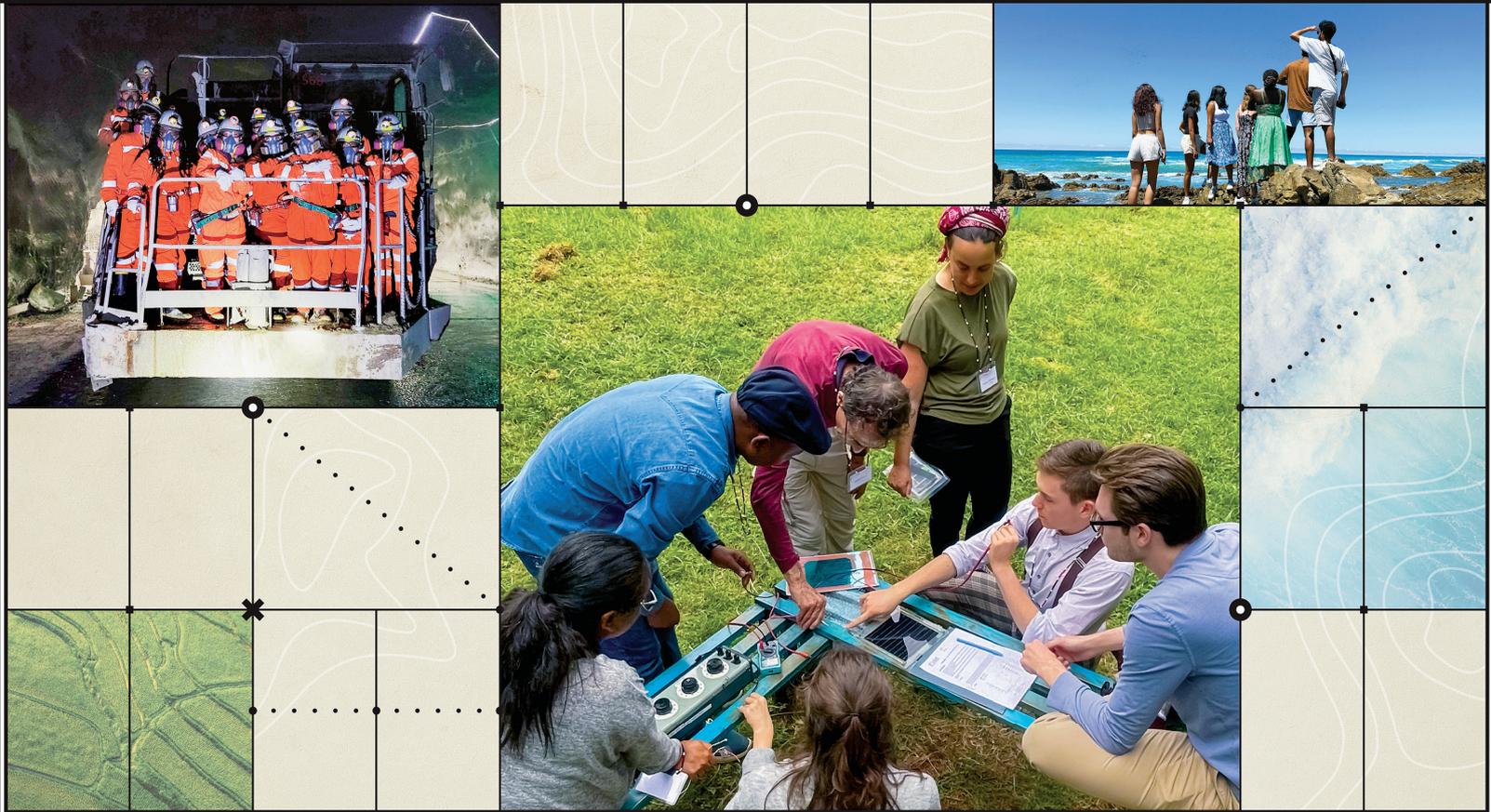




INTERNATIONAL EXPERIENCES EXPAND ENGINEERING PERSPECTIVES

NORTHWESTERN ENGINEERING STUDENTS DEEPEN THEIR UNDERSTANDING OF GLOBAL CHALLENGES FIRSTHAND THROUGH LEARNING EXPERIENCES WORLDWIDE.





left PhD student Matthew Sweers reviews a laboratory exercise at JUAMI 2023 in Nairobi, Kenya.

right JUAMI teaches the fundamentals of materials research through hands-on activities.

“I formed friendships and experienced opportunities that have changed my academic, professional, and global perspectives. I am so grateful to have participated in JUAMI.”

