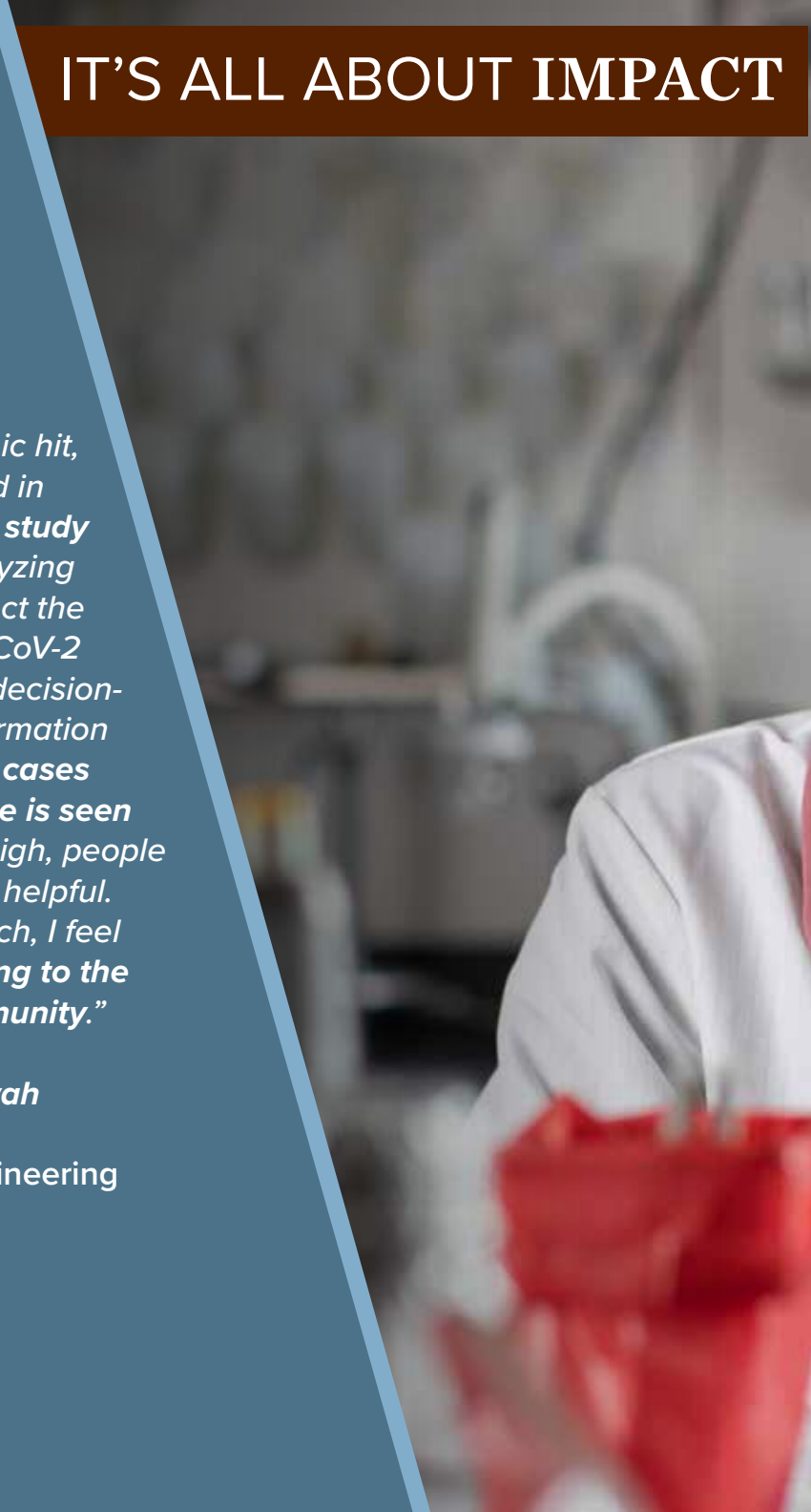
LEHIGH UNIVERSITY | P.C. Rossin College of Engineering and Applied Science

