusion, Equity, and Diversity; TE3: Support and empower our outstanding faculty and staff; IS1: Infrastructure and Support- Prioritize investment in our people College SP Goal 1				
References and Resources	Gender & Diversity KPI Alliance, 2020 National Gender Equity Indicators, Penn State Strategic Plan— Advancing Inclusion Equity and Diversity				
Implementation Timeline	2020/2021	2021/2022	2022/2023	2023/2024	2024/2025
	Action Projects	Action Projects	Action Projects	Action Projects	Action Projects

4 Equity Action Planning Process Engaged Diverse College of Engineering Stakeholders

To enter the path of crafting the Equity Action Plan, the Excellence, Equity and Impact Team engaged community stakeholders to share experiences, identify issues, and evaluate data. Associate Dean for Equity and Inclusion Tonya Peebles provided this group with a framework for conversation and with support for facilitation. This enabled stakeholders to distinguish urgent issues that could be addressed with evidenced-based interventions right away, from longer-term items that would require further study to be addressed in later years of the plan. Further engagement with staff, students, alumni, and industry stakeholders extended this process of issue identification and resource inventory.

Faculty Input

ENGINEERING EXCELLENCE, EQUITY, AND IMPACT INITIATIVE TEAM

The process of arriving at the EAP items was identified as a strength from participants. The dean charged a faculty committee to support the crafting of the plan and upon invitation highlighted the critical efforts at evolving the engineering culture through examining the college's promotion and tenure guidelines (PTGs) including advancement for teaching and research professors (TRPs) in addition to the advancement of tenure track professors (TTPs). Another important factor was the University-level deep self-reflection related to racial justice.

Given these factors, Dean Justin Schwartz charged the faculty group with helping the college address faculty equity across appointment types and helping to advance equity in engineering staff, research labs, and classrooms. With this approach, faculty were identified as key levers for culture change. At the same time, the dean's team recognized that the college change process needed to be launched across all stakeholders.

Key literature on institutional change and college change from the Association of Public and Land Grant Universities (APLU) and the American Society for Engineering Education (ASEE) were adapted as a guiding framework (Figure 2) for College of Engineering equity planning.^{5,6} The EEEI leadership group discussed this framework and was asked to lead the college's faculty community in identifying needed actions and interventions to advance a more equitable engineering community.

FACULTY CONVERSATION CIRCLES AND FORUMS

The process of opening the equity action planning dialogue with faculty was initiated during the fall 2020 semester via a series of meetings and discussions around the Engineering Equity, Excellence, and Impact Initiative (EEEI). A team of 32 faculty and staff members from across the college volunteered for the EEEI Leadership Team to contribute ideas, lead discussions, review documents, and otherwise help to progress the initiative.

In November, Senior Associate Dean Anthony Atchley and Dean Peebles co-hosted an open faculty discussion and a roundtable focused on the intertwined efforts of Equity Action Planning and Promotion and Tenure Conversations. Then, in February 2021, they led a forum on the Equity Action Plan and Faculty Advancement, focused on small group discussions with feedback from each of 10 random breakout rooms. The 73 participants were asked to address three core questions:

