Report to the President year ended June 30, 2025, Department of Civil and Environmental Engineering

Executive Summary

In MIT Civil and Environmental Engineering (CEE), we utilize innovative science and engineering to maintain a strong focus on fundamental issues related to the built and natural environment. CEE strives to create a better world by conducting research and education that is focused on delivering sustainable solutions to large-scale societal problems in material sustainability, infrastructure systems resilience and networks, climate science and engineering, food security, water, ecology and ecosystems, and environment. We focus on the knowledge needed to create sustainable solutions that benefit society from the nano to global scale. We work in and out of the classroom every day to expose our students to small-scale change that produces large-scale global impacts.
The department continued with notable advancements in research, enriched educational programs and subjects, as well as local, regional, and global gains in recognition during the 2025 academic year. We continue to enhance our leadership in the fields of structural and environmental engineering to provide the inventive, intradisciplinary research, experiences, and skills necessary for students to redefine and challenge the integrated boundaries of civil and environmental engineering in the 21st century. At the Institute, CEE faculty lead two MIT Climate Project missions, “Preserving the Atmosphere, Land and Oceans” co-led by Prof. Jesse Kroll and “Wild Cards” led by Prof. Benedetto Marelli to help accelerate solutions to address climate change.

In the 2025 academic year, we continued outreach efforts with the MIT undergraduate student population. We reached potential students through events, posters, email campaigns, student and faculty panels, the CEE website, and social media channels.

CEE research has contributed to groundbreaking methods for removing “forever chemicals” from contaminated water, improving the design and operation of wind farms, streamlining complex planning problems for improved transportation logistics, developing satellite-based methods to measure elevated carbon dioxide in terrestrial ecosystems, designing strong and sustainable materials for structural design, and uncovering new measures for reducing carbon emissions from residential heating and mitigating microplastic accumulation in aquatic systems.

Appreciating a broadly empowered vision, the Civil and Environmental Engineering profession continues to require extraordinary efforts. Our role as educators requires that we anticipate these shifts to improve and provide students more holistic and in-depth learning experiences. This provides students with a well-rounded, and solid foundation to contribute to the demands and complexities of the world. This commitment is reflected in our core mission of the department, to educate, at all levels, ranging from undergraduate to postdoctoral.

The new 1-12 Climate System Science and Engineering bachelor’s degree for addressing climate change, launched in 2023, continues to exhibit enthusiasm and excitement from Course 1-12 students who shared their experience for the major in a new video.

The Academic Programs Office collaborated with the Undergraduate Education Committee, CEE Student Association (CEESA), and Communications to promote and publicize the 1-ENG undergraduate program through countless channels such as posters and email campaigns, student highlights, career- oriented brochures, social media campaigns, and department events.
In 2024-2025 the Graduate Officer, Communications Officer, and Academic Programs Office staff worked together to successfully recruit students for all three MEng tracks in the Master of Engineering degree program.

The CEE graduate students continued their engagement in conferences and research presentations and successfully competed for several MIT and national fellowships.

Goals, Objectives, Priorities

CEE’s five strategic objectives remain the same as we continue our important work and build upon past accomplishments. This report articulates our advancements during the 2025 academic year.

1. Renew, develop & implement inspiring educational programs
2. Maintain success within the administration, facilities, and community
3. Focus on the future of CEE: Accelerated faculty hiring and junior faculty development
4. Leadership at MIT and beyond: Outward focus and initiatives
5. Alumni Engagement and Resource Development

Objective 1: Renew, develop & implement inspiring educational programs

Over the past academic year, 188 students were enrolled in CEE (29 undergraduates and 159 graduate students/doctoral candidates).

CEE awarded 18 PhD, 4 SM, and 21 MEng degrees in the graduate program and 11 SB degrees in the undergraduate program (for Bachelor of Science degrees). Of the 18 doctoral graduates, approximately one half are proceeding to careers in academia.