Civil & Environmental ENGINEERING

Graduate Degree Programs

IT'S ALL ABOUT **IMPACT**



*"When the pandemic hit, our lab got involved in the **global effort to study COVID-19**. I'm analyzing wastewater to detect the presence of SARS-CoV-2 RNA. We can give decision-makers critical information to **identify a rise in cases even before a surge is seen in hospitals**. At Lehigh, people are supportive and helpful. Through my research, I feel like I am **contributing to the health of our community**."*

Nusaibah Alqasawah
PhD candidate
Environmental Engineering

Lehigh's Department of Civil and Environmental Engineering equips graduate students with sound reasoning and advanced technical skills to address complex engineering challenges. Our programs prepare graduates to lead in careers with top engineering firms, government agencies, and academic and research institutions.

Doctoral students work closely with our distinguished faculty to conduct cutting-edge research on campus and with partners at leading universities and research centers worldwide. Students have the opportunity to publish their research in top-tier journals and present at leading conferences.

Master's students learn from our faculty in an individualized, small-classroom environment, and choose the right pace and path for their interests and goals. Students can customize a unique coursework degree program or pursue a thesis- or project-based degree.

CEE graduate programs combine Lehigh's close-knit community with the professional advancement and impact expected of larger schools.

Lehigh CEE graduate programs

- **MS & PhD in Civil Engineering**
- **MS & PhD in Environmental Engineering**
- **MS & PhD in Structural Engineering**
- **Design-focused M.Eng. in Structural Engineering**
- **Certificate in Probabilistic Modeling across Engineering & Science**
- **Certificate in Catastrophe Modeling & Resilience**

Fully online options available for all master's programs

IT'S ALL ABOUT **BALANCE**

Lehigh's Department of Civil and Environmental Engineering offers graduate students a vibrant, engaging setting for scholarship, advanced research, and professional growth. Faculty members go beyond advising to provide true, lasting mentoring. Through scholarly rigor and an entrepreneurial, collaborative mindset, we challenge and encourage our students to evolve into tomorrow's leaders in our field.

As educators, we value personal interaction and maintain a favorable student-to-faculty ratio, while providing access to significant research resources and an expansive network of internal and external partnerships that rivals those of far larger universities.

It is a balance that many institutions aspire to develop, but at Lehigh, it is in our DNA.

As a graduate student, you will learn from and work with internationally recognized faculty experts addressing issues in environmental, geotechnical, structural, and water resources engineering. Our diverse research portfolio includes projects such as hybrid simulation of large-scale structural systems, offshore wind turbine engineering, and community resilience against natural disasters.

Students thrive in our tight-knit community and find value in our network of successful alumni.

Our traditional areas of strength include environmental engineering, geotechnical engineering, structural engineering, and water resources engineering. Our emerging areas of focus include infrastructure systems, data science applied in CEE, sensing, natural hazard engineering, CEE materials, CEE energy applications, and geomatics. Our faculty are engaged in cutting-edge research, in areas such as the following examples.

Real-Time Hybrid Simulation Facility

Lehigh University has been at the forefront of hybrid simulation since its inception. This innovative approach combines experimental tests and numerical models to simulate real-world conditions of complex infrastructure components in a lab. For example, this technique was used to study the response of tall buildings to earthquakes. More recently, the same approach has been applied to offshore wind turbines under various operational and extreme scenarios, improving design and reducing costs. The facility supports geographically distributed hybrid simulations, catering to the natural hazards threatening various U.S. regions. This work enhances the country's economic competitiveness, resilience, and technical innovation.

Pre- and Post-Disaster Intelligent Sensing

Lehigh researchers use innovative sensing and processing techniques to monitor the health of our structures and infrastructure systems, their aging and deterioration process, and their conditions after extreme events occur. For example, by developing advanced algorithms and leveraging data from drones and ground robots, the researchers work to automate the analysis of disaster imagery to determine damage levels. This includes creating datasets to train

IT'S ALL ABOUT **DISCOVERY**

artificial intelligence (AI) models for improved disaster response. Additionally, the research uses data science and machine learning for climate change studies, enhancing our ability to address environmental challenges.