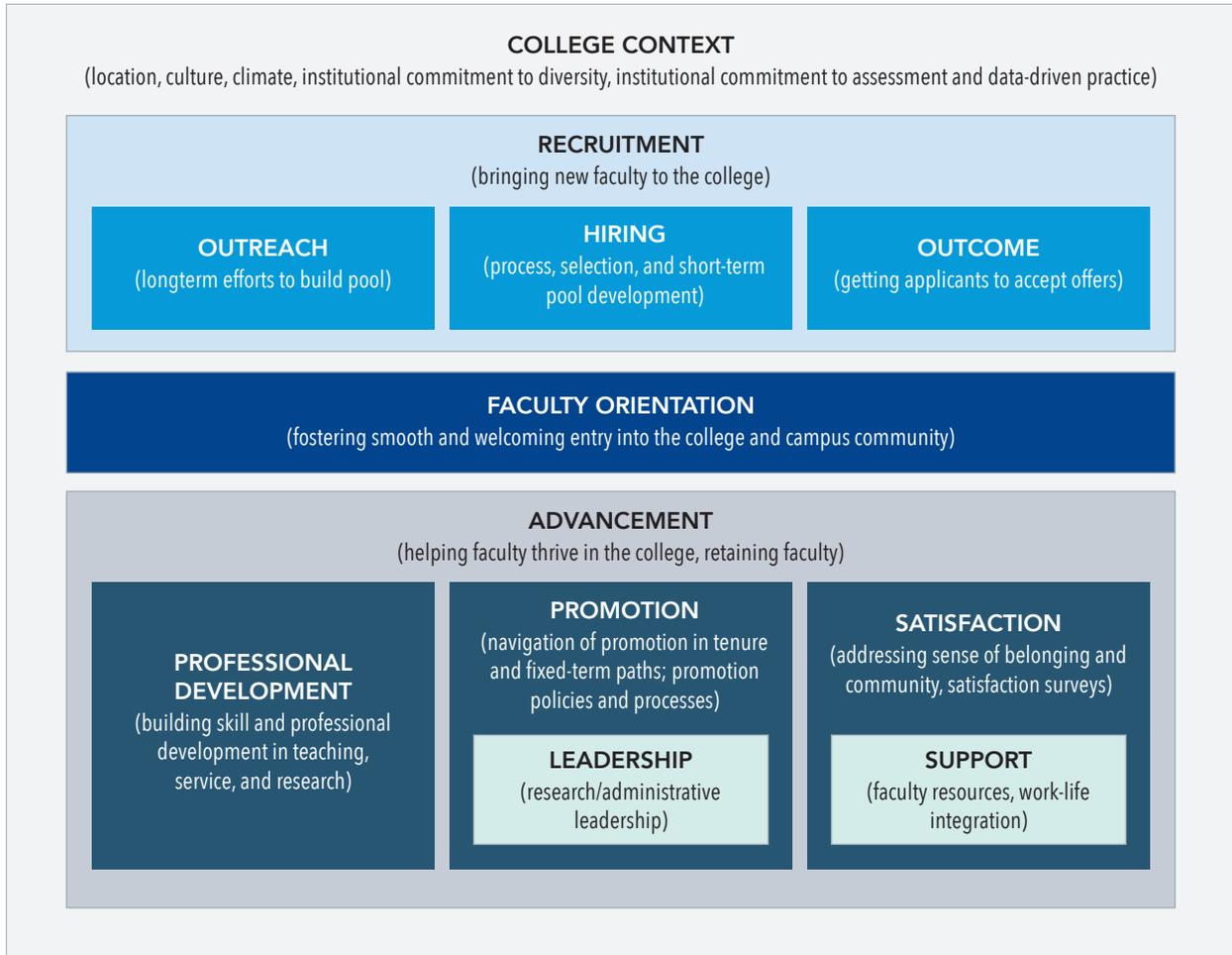
- What are the strongest/most effective strategies, policies, and/or programs that we have regarding faculty advancement? (Roses)
- Where has our college struggled, missed opportunities, or faced challenges regarding faculty advancement? (Thorns)
- Where are our greatest opportunities for growth and something new to advance equity? (Buds)

Subsequently, in March and April, 11 conversations were held with groups of 5 to 10 faculty members. All faculty were invited to participate and self-selected for specific conversations focused broadly on equity as well as on focus areas such as faculty who are women, teaching faculty, research faculty, assistant professors, faculty underrepresented in engineering, and other cultural groups. Registration was open and visible so that faculty had the best opportunity to select conversations in which they would be most able to share feedback openly. Each conversation circle was facilitated by two members of the EEEI Leadership Team; the 65 participating faculty were again asked to identify roses, thorns, and buds. In addition, nine faculty members requested individual conversations with a member of the EEEI team. The qualitative input from the faculty forums and conversations was key in targeting the action plan to the current climate, experiences and needs of the faculty.

During spring and early fall 2021, faculty were also invited to participate in small conversations and asynchronous collaboration to consider revisions to the college’s promotion and tenure guidelines, with an emphasis on consideration of equity and impact. The conversations were facilitated by Senior

Associate Dean Atchley. Across the events, 51 faculty members engaged, many in multiple opportunities. The promotion and tenure guideline update efforts will continue via the ongoing EAP and Strategic Plan implementation.

