

Paving a Pathway to SUCCESS

OU
IS CREATING
SYSTEMS FOR
ENGINEERING
STUDENTS TO
THRIVE AS A
NATIONAL
WORKFORCE
SHORTAGE
LOOMS.

BY SUSAN GROSSMAN

Whether by bridge, internet or electric car, we move through the world seamlessly using systems created by a behind-the-scenes workforce: Engineers.

Creative problem-solvers tasked with addressing complex societal issues, engineers employ math, science and technology to tackle a diverse range of challenges, from water filtration systems preventing disease to creating assistive medical devices for patients or ensuring the safety of astronauts aboard the International Space Station.

Surprisingly, given the range of opportunities within the field, there has been a decline in the number of engineering graduates nationwide. According to the U.S. Bureau of Labor Statistics, the shortage could be as great as 6 million engineers over a decade.

But the University of Oklahoma's Gallogly College of Engineering is tackling this critical issue, with a goal of increasing its number of graduates by 30 percent in the next five years.

Bolstered by a directive from the Oklahoma State Legislature and a \$21.6 million investment from the Oklahoma State Regents for Higher Education, OU has launched Engineering Pathways, a multi-layered support system designed to foster community, success and, ultimately, a steadily increasing number of OU engineering graduates. The program welcomed its first cohort in fall 2022.

The Engineering Pathways initiative

begins with outreach and recruiting, then offers ongoing support to students transitioning to OU. While building confidence and skills, Engineering Pathways helps students earn their degrees and move into the many engineering jobs waiting to be filled.

"This is a student success program embedded within our engineering program," says Randa Shehab, Gallogly College senior associate dean for academic affairs and faculty development. "The state has tasked us with growing the engineering workforce. Engineering Pathways is a new framework for how we do that.

"The State of Oklahoma is focused on workforce development, business and expansion, and bringing new companies to the state," she adds. "One of the challenges Oklahoma has faced is that we don't have the STEM-educated (science, technology, engineering and math) workforce that is so important to companies considering relocation."

Shehab has spent more than two decades in the OU engineering education space and says she and her colleagues have regularly studied the necessary factors to help students stay the course in engineering.

"This program is a result of many years of thinking about student success and our passion to excite students about engineering and help them graduate as engineers," she says. "Fortunately, we have years of research behind us and were able to launch quickly."

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ERIKAH BROWN

In two short years, 11 new OU Engineering Pathways faculty have been hired, learning spaces created and several programs solidified to enhance student-centered learning.

The term “pathways,” rather than “pipeline,” was purposefully chosen for the enterprise.

“Pipelines are fixed and rigid,” explains Shehab. “Pathways, on the other hand, create multiple entry points for students to come into OU’s engineering programs. It is our responsibility to help them graduate successfully from whatever entry point they arrive.”

Foundational mathematical skills are important for success as an engineering student. To that end, one entry point on

the pathway is Summer Bridge, a four-week, residential transition program designed to foster a sense of community among first-year engineering and science students. Participants take a summer math course for credit, are part of a team engineering design project and experience campus life.

Shehab says many aspiring engineers who come to Gallogly College lack sufficient math preparation or never had role models with backgrounds in math-based engineering.

“We have to acknowledge that students come to us with different levels of preparation, experience and understanding,” she says. “It is a function of their environment, not their ability.”

“This program is a result of many years of thinking about student success and our passion to excite students about engineering,” says Gallogly College Senior Associate Dean Randa Shehab.



Program executive director Susan Walden, left, works with students in the new Nettie Vincent Boggs Engineering Pathways Studio.

Engineering Pathways strives to meet students no matter what background they come from or what level of proficiency they have upon arrival at OU, she adds.

A vital part of Engineering Pathways is “Engineering Catalyst,” a program designed to support first-year students who begin their path at OU in a pre-calculus math course. The program utilizes intensive mentoring, community-building, active learning and problem-solving strategies as it focuses on building students’ academic and professional toolkits.

Among its instructors is Assistant Professor of Engineering Casey Haskins, whose academic background encompasses multiple degrees in mathematics and a doctorate in learning sciences.

Catalyst has three components connecting students with math, engineering and research content. With a focus on educational psychology, Haskins also works to instill confidence in her students.

“So many students have math-related struggles. My passion is helping students feel more comfortable with struggle because it is a normal, necessary part of learning,” she says. “It’s important to understand that learning is about more than just being smart; it’s about how we work to achieve academic success.”

Haskins also hosts workshops, such as “Math ’Til You Drop,” and is developing EMPOWER (Engineering Mathematics Program for Orientation, Workshops and other Educational Resources), which will provide ongoing student support.

Susan Walden, an American Society for Engineering Education Fellow, has been a part of the OU engineering program since 2001 and currently serves as the Engineering Pathways program’s executive director.

In addition to undergraduate program development, Walden says Engineering Pathways faculty and staff are focused on growing the number of OU engineering students through outreach and recruiting. The college offers learning activities for public education partners from pre-K to high school, creating awareness of engineering careers.

“We are working to get the OU brand and messaging out to students all over Oklahoma and Texas and share that engineering is a wonderful career option,” she says. “We are changing the conversation—we want to stop telling high school students that they have to be outstanding in math and science to consider studying engineering and point them toward the societal benefits.”

Engineering Pathways also features several physical spaces. The McCasland Foundation Engineering Pathways Hub is located on the second floor of historic Felgar Hall and houses areas for faculty collaboration and engagement with students. The third floor is home to the Nettie Vincent Boggs Engineering Pathways Studio, a first-year instructional facility that accommodates approximately 60 students in an active-learning classroom. Students have access to equipment, materials and tools and are devising solutions to problems submitted by community partners. In addition, freshman Engineer-

ing Pathways students learn professional skills and work with upper-level student mentors.

Among them is OU sophomore Amrion Lockett, a mechanical engineering major who has experienced the benefits of Engineering Pathways and now serves as a learning assistant for Catalyst.

“This program helped me catch up and become more confident in my skills in math and engineering,” he says. “People come into Catalyst from different backgrounds and levels. It’s not that they are behind, but more that their preparation is not the same. Catalyst helps individuals feel like they can succeed.”

Lockett also participated in Gallogly College’s Summer Bridge program, which

he says offered the best possible opportunity to ramp up his engineering math skills before freshman year.

Shehab says Lockett’s success proves Engineering Pathways is on track with its multi-faceted approach to supporting—and graduating—more engineers who will fill state and national shortages.

“Engineering drives society,” she says. “When we solve problems, it changes the way people live. Our job is to spread this message and support students along the pathway to graduate with engineering degrees.”

Susan Grossman is Senior Program Officer for Kirkpatrick Foundation in Oklahoma City and a freelance writer who lives in Norman, Okla.

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OU Assistant Professor of Engineering Casey Haskins helps students instill skills and confidence.