Reducing the Carbon Footprint of Manufacturing

Lehigh's interdisciplinary team targets some of the world's major carbon-generating processes, such as concrete manufacturing. For example, the researchers have collaborated with industry to create a new cement ingredient using low-temperature calcined clays to significantly reduce greenhouse gas emissions. By developing this innovative material, the team aims to match the performance of traditional cement while promoting sustainability in the construction industry through environmentally friendly and economically viable solutions.

Lehigh's Interdisciplinary Research Institutes (IRIs) enable the university to solidify and further develop its strengths in key focus areas that resonate among our community of faculty, student researchers, and their external collaborators.

- **Institute for Cyber Physical Infrastructure and Energy (I-CPIE)**
- **Institute for Data, Intelligent Systems, and Computation (I-DISC)**
- **Institute for Functional Materials and Devices (I-FMD)**

For more, visit **lehigh.edu/iri.**

IT'S ALL ABOUT **LEADERSHIP**

Lehigh's distinguished civil and environmental engineering faculty pursue game-changing research while inspiring the next generation of innovators and thinkers in our field. The Academic Ranking of World Universities has placed our department among the top 10 civil engineering departments in the world for many years in a row. Professors lead, mentor, and encourage students to tackle tough questions, while providing access to state-of-the-art facilities for research and cutting-edge scientific knowledge in a highly collaborative environment.

Paolo Bocchini
Resilient infrastructure and communities; catastrophe modeling; computational mechanics; probabilistic analysis

Derick G. Brown
Environmental biotechnology; microbial kinetics; charge-regulated surfaces; microbial fate and transport; colloid and surface interactions

Panayiotis Diplas
Hydraulic phenomena; river mechanics and morphology; stream restoration; ecological hydraulics; renewable energy harvesting

John T. Fox
Engineering processes for sustainability; water treatment; pollution prevention; air pollution treatment and prevention; solid waste treatment and reuse

Dan M. Frangopol
Structural reliability; life-cycle civil engineering; probability-based assessment and design; climate change

Jennifer H. Gross
Structural engineering

Mesut Pervizpour
Geotechnical engineering; materials; wave propagation; nondestructive testing techniques

Stephen Pessiki
Design of structures; fire effects on structures; nondestructive materials evaluation; innovative structural materials; earthquake engineering

Spencer Quiel
Structural engineering; fire engineering; blast resistance; collapse resistance; thermal energy effects on structures

Maryam Rahnemoonfar
Computer vision; deep learning; remote sensing; AI for social good; machine learning; data/model integration in polar regions; disaster resiliency

Claudia Reis
Fluid-structure interaction; fluid-soil-structure interaction, multi-hazard risk mitigation

James M. Ricles
Innovative structural systems; structural connections; supplemental damping; advanced experimental and computational simulation

Diego Isidoro Heredia Rosa
Computational mechanics, constitutive modeling, reduced-order modeling, stability, long-term effects, fluid-structure interaction

Kristen Jellison
Environmental biotechnology; water treatment; water resource management; sustainable development; fate and transport of contaminants

Faegheh (Farrah) Moazeni
Mathematical modeling and optimization; control of interconnected infrastructure systems; water-energy-building nexus

Clay J. Naito
Blast resistant design of structures; design of concrete structures; structural engineering; innovative structural materials and systems

Shamim Pakzad
Structural identification and damage detection; wireless ad-hoc and sensory networks; signal processing; nondestructive testing

Sibel Pamukcu
Environmental remediation and mitigation; underground sensor technology; smart geomaterials

Richard Sause
High performance structural materials; innovative structural systems; earthquake engineering; structural dynamics

Arup K. SenGupta
Arsenic, fluoride, and trace contaminant removal; desalination; decarbonization; environmental technology; nanotechnology

Gabrielle String
Water; sanitation; hygiene; environmental health; humanitarian emergencies

Muhannad T. Suleiman
Geotechnical engineering; sustainable development; sensor networks; renewable energy; offshore engineering

Y. C. Ethan Yang
Water resources; food-energy-water-environment nexus; adaptive systems; stormwater smart cities; IOT-based infrastructure

IT'S ALL ABOUT **WHAT'S NEXT**

Lehigh's solid track record for graduate placement is a hallmark of our programs, with civil and environmental engineering alumni holding influential positions in leading companies across the country and around the world. Students who complete a master's degree at Lehigh are highly competitive applicants to higher degree programs, whether they remain on campus or attend other prominent universities. Lehigh's PhD program cultivates students' academic aspirations—with strong placement in faculty careers as well as intermediate postdoctoral positions at other prestigious institutions—and opens doors to specialized roles in industry and at national laboratories.