Undergraduate Program Academic Highlights

The 2025 academic year saw large-scale changes to Course 1-ENG, general engineering, the department’s ABET accredited Bachelor of Science degree program. After several years of gathering feedback from 1-ENG alumni, current students, faculty, industry connections, and the departments visiting committee, the Undergraduate Education Committee (UEC), under the leadership of Professor Saurabh Amin, rolled out adjustments to each of the three cores. The goal of the program changes was to expose students to move hands-on lab classes, provide more exposure to the design process, and to fill in gaps in knowledge. Examples of changes included moving 1.101 Introduction to Civil and Environmental Engineering Design to the General Department Requirements and creating new laboratory subjects, like 1.104 Sensing and Intelligent Systems, 1.105 Environmental Biology Lab. The newly revised program can be viewed here.

Another UEC initiative in the 2025 academic year was to increase the amount of exposure that our undergraduate students have to the industry to draw more connections between what they learn in the classroom and how it is applied to the “real world”. This was achieved through piloting local outings to Eastie Farm. Additionally, many subjects began weaving local site visits into the curriculum. For example, 1.080 Chemicals in the Environment took students to the Deer Island Water Treatment facility and 1.104 Sensing and Intelligent Systems took students to the Amazon Warehouse and MIT’s Cogeneration plant.

The 1-12 Governance Committee has also begun its own process of program review and revision. As the program has now been running for two full academic years, the committee is beginning the process of surveying faculty, current, students, alumni, and industry professionals to see how the program is being received and where refinements may be needed.

To better connect CEE students (both graduate and undergraduate) with internships and employment, the department joined Career Advising and Professional Developing in piloting a partnership with

Harvard's Salata Institute to host their annual Climate and Sustainability Career Expo. In addition to participating in the organization of the event, CEE also chartered a bus to take students to the expo. In this pilot year, 30 students from the department attended. This was the attendance of any department from MIT.

Broadly, the 1-ENG program prepares students for today's jobs, plus emerging new ones like Chief Resilience Officer, 3D Infrastructure Engineer, Urban Agriculturist, or Global System Architect. The 1-ENG students in the Mechanics and Materials core are pursuing careers in innovating structures, architectural design, material testing, promoting net zero energy buildings, sustainable infrastructure, and geo-tech. Environmental engineering students expressed interest in exploring bioremediation, atmospheric modeling, hydrology modeling, pollution control, enhancing food security, and mitigating climate changes. Finally, systems engineering cohorts gravitated toward applications in biological networks, traffic and transportation engineering, carbon sequestration, city planning, and in mitigating infectious diseases.

CEESA hosted social events throughout the year, including game nights and study breaks. They also continued to organize monthly faculty luncheons where they invite the undergraduate student body to have lunch with a CEE faculty member. The lunches, serve as a great way for the students to get to know the faculty on a more personal level and gain exposure to areas of research that they may not have otherwise considered. CEESA also piloted a series of mixers with undergraduates in Earth, Atmosphere, and Planetary Science and Urban Studies and Planning to grow their networks and collaborate across departments.

In Spring 2025 Chi Epsilon, the CEE honor society, partnered with the department, MIT Office of Sustainability, MIT Climate and Sustainability Consortium to host a seminar series entitled Student Stories of Sustainability. The series consisted of engaging talks where students from across MIT share their insight and work on sustainability challenges both at MIT and around the globe.

Building on the success of the department's unique mini-UROP program, the department again hosted an innovative and robust program during the 2025 Individual Activities Period (IAP). Spearheaded by Course 1 graduate students, graduate students and postdocs are paired individually with first-year students, the mini-UROP students work at least 30 hours per week in direct research over IAP. To augment the experience, the CEE Communications Lab worked closely with the participants in weekly workshop teaching them how to clearly communicate their work to the public.

Graduate and other Advance Degree Programs Academic Highlights

The Graduate Education Committee (GEC), chaired by Graduate Officer, Professor Heidi Nepf, and comprised of faculty from both Parsons and Pierce Labs worked on Graduate Education program refinement and improvement. The department also admitted 20 SM/PhD students and 18 MEng students matriculating in Fall 2025.

The Institute-wide Transitional Support Program process for students seeking support in changing advisors continues to be supported and implemented alongside the previously developed department bridge funding policy.