Figure 2: Conceptual model of College of Engineering faculty diversity adapted from Griffin et al 2021⁵ and ASEE Engineering Dean’s Gender Equity Project⁶



Student Support and Student Leader Input

ASGP + CEOI + CAMPUS ENGAGEMENT CONVERSATIONS

To address student support, leaders from Academic Support and Global Programs, Career Resources and Employer Relations, the Center for Engineering Outreach and Inclusion, as well as the Industrial

Professional Advisory Council (IPAC) and Center for Engineering Outreach and Inclusion (CEOI) Advisory board were engaged. In several meetings, participants were asked to reflect on things that were working well, things that were lingering challenges, and areas that were opportunities for deepening support for student success. Input systems were left open over the course of several months for stakeholders to provide input.

In making meaning of student equity issues, several conceptual frameworks were explored. Each conceptual model provided an impetus for developing interventions, metrics, and key performance indicators toward equity for undergraduate students.

Frameworks for Undergraduate Student Success

- **Student Success Center Model**
 - Penn State central resources support student care and advocacy
 - Holistic view of student environment
 - <https://success.psu.edu>
- **Leonhard Center Framework**
 - Points our curricular and co-curricular student domains
 - Identifies student issues and faculty issues for development
 - <https://www.leonhardcenter.psu.edu>
- **Center for the Study of Higher Education STEM Framework**
 - Highlights program values, program community and multidimensional identity
 - Supports assessment of outcomes for structural, agent, and academic dimensions
 - <https://sites.psu.edu/cshe/research-focus-areas/>

In addition to active engagement of the student support community, EAP development included information from a student survey to gather baseline data for first-year and second-year students at University Park. The survey was developed by Professor Leticia Oseguera in the Center for the Study of Higher Education (CSHE) and administered by the Leonhard Center.

The survey was launched at the end of the fall 2019 semester to first-year students enrolled in the College

of Engineering at the University Park (UP) campus. It was again given in spring 2020, during the pandemic. The CSHE-designed survey was based on document instruments to assess: “Likelihood of College Involvement, Pluralistic Orientation, Leadership Skills, Grit, Mindset, Help-seeking skills, Scientific Identity, Interpersonal Reactivity, Identity Compatibility, Sense of Belonging, and Discrimination and Bias.”

This launch was intended to capture pre-major engineering students’ experiences. This first survey was to serve as a baseline for additional surveys designed to capture the first two years of the undergraduate entry-to-major pathway in the College of Engineering at the UP campus. Responses were evaluated on the basis of international status, gender, and socioeconomics, as well as race and ethnicity. Some differences in responses were related to knowledge of entry to major requirements, emotional health, feelings of safety on campus, and the feeling of working harder than peers to be perceived as a good student. The early data seemed consistent with the results of the community survey in terms of student belonging and experience of bias (Figure 3). There are a few satisfaction gaps among groups of engineering students.

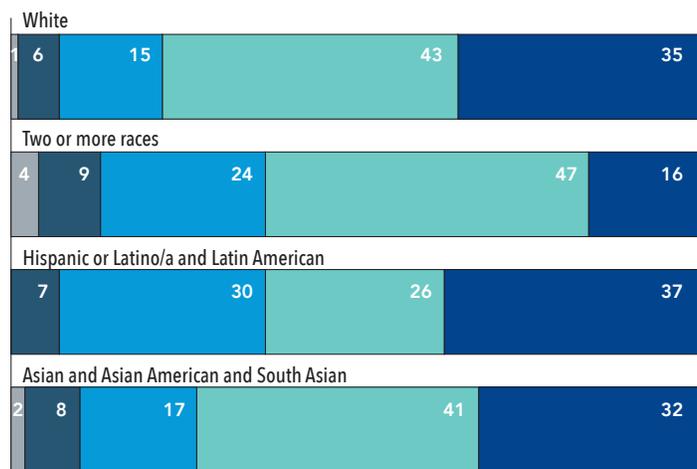
In the community survey, overall numbers of Black undergraduate respondents in the College of Engineering were below the threshold to report the disaggregated values. Upon being asked the extent to which they experienced a sense of belonging, most student respondents at UP expressed being satisfied or very satisfied (63% LatinX students and students of two or more races, 73% Asian American Students, and 78% for white students). Woman-identified undergraduate students were slightly more satisfied than man-identified students. There were not enough undergraduate student respondents in other categories to report numbers.