- AECOM
- AIR Worldwide
- Cornell University
- DeSimone Consulting Engineers
- Fermat Capital Management
- Geosyntec Consultants
- GZA GeoEnvironmental
- The Hong Kong Polytechnic University
- Langan Engineering & Environmental Services
- Lawrence Livermore National Laboratory
- LERA Consulting Structural Engineers
- MIT
- Naval Surface Warfare Center (Carderock Division)
- Princeton University
- RIZZO International
- Rutherford + Chekene
- Sanborn, Head & Associates
- Socotec Group
- SpaceX
- Stanford University
- Thornton Tomasetti
- Titan Engineers
- UC San Diego
- Verisk
- Verizon
- Wiss, Janney, Elstner Associates
- WSP USA

COURTESY OF SOM

"Graduate school is essential, and ***Lehigh had a huge impact on my ability to be successful.*** *The structural engineering program applies science to the practical side of the built environment with a rigorous, relevant approach to analysis and design.* ***Our professors brought their research problems into the classroom.*** *Working in the Industrial Testing Group at Fritz Laboratory was a highlight in my life. I saw a whole range of ideas—from ships to helicopters to cable structures to fatigue testing of girders—and* ***worked alongside deeply committed faculty and students.*** *That 'we can take anything on' approach was the grounding for my practice at SOM, which is centered on design but underpinned by research."*

Mark P. Sarkisian, PE, SE, NAE, LEED
Partner, Structural and Seismic Engineering, Skidmore, Owings & Merrill
Member, National Academy of Engineering

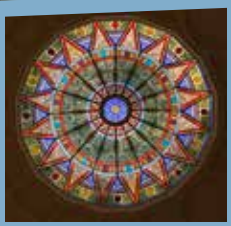
IT'S ALL ABOUT YOU

Outside of our classrooms and labs, Lehigh civil and environmental engineers are a collaborative, supportive, and driven cohort of future scholars and professionals who are engaged in the university's graduate student landscape, the campus at large, and our local community.

Opportunities for professional development are many, including a variety of research seminars, events featuring industry and expert panels, and various networking and leadership-building activities. Graduate students regularly present their work in local, national, and international conferences and workshops, and they are routinely recognized in these settings through competitive awards and travel grants.

The Department of Civil and Environmental Engineering attracts a constant flow of world-class visitors from the private sector, public sector, and academia, who spend time with our graduate students and share their experiences with them.

Lehigh's Center for Career and Professional Development hosts events throughout the year to connect graduate students with the resources they need to achieve their career goals. Recreational activities and learning programs offered by the Graduate Life Office enhance students' academic, personal, and professional development and build a sense of belonging. Events include barbecues, birthday and holiday celebrations, and other outings.



Bethlehem and Pennsylvania's Lehigh Valley

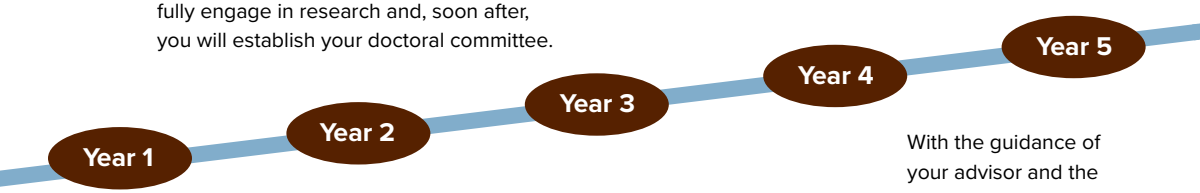
Lehigh University is located in the heart of the beautiful Lehigh Valley, the third largest metropolitan area in Pennsylvania. Home to top-notch entertainment, shopping, and restaurants, our region is also known for its seemingly endless array of opportunities for outdoor exploration and adventure.