JENNA TROST Chemical Engineering



PhD student Jenna Trost works with collaborators at JUAMI 2023.

SOMETIMES, getting the best engineering education means leaving campus and stepping out of your comfort zone.

Through immersive learning experiences abroad—as far-reaching as the Atacama Desert in Chile to hospital rooms in Cape Town—Northwestern Engineering students widen their perspectives on global challenges in energy materials, health systems, manufacturing supply chains, sustainability, and water infrastructure.

Bonded by their curiosity to push past the familiar, they deepen their understanding of these challenges, experience other cultures firsthand, forge strong personal connections, and discover fresh ideas, novel approaches, and unexpected opportunities.

📍 JOINT UNDERTAKING FOR AN AFRICAN MATERIALS INSTITUTE

Led by McCormick School of Engineering Professor Sossina Haile, JUAMI fosters collaborations between US-based materials science researchers and their counterparts in Africa through international learning programs.

JUAMI 2023, held in June in Nairobi, Kenya, provided PhD students Matthew Sweers, Jenna Trost, and Dylan Bardgett the opportunity to explore that event’s theme, “Materials for Sustainable Energy,” with a cohort of international peers who share a passion for global sustainability.

During the two-week program, the students engaged in hands-on laboratory exercises and tutorials and heard from renowned international speakers on electrochemistry, life-cycle analysis, nano-materials, and solar fuel production. To culminate the experience, they collaborated as part of multinational teams to present high-impact research, outreach, and education proposals.

Sweers, who studies materials science, and his team prototyped JUAMICharz (pronounced JUAMI Cares), an online database of available scientific instruments that could help East African students access the materials characterization tools they need to advance research progress.

“One of the great things about the program is that most attendees have dedicated their careers to research into materials that can help solve our energy and climate crisis,” Sweers says. “Given the intelligence and determination of my fellow students, I am positive that many projects will reach successful conclusions.”

Trost, who studies chemical engineering, worked with her team of female collaborators from five countries to develop university outreach programs designed to encourage women to pursue STEM fields both in the US and East Africa.

“I formed friendships and experienced opportunities that have changed my academic, professional, and global perspectives,” Trost says. “I am so grateful to have participated in JUAMI.”

Bardgett, a member of the Haile research group who studies chemistry and helped coordinate the JUAMI lab experiments, realized how some sustainable technologies are more equitable and accessible than others.

“JUAMI helped me realize how important it is to understand the full societal context of whatever scientific problem I am trying to solve,” Bardgett says. “I want to do research that would make all of my friends and colleagues from JUAMI proud. To ensure my research is both equitable and accessible, I need to think critically about the problems I’m solving with my research and engage with the communities who will be impacted by my research.”

JUAMI is supported by the National Science Foundation and Northwestern’s Paula M. Trienens Institute for Sustainability and Energy.



left Students on the Chile Global Engineering Trek took a funicular up San Cristóbal Hill to experience views of Santiago.



right Students explored an underground copper mine run by the government-owned company Codelco.



Students on the Taiwan Global Engineering Trek toured the Lam Research training center in Hsinchu.

GLOBAL ENGINEERING TREKS

Global Engineering Treks are immersive undergraduate experiences in countries around the world including Chile, China, Israel, Germany, and Taiwan. Lasting nine to 12 days, treks are offered through McCormick Global Initiatives, the Paula M. Trienens Institute for Sustainability and Energy, and other University partners.

CHILE: ENERGY STORAGE & CRITICAL MINERALS

Chile is one of the world’s largest lithium and copper producers. It’s also a leader in global efforts to build green energy generation and storage systems, accelerate decarbonization initiatives, and invest in renewable resources, such as wind and solar, to power its energy-intensive mining operations.

To better understand this ecosystem, nine students in the Global Engineering Trek in Energy Storage and Critical Minerals visited the country in September 2023. By touring the Sustainable Minerals Institute’s International Centre of Excellence, the SQM Lithium extraction facility in the Salar de Atacama salt flat, and El Teniente, an underground copper mine, students found they could better understand the interconnected cultural and economic contexts of minerals mining.

That led mechanical engineering student Penelope De La Torre to refocus her thinking about finite resources and the sustainability of a product’s life cycle.

“My concentration is manufacturing, which is dependent on the materials that are mined in Chile and other places around the globe,” De La Torre says. “The trek gave me a greater appreciation for the way we get the materials that we use in our daily lives and made me want to dive deeper into both manufacturing more sustainably and also how we can use products in a more sustainable way and create less waste.”