Figure 3: Community Survey data shows missing Black students and satisfaction differences between minoritized groups and majority peers

BELONGING AND INCLUSION

The extent to which you experience a sense of belonging or community at your campus

- Very dissatisfied
- Generally dissatisfied
- Neither satisfied nor dissatisfied
- Generally satisfied
- Very satisfied



GRADUATE STUDENT SUPPORT

At the graduate level, collaboration with the Collegiate Council on Graduate Education (CCGE) as well as through engagement from directors for Student Research and Graduate Equity led input from graduate students and faculty regarding the onboarding, mentoring, and advancement for students. Findings are consistent with priority areas identified by the Institute for Broadening Participation⁷ and the other elite graduate programs such as the MIT Roadmap.⁸ Elements of graduate student success from the literature and from stakeholder groups are synthesized in Figure 4.

Two structures for input for minoritized graduate students include the Multi-Cultural Engineering Graduate Student Association⁹ (MEGA) and Graduate Women in Engineering¹⁰ (GradWIE).

- MEGA supports recruitment and retention of domestic underrepresented graduate students in all STEM fields across the Penn State University Park campus. MEGA partners include: Multicultural Engineering Program (MEP), Office of Graduate Educational Equity Programs (OGEEP), Black

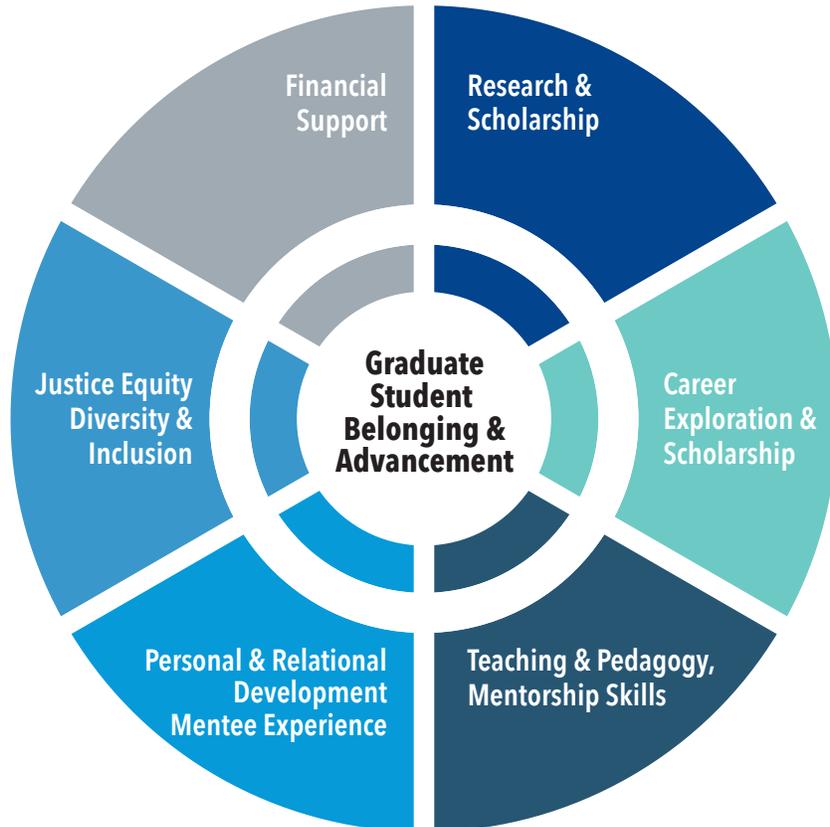
Graduate Student Association (BGSA), American Indian Science and Engineering Society (AISES), Boricua Grads, Latin American Graduate Student Association (LAGRASA), Society of Hispanic Professional Engineers (SHPE), and National Society of Black Engineers NSBE.

- GradWIE is a new student organization with a mission to support success of engineering graduate students. They “highlight the engineering experience through a lens of gender,” and they are inclusive of other student experiences and identities.

Both MEGA and GradWIE engage with college of engineering staff in CEOI and share concerns and aspirations for advancing equity. Both organizations want to support strong connections between graduate faculty and students while also advancing professional development opportunities for graduate students.

These groups of students were heavily engaged as Penn State responded to the pandemic through focus group conversations, and they participate in the broader Diversity Round Table to address equity, inclusion, and allyship across the STEM disciplines.

Figure 4: Issues identified as important to graduate student belonging and advancement. These elements are synthesized from the MIT roadmap and Institute for Broadening Participation and in consultation with the stakeholders who support graduate student mentorship.