Bethlehem is a vibrant city, rich in history and known for its small-town friendliness and feel. The arts are alive here, with exciting seasonal events, nationally recognized musical acts, comedy, art, and more. Known as the "City of Festivals," Bethlehem hosts 20-plus major festivals and over 150 mini-festivals each year.

Need more action? Plan a day or weekend trip to New York City, Philadelphia, the Pocono Mountains, or the New Jersey and Delaware beaches—all within easy reach by car or public transportation.

PhD STUDIES

Doctoral students in civil and environmental engineering work alongside internationally recognized experts and enjoy a 4-to-1 student-to-faculty ratio that ensures personalized mentoring and close collaboration. All of our PhD students receive 100% funding of tuition and have the opportunity to publish in peer-reviewed publications and/or present at leading technical and professional conferences. PhD students in civil and environmental engineering come from a variety of backgrounds, including physics, mathematics, chemistry, and environmental sciences. Students work across disciplinary boundaries to establish dynamic partnerships with academic, industry, and government collaborators as they advance knowledge in their field and prepare for careers of impact.



Year 1

In our department, you will join a research team upon admission to the doctoral program, so that on day one, you will already have a research advisor and a group of fellow researchers.

Year 2

You will engage in core courses to refine your technical foundation. You will balance coursework and research and achieve your first programmatic milestone: the PhD qualifying exam. In the summer, you will fully engage in research and, soon after, you will establish your doctoral committee.

Year 3

You will dive into dissertation development, prepare scientific publications and conference presentations, and achieve your second programmatic milestone with a formal presentation of your dissertation proposal to your doctoral committee.

Year 4

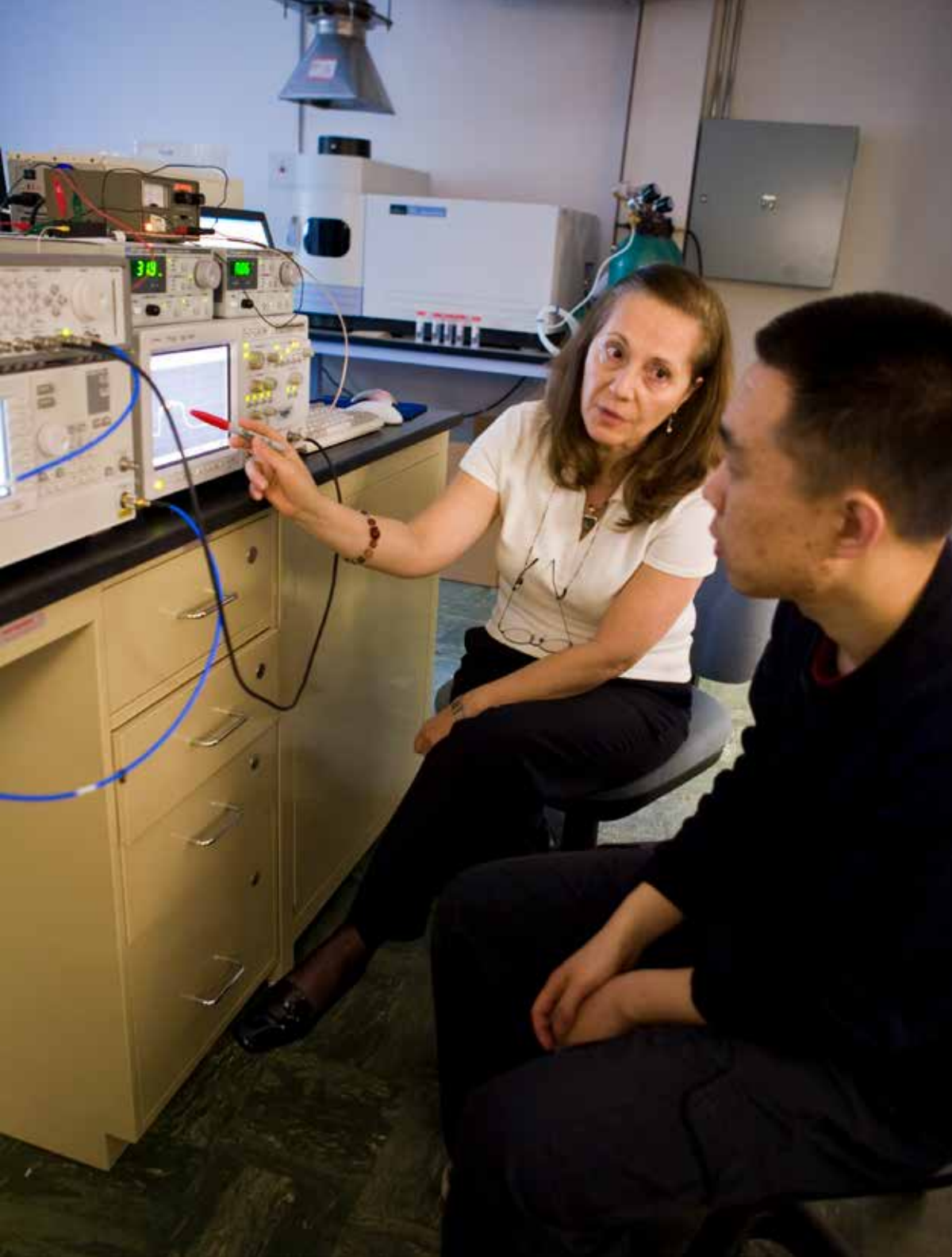
As your momentum builds, you will continue to pursue research, scientific publication, and conference presentation goals. You will achieve your third programmatic milestone: the general examination, where your doctoral committee will assess your proficiency and maturity as a scholar and researcher.