TAIWAN: INNOVATION AND HIGH-TECH

For Marisabel Aguilar, a fourth-year student pursuing a bachelor’s degree in computer engineering and a Segal Design Certificate, the Global Engineering Trek’s inaugural visit to Taiwan was a chance to explore her curiosity about other communities and cultures while learning more about the country’s semiconductor, chip, and hardware industries.

The 10-day trip to Taipei and Tainan in June 2023 immersed 15 multidisciplinary Northwestern students in Taiwan’s innovation and entrepreneurship ecosystem. The cohort visited semiconductor industry leaders Taiwan Semiconductor Manufacturing Company and Lam Research, toured the Taiwan Tech Arena innovation incubator, and attended research seminars at Academia Sinica and National Tsing Hua University. At National Taiwan University’s Human-Computer Interaction Research Lab, the group demoed virtual reality programs and computer games developed by NTU students.

“Many of the companies we visited have offices in the US, and the representatives were very welcoming in encouraging us to look into positions in the US and abroad,” says Aguilar.

Aguilar also appreciated the opportunity to connect with the Northwestern cohort, peer students studying in Taiwan, and members of the Northwestern Alumni Club of Taiwan. “We got super lucky with everyone on the trip,” Aguilar says. “It felt like a big family.”

A joint initiative with Northwestern’s Office of the Vice President for International Relations, the Global Engineering Trek in Innovation and High-Tech was generously supported by the Ministry of Foreign Affairs in Taiwan and the Friends of Taiwan Foundation.



Students in the Global Healthcare Technologies in South Africa program toured the Garden Route on the southeastern coast of South Africa.

“I learned a lot about myself. The experience made me more confident in my decision to pursue software engineering.”

SHUBHANSHI GAUDANI Computer Science

GLOBAL HEALTHCARE TECHNOLOGIES IN SOUTH AFRICA

During the winter 2024 quarter, 15 Northwestern Engineering students joined the Global Healthcare Technologies in South Africa program, collaborating with faculty members from Northwestern, University of Cape Town, and Stellenbosch University to develop point-of-care medical technologies and methodologies to improve health outcomes in the townships of Cape Town. Past diagnostic and therapeutic innovations include a phototherapy blanket to treat jaundice in neonates, a digital x-ray system, and a specimen cup to test for tuberculosis.

Organized by Northwestern Engineering’s Center for Innovation in Global Health Technologies and Northwestern’s Global Learning Office, the program included a four-course Northwestern curriculum emphasizing problem definition, user-centered solutions, and the principles and practice of medical device design. Through site visits to Cape Town hospitals, students learned firsthand the challenges of cost-effective healthcare delivery in developing countries and the disease burden in resource-constrained health systems.

Anika Gupta, a fourth-year student pursuing combined bachelor’s degrees in biomedical engineering and global health studies and a master’s degree in chemical and biological engineering, worked with faculty at Stellenbosch University to analyze barriers in the medical device innovation process in South Africa and developed approaches to overcome these obstacles.

The ability to study abroad while fulfilling requirements for both her majors was a key factor in Gupta’s decision to choose Northwestern.

“I am interested in learning about cultures and healthcare systems around the world and how innovation can make healthcare more widely effective and accessible,” Gupta says. “I’ve realized that more international collaboration could really help with creating a healthcare system that equitably benefits and serves people.”

COMPUTER SCIENCE ABROAD

Shubhanshi Gaudani was one of 23 Northwestern Engineering computer science undergraduate students who studied at institutions around the world in fall 2023, including ETH Zürich in Switzerland, National Taiwan University, Universidad Carlos III de Madrid, University of Edinburgh, and Yonsei University in Seoul.

During her quarter at ETH Zürich, Gaudani completed graduate-level courses in object-oriented programming, natural language processing, and advanced topics in communication networks. She found ETH Zürich’s theoretical approach to curriculum in stark contrast to her Northwestern computer science studies.

“Northwestern has a more hands-on, coding-focused, practical approach, whereas ETH classes focused more on mathematical theorems, proofs, and concrete reasoning,” Gaudani says.

An avid hiker, Gaudani formed a travel group to organize weekend travel, including an Interrail train trip to Finland to view the northern lights. As part of an applied glaciology course, Gaudani also joined an excursion to the research station at the glacier saddle Jungfrauoch.

The bonds Gaudani built with other computer science students gave her confidence about her career pathway.

“I learned a lot about myself. The experience made me more confident in my decision to pursue software engineering,” Gaudani says. “Several of us were going through the same recruitment cycle for post-graduate opportunities, jobs, or internships. We were all going through similar struggles, so I felt supported.”

MICHELLE MOHNEY