STUDENT LEADER INPUT – DIVERSITY ROUND TABLE, EQUITY SUMMIT (APRIL 10-11, 2021)

The Penn State College of Engineering Diversity Student Round Table (DRT) is a group of student leaders from equity-focused organizations within the college. This community convenes to lead cross-organizational community building and allyship programming. Students regularly meet with the associate dean for equity and inclusion and programmatic leaders in Center for Engineering Outreach and Inclusion including the directors of the Multi-Cultural Engineering, Women in Engineering, Student Transitions and Pre-College, and International Engineering Programs. Students discuss issues and share concerns for advancing equity in the college. This is a source for some of the EAP issues and recommended interventions for students, faculty, and staff.

On April 10-11, 2021, DRT hosted a gathering entitled the “2021 Engineering Equity Summit: Evolving Behaviors to Make Strides in Policy.” This two-day event included presentations from accomplished alumni and discussions about growing together to create a more equitable society, from individual behaviors to societal policies. Topics included being unapologetically yourself, empowerment of claiming your space, colorism, and allyship, with a focus on the power of networking. Featured speakers included:

- **Sharaé Meredith** (Ph.D., Aerospace Engineering), Interim Analytics and Wargaming Branch Chief and Senior Research Engineer at Georgia Tech Research Institute
- **Paula Garcia Todd** (B.S. and M.S., Chemical Engineering), Global Strategic Manager – Pharma Solutions, International Flavors & Fragrances
- **Lisa Williams** (M.S., Manufacturing Management), Bulk Marine and Terminal Sourcing Director, Logistics Strategic Sourcing Center, Dow Global Purchasing

On April 2, 2022, DRT hosted the 2022 Engineering Equity Summit, which included a number of accomplished speakers and panelists on topics of mentorship, leadership, equity and inclusion professional networking, disability in STEM, gender equity in leadership, and maintaining authenticity while pursuing mentorship. The keynote address was delivered by **Wilbur C. Millhouse III**, Chairman/CEO of Millhouse Engineering and Construction, Inc., the largest Black-owned engineering firm in the U.S. Other featured speakers included:

- **Amy Freeman**, Director of Millennium Scholars Program, Penn State
- **Cortney Gensemer**, Ph.D. Candidate, Medical University of South Carolina
- **Amanda Hildenbrand**, Systems Engineering Associate, Lockheed Martin Space.
- **David Payne**, Vice President (retired) of Health, Environment, and Safety, Chevron
- **Chidi Nwosu**, Finance Manager – Engineering FP&A, Twitter
- **Baron Roger**, Staff Psychologist and Coordinator of Black and African-American Student Services, Penn State
- **Paula Garcia Todd** (B.S. and M.S., Chemical Engineering), Global Strategic Manager – Pharma Solutions, International Flavors & Fragrances

These summits provided opportunities for College of Engineering faculty, staff, and students to engage with and learn from alumni, industry leaders, researchers, and Penn State offices that offer student support to inform and inspire. At each summit, Associate Dean Peebles has provided an update on the status of equity action planning and invited participants to offer engagement and input to college of engineering efforts.

Industrial Professional Advisory Council and Center for Engineering Outreach and Inclusion Advisory Board Input on Equity and Inclusion

During the course of equity action planning, a series of meetings were held with the Industrial Professional Advisory Council (IPAC) Equity and Inclusion Working Group and the Center for Engineering Outreach and Inclusion (CEOI) Advisory Boards. In joint meetings, these groups—representing industry, alumni, and academic stakeholders—engaged with College of Engineering students, faculty, staff, and administrators to identify key strengths, challenges, and opportunities to advance equity in engineering. Notes from several meetings between September 2020 through March 2022 provided rich insight and highlighted the perspectives of employers and alumni about the challenges for recruitment, retention, and career success of students from racially underrepresented groups and for students who identify as women. The boards highlighted needs for a diverse workforce, for well-developed inclusive engineers, and for shared

strategies for retention of people from groups that are currently underrepresented in their organizations. The external boards challenged the college in some specific areas to:

1. Have a compelling vision for the equity goal with clear, externally visible objectives measured against best in class, and with alignment of goals to external market demand—companies NEED all perspectives, and with a mindful lens on how external audiences are receiving and perceiving those messages.
2. Maintain attentiveness to other messages from social media that characterize the Penn State engineering experience for students from underrepresented groups.
3. Monitor clear metrics indicating key performance indicators and key behavioral indicators of inclusive practices for recruitment, retention, and success.
4. Build ethics, equity, and inclusion into the curriculum including emphasis on soft skills training (difficult conversations, conflict resolution, integrate in the curriculum on the University level, developing empathy).
5. Draw interest from students by showing what the students are going to do when they enter the real world and that what they are doing is going to have societal value.
6. To identify actions to have more linkage between the University and industry on areas we could help each other: For example, using industry employee resource groups (ERGs) to interact with the Women in Engineering Program Orientation (WEPO) or the Multi-Cultural Engineering Program Orientation (MEPO) to energize student and industry participants.
7. Capture the success of the Women in Engineering Program and translate positive outcomes for WEP-engaged students to other student populations.
8. Explore linkages to other programs such as Historically Black Colleges and Universities for managing the pipeline all the way to the corporation and University faculty.