Year 5

With the guidance of your advisor and the help of the department, you will secure the next step in your career and achieve your final programmatic research milestone: your formal dissertation defense.

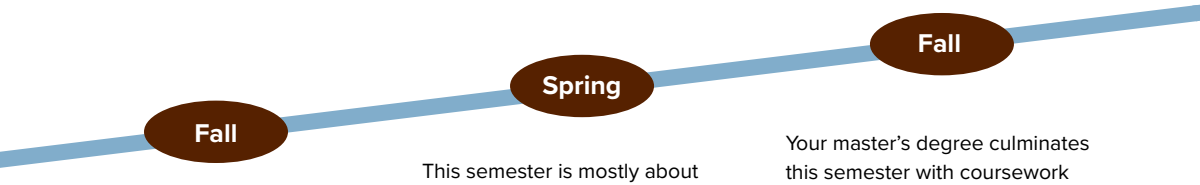
The Department of Civil and Environmental Engineering provides a supportive environment that enables doctoral students to flourish. Over the course of your studies, you will develop the knowledge, skills, and perspective necessary for true research leadership—launching you into the next phase of your career.

- **Average time to complete degree: 4.8 years**
- **Average starting professional salary: $118,000**



MASTER'S STUDIES

Lehigh's master's degrees in civil and environmental engineering are rigorous, yet designed with flexibility. Students can choose a thesis, project, or customized coursework-only path. Most programs include a small number of required courses, allowing students to select electives from a broad portfolio of offerings in CEE and other departments. The Master of Engineering (M.Eng.) in Structural Engineering is a unique program that emphasizes group and individual structural design projects. Master's students in civil and environmental engineering are continuing in their undergraduate field or come from a variety of backgrounds, including disciplines such as physics, mathematics, chemistry, and environmental sciences, as well as related technical fields. Master's programs offer an individualized, small-classroom learning environment to prepare students to launch their careers. Fully online options are available for all master's programs.



During this semester, core coursework will help you establish advanced knowledge in foundational disciplines. You will also explore career options and set professional development goals. Students intending to engage in research will begin detailed exploration of innovative opportunities, while others may begin exploring opportunities for one or two semester-long projects with faculty or industry partners.

This semester is mostly about customizing your degree with electives that will guide you in the direction of your career goals. Students may also explore research and/or project opportunities.

Your master's degree culminates this semester with coursework and project work that caps off a custom-tailored advanced degree. Your advisor, your mentoring network, and Lehigh's professional development resources will support you as you pursue the next chapter in your professional growth and career.

Graduates consistently acknowledge the critical role a Lehigh master's degree plays in their successful advancement along technical and management career paths.