Based on conversations regarding the needs for industry engagement with equity, the boards prioritized building connections and leveraging the power of university-industry partnerships to enhance development of students. Priority actions for the beginning of the equity action plan implementation were to:

1. Connect Employee Resource Groups with Diversity Round Table for Spring 2022 Equity Summit on mentoring.

2. Form Sub teams for “Engage,” “Deepen,” “Advance,” and “Recruit” Action Projects:

- **Engage**

- Year 1 Focus: mentorship and community building—review stakeholder input to provide feedback on gaps and opportunities for alumni/industry engagement
- Key Question: How can we connect with the professional community to enhance community building?

- **Deepen**

- Year 1 Focus: mentorship and community building—review mentor and mentee development resources, provide feedback on programs and efforts for scaling across college.
- Key Question: What can we bring in from the professional community to enhance learning goals for mentoring?

- **Retain and Advance**

- Year 1 Focus: mentorship and community building—review implementation of mentorship with an eye towards gender inclusion and racial equity, are there areas to enhance efforts
- Key Question: Where are our mentoring and community gaps for marginalized populations, how can we leverage strengths and share best practices across academic and industrial professional communities?

- **Recruit**

- Year 1 Focus: mentorship and community building—review recruitment and scholarship efforts and outcomes, consider alumni strategy for engagement with prospective undergraduates P-12 and prospective graduate students grade 9 – undergraduate
- Key Question: How do we leverage the alumni community to support recruitment and broadening participation in STEM?

3. Form a more frequent meeting schedule to address portions of the plan and information at a deeper level.
4. Focus on “mentorship and community building” and the contributions that can be brought by university/ industry collaboration.

Embedded in the board conversations were some consideration for the broader vision of the equity action process including: Engaging people asking questions; Empower people to do something; Establishing a Culture of Inquiry^{11,12}; Connect equity to every-day work; Gathering “behind the scenes outreach” to influencers and natural leaders, to gain a more

complete understanding of what has been going on “on the ground; Investing “from the top” to raise the stakes on the level of commitment, accountability, and transparency around expectations.

Models of how corporations engage stakeholders should also be considered to expand engagement. The Boeing Critical Lift Group runs diversity summits. The corporation gives employees some hours of overhead to attend a summit, which includes presentation from executive leaders and wonderful outside speakers. This virtual programming helped to connect people across the organization. In addition, an alumnus with expertise in organizational effectiveness shared information regarding the Shingo model¹³ of organizational transformation and is happy to help facilitate this work in support of work on college culture. The board members recognized the challenges to advancing equity work. This includes the fears of saying the wrong thing or doing the wrong thing. They encourage the college not to limit the KPIs and to continue to inquire of employees “How are you building your own equity bank?” This is because “What gets measured gets done.” Further, in support of equity and inclusion, the college should go beyond KPI’s to define KBIs—key behavioral indicators. It’s not just what we want to accomplish, the “how” we accomplish it matters. This is at the heart of a cultural transformation—alignment on “the goal” and “the way.”

Staff Advisory Council Equity and Inclusion Survey

During fall 2020, the Staff Advisory Committee formed an Equity Committee. As inaugural chair, Tracy Peterson, director of Student Transitions and Pre-College Programs, worked with the committee to develop an Equity and Inclusion survey in Spring 2021 for the college of engineering staff (46 out of 300 staff members responded). This group identified areas of need in skill building. As a result, the group will be launching a program to support staff and faculty professional development, entitled ILEAD (Inclusive Leadership in Equity, Allyship, and Diversity). The ILEAD program creates an opportunity for College of Engineering staff to build intentional knowledge and skills to contribute to a welcoming and inclusive environment for all. By completing workshops, participants will earn digital badges demonstrating their commitment to acting as leaders for diversity, equity, and inclusion in the workplace. The curriculum will include two or more sessions offered each semester. Participants may take courses individually, without working toward a certificate. Successful fulfillment of the ILEAD certificate requires completion of one

required core course (Foundations for Diversity & Inclusion) and three elective courses. All courses taken for the program are free of charge to participants. Individuals who complete the ILEAD programs four sessions will receive a certificate and be recognized at the Annual Staff Awards Ceremony and Reception.

Climate Survey Information

2016 CLIMATE SURVEY

The “Penn State College of Engineering Assessment of Climate for Learning and Working” carried out by Rankin & Associates Consulting in 2016 evaluated the “attitudes, behaviors and standards of employees and students” in terms of how community members experience access and inclusion to learning and working opportunities, and how community members experience respect for their needs, abilities, and potential as contributors to the college. Several minoritized constituent groups indicated that they were less comfortable with the College of Engineering climate, workplace climate, and classroom climate than their majority peers.

- 31% of men faculty and students felt “very comfortable” in the College of Engineering classes, while only 24% of women faculty and students felt this way.
- While 82% of White respondents, 82% of Asian/Asian American/South Asian respondents, and 79% of Multiracial respondents felt “comfortable” or “very comfortable” with the College of Engineering climate, only 72% of racially underrepresented respondents felt this way.
- 31% of U.S. citizen faculty, staff, and graduate students felt “very comfortable” with the climate in their classes, while 24% of non-U.S./naturalized citizen respondents felt this way.
- 30% of non-first-generation student respondents felt “comfortable” with the climate in classes, while 23% of first-generation student respondents felt this way.

11% of members of constituent groups reported mistreatment (exclusionary, intimidating, offensive, and/or hostile conduct). Of the respondents who reported these modes of marginalization, respondents felt that their experience of mistreatment was based on their:

- Position in the College of Engineering - 25%
- Gender/gender identity - 22%
- Academic performance - 17%
- Ethnicity - 14%

Staff respondents were more likely to indicate mistreatment compared to faculty (18%), graduate student (12%) or undergraduate student (7%) respondents. A higher percentage of women (15%) indicated mistreatment than men (8%).

2020 COMMUNITY SURVEY

In 2020, Penn State conducted the first University-wide survey to support strategic priorities in the areas of community, inclusion, and diversity. The 2020 Community Survey and its future iterations provide one source of metrics for monitoring progress achieved via the equity action plan.

The community survey dashboard is openly accessible at <https://opair.psu.edu/community-survey/dashboards/total/>. Survey results can be viewed for questions addressing belonging and inclusion; engagement across difference; experiences with stereotyping, microaggressions, and harassments; cultural competence and knowledge; institutional commitment to diversity, equity, and inclusion; and off-campus community contexts. The results can be categorized specific to the College of Engineering, and by respondent role, race/ethnicity, gender, sexual orientation, disability, veteran status, citizenship, and other demographic factors.

In support of equity action planning the College of engineering was able to use some information from the Penn State Community Survey, which was launched in February of 2020. For most of the questions it was difficult to disaggregate data based on race/ethnicity because the numbers of Black, LatinX and Native American respondents were too small. In general, overall engagement of engineering community members with the survey was low. Where disaggregation was possible, there were differences in the level of satisfaction with belonging and community in the college based on gender, international status and race and ethnicity that can be further explored. As the overall data from the Office of Planning, Institutional Research and Assessment is purported to be extensive and rich, the college suffers from a situation where topline descriptive statistics can obscure the perspectives of survey-invisible populations. The survey participation rates and low numbers of populations highlights the needs to engage College of Engineering community members in equity and inclusion in such a way that there is trust that survey participation will lead to improved climate. This aligns with key performance indicators of increased engagement of all stakeholder groups.

5

Summary

The Penn State College of Engineering seeks to create a more equitable engineering environment to support community members as they navigate an increasingly connected world and to better serve the needs of society through our innovative and entrepreneurial pursuits. The primary mechanism for advancing a more diverse and inclusive engineering community is through developing students, staff, and faculty to welcome others into engineering fields. To this end, the college has a strong, well-established educational equity and inclusion infrastructure that draws students to our program and enables them to thrive once they are here. Students who engage with the award-winning interventions from the Center for Engineering Outreach and Inclusion succeed at the highest rates in the college. The college is actively recruiting faculty who contribute to achieving and sustaining diversity, equity, and inclusion goals. As of spring 2022, nearly half of the college's department heads are women or people from groups underrepresented in engineering. The college continues to actively expand engagement initiatives across all engineering populations—including pre-college youth, undergraduate and graduate students, faculty, staff, alumni, industry partners, peer institutions, and others at every level—through internal and external efforts to transform the culture of engineering in education and beyond.