- **Degree completion in as little as 1 year for all master's degrees**
- **Average starting professional salary: $90,000**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ADMISSIONS **INFO**

Application deadlines

Summer and Fall semester admission: Rolling, starting in September, but encouraged by December 15

Spring admission: Rolling, starting in August

The Department of Civil and Environmental Engineering uses a rolling admission system, so **applications are considered at all times**. All applications undergo a rigorous, holistic review. Decisions are based on factors extending beyond simple benchmarks, including motivation for advanced study, tenacious pursuit of personal and technical goals, strong or strengthening academic record, and the desire and skill set to tackle challenging questions—whether in industrial practice, the academic research lab, or even the university classroom/lab—recognizing the continuum of prior opportunities available to our applicants.

Apply today!
Scan code or visit
engineering.lehigh.edu

Application guidelines

Prior degrees: Applicants must have earned a Bachelor of Science (BS) or a Master of Science (MS) in civil or environmental engineering or a related engineering discipline by the time of their matriculation. Applicants with degrees in related science fields (e.g., physics, mathematics, environmental sciences) are also welcome.

GRE not required: Neither unofficial nor official GRE scores are required. If submitted, scores will be considered in evaluating an application.

GPA benchmark: To be considered for admission, an applicant must have an undergraduate cumulative GPA of 2.75 or higher (4.0 scale) or a GPA of 3.0 or higher for the last two semesters of undergraduate studies or in a minimum of 12 hours of graduate work at other institutions. GPA standards for international institutions will be followed accordingly. Consideration will be given to a trend showing a strengthening of core GPA during final semesters of study.

TOEFL, IELTS, or Duolingo English Test (international students only): Official internet-based TOEFL, IELTS, or Duolingo English Test scores must be submitted to Lehigh University from the testing agencies. If the applicant received a degree in the U.S. within the past two years, these test scores can be waived. All assessments are valid for only two years from the date the test was taken. *Individual "skill section score" recommendations for Lehigh University and the Internet-based TOEFL:* Writing (20), Speaking (20), Reading (20), Listening (15), Composite score (79). *Individual "skill section score" recommendations for Lehigh University and the IELTS:* Writing (6.0), Speaking (6.5), Reading (6.5), Listening (6.0), Overall score (6.5). *Recommended overall score for Lehigh University and the Duolingo English Test:* 125.

Complete applications also must include:

- **Candidate's resume** summarizing background relevant to graduate study, including (but not limited to) education/degrees (with GPA), class rank, relevant coursework, projects, research, scientific publications, relevant work experience, career goals, and extracurricular activities. The resume should be current, documenting experiences (in reverse chronological order) and all positions held up to and at the time of application.
- **Candidate's personal statement** detailing motivation for graduate study, relevant background, and, if applicable (i.e., PhD and MS applicants), research experience, specific research interests, and specific faculty of interest.
- **Complete transcripts** from each college and university attended. Unofficial copies may be uploaded by the candidate, but official transcripts from the prior institution's Registrar's Office must be submitted by candidates who accept offers of admission.
- **Letters of recommendation** – Two (2) letters of recommendation submitted online directly by qualified individuals who are able to evaluate the applicant's academic achievements and potential for graduate studies. Preference is given to letters from research advisors and professors, but relevant letters from technical/industry employers who are able to speak to a candidate's potential for graduate study/research will also be accepted.
- **Application fee** of $50 (non-refundable). Fee waivers are offered during department webinars.

Applicants who do not meet the above-mentioned requirements may be admitted at the department's discretion.

Lehigh's **Advanced Technology for Large Structural Systems** (ATLSS) Engineering Research Center includes two world-class structural testing facilities, the **ATLSS Multi-Directional Experimental Testing Laboratory** (pictured on front cover) and the **Fritz Engineering Laboratory** (shown on this page), where researchers study large-scale structural subassemblies under static, dynamic, and/or cyclic multi-directional loading with complete computer-controlled experimentation. ATLSS facilitates broad programs of graduate study and research in the fields of structures and materials.

engineering.lehigh.edu/cee

To learn more, please contact:

CEE Graduate Program Coordinator
Lehigh University
engineering@lehigh.edu

LEHIGH UNIVERSITY