Despite these positive attributes, climate assessment and enrollment data show that Penn State, like many large public institutions, has more work to do in broadening participation and advancing success for people from underrepresented groups in the engineering disciplines. One area of focus the college needs to address is how certain cultural aspects can lead to negative experiences for staff, as reported in earlier climate studies. Staff play a critical role in efforts

to enhance the learning and working environment, and inclusive staff enhance the sense of belonging for students, faculty, post-doctoral scholars, and fellow staff. Likewise, inclusive populations across the college help support a more positive environment for staff. Setting the example for this positive feedback loop, inclusive executives provide the leadership and accountability to advance equity, enhancing and sustaining belonging and efficacy of the staff, faculty, and students. Every community member has an impact on those with whom they work, and that impact has far-reaching benefits. These activities extend beyond the College of Engineering to influence the industries and institutions where Penn State graduates continue their careers, or where Penn Staters inspire pre-college students to pursue studies in STEM.

Through the goals and initiatives described in this plan, the college will build a more inclusive academic community in engineering to enhance the Penn State experience for all constituents. Penn State will lead the field by integrating cultural intelligence in operations and educational offerings. To lead and advance such inclusive practice, our community will need to develop the cultural humility required for continuous learning, while simultaneously sharing and guiding promising practices with other engineering organizations—in collaboration with the American Society of Engineering Education community, through the Engineering Dean's Diversity Initiative, and other Big10++ institutions—as we benchmark diversity, equity, inclusion, and belonging metrics, key performance indicators and outcomes. By actively collaborating to advance equity and implement the equity action plan, the Penn State College of Engineering will lead in enhancing and sustaining diversity, inclusion and belonging for all constituents.

References

- ¹ National Association of Colleges and Employers Equity (2022) "Equity" <https://www.nacweb.org/about-us/equity-definition/> Accessed 03/31/2022
- ² DO-IT, University of Washington (2022) "Universal Design" <https://www.washington.edu/doit/programs/accesserc/universal-design> Accessed 04/30/2022
- ³ Penn State Office of Provost (2021) "Our Commitment to Impact: The Pennsylvania State University's Strategic Plan for 2016 to 2025" <https://strategicplan.psu.edu> Accessed 08/18/2021
- ⁴ Zittoun T., Brinkmann S. (2012) Learning as Meaning Making. In: Seel N.M. (eds) Encyclopedia of the Sciences of Learning. Springer, Boston, MA. https://doi.org/10.1007/978-1-4419-1428-6_1851
- ⁵ Griffin, K, Mabe A and Bennett (2021) "A Guidebook for a Campus Self-Assessment of Successes and Challenges in STEM Faculty Diversity and Inclusion" <https://www.aplu.org/library/guidebook-for-a-campus-self-assessment-of-successes-and-challenges-in-stem-faculty-diversity-and-inclusion/file> Accessed 08/18/2021
- ⁶ ASEE (2021) "ASEE Engineering Deans Gender Equity Initiative" <https://edge.asee.org/> Accessed 08/18/2021
- ⁷ Institute for Broadening Participation (2018) Resource Toolbox <https://www.pathwaystoscience.org/toolbox.aspx#Graduate%20School> Accessed 08/28/2021
- ⁸ MIT (2021) Graduate Student Roadmap. <https://ovc.mit.edu/graduate-student-roadmap/> Accessed 08/28/2021
- ⁹ MEGA (2021) <https://sites.psu.edu/mega/> Accessed 08/28/2021
- ¹⁰ Graduate Women in Engineering (2022) <https://sites.psu.edu/gradwie/> Accessed 02/26/2022
- ¹¹ Schein, Edgar H (2013), Humble Inquiry: The Gentle Art of Asking Instead of Telling. San Francisco: Berrett-Koehler Publishers
- ¹² Schein, Edgar H.(2009) Helping: How to Offer, Give, and Receive Help. San Francisco: Berrett-Koehler Pub,
- ¹³ The Shingo Institute (2022) "The Shingo Model". <https://shingo.org/shingo-model/> Accessed 04/30/2022