CEE maintains support for conference attendance with virtual options by funding 55 students over the last academic year to present their research at conferences such as, International Association of Shell and Spatial Structures, 76th Annual Meeting of the Division of Fluid Dynamics, ASCE Geo-Congress, Transportation Research Board 2025, and American Geophysical Union (AGU).

CEE graduate students continue to excel with Zane Schemmer receiving the Tucker Voss award, Matthew Goss receiving the Best Doctoral Thesis award, and Austin Saragih receiving the Maseeh Annual Award for Excellence as a Teaching Assistant.

CEE also hosted in hybrid form, the fifth-annual graduate student alumni panel, hosting young alumni from NASA Goddard Space Flight Center, SGH, Cornell University, and Ivu Biologics.

In addition, our graduate student committee, referred to as GradCom, along with other graduate students in the CEE community, and CEE faculty and staff worked closely together during this past year to host a town hall, apple picking outing, skating event, a book club, a professional headshot event, community breakfasts, and BBQs.

Postdoctoral Program

The department's postdoctoral committee has continued its path of success, providing a forum for discussion and involvement with the approximately 55 postdoctoral researchers in the department. The committee has continued its progress in understanding and addressing the professional and career development needs of the postdoctoral researchers, identifying, and improving mentoring, providing the CEE postdocs with opportunities to contribute to the department's educational programs, and overall enhancement of their MIT and CEE experience. Focus has been placed on the efforts to diversify the academic and research experience of the CEE postdocs and to provide career development opportunities and workshops relevant to the broader CEE community to include graduate students and junior faculty. Postdoctoral liaisons selected by the CEE postdoc committee each year ensure that there is on-going communication between the postdoctoral community and the department leadership.

The committee continued to organize and host regular (bi-monthly) Postdoc Seminar Series, an opportunity for the postdoctoral community to gain experience and confidence in presenting, along with learning about the research from their peers.

Other activities included once-a-semester town halls with the department head; availability of teaching fellowships to allow for postdoctoral involvement in teaching and education as part of their career development; mini-UROP mentoring, two consecutive workshops on hands-on grant writing, and a panel on giving academic talks. The postdoc teaching program has been very successful for postdocs, faculty and students and continues to provide valuable training for our postdocs. CEE postdocs continued to serve as communication fellows, teaching others how to write for science and engineering through our CEE Communications Lab. The communications fellow position is a special opportunity for select group of CEE postdocs interested in scientific writing as part of their career development.

Objective 2: Maintain success within the administration, facilities, and community

The administrative staff continues to evolve and engage with all communities, including current and prospective students, their parents, faculty, other MIT faculty/staff, external peers, alumni, and news media. We accomplish this outreach through workshops, seminar series, the dissemination of stories online, through social media, speaking engagements and other activities. Additional accomplishments and events are listed in subsequent highlights and accomplishment sections of this report.

MIT context for the role of CEE

The department's intellectual focus is discovery and innovation to sustain life and society in changing conditions. Our department's two research labs, Pierce, and Parsons, enable research to better understand and solve the grand challenges of our time, from problems created by human activity to those that exist as natural systems. Our contributions are at the core of new sustainable products and applications that are being developed today in climate and environment, food and water security, sustainable materials and infrastructures, and large-scale resilient systems design. The Department of Civil and Environmental Engineering is committed to playing a central role to support MIT's leadership in its focus on climate change.

Department Highlights: Facilities, Safety, and Operations

This year, the department made significant strides in improving research infrastructure, safety compliance, and student support spaces. Below is a summary of key accomplishments:

Lab Space Enhancements

- Room 48-428: Completed cleanout, decontamination, and relisting of the lab.
- Room 48-120: Upgraded hot water systems in the Nepf lab flumes, improving safety and resolving leakage issues.
- Room 48-433: Installed LC-MS system in coordination with MIT engineers and Acella Construction.
- Room 1-334: Managed a full lab upgrade, including asbestos testing, bench refurbishment, cabinetry updates, and EHS compliance.
- Room 1-034: Oversaw structural wall repairs with R&M Masonry.

Office and Student Space Improvements

- Room 48-212, Room 1-348, Room 48-208: Created and furnished new student group spaces with electrical upgrades and asbestos abatement where needed.
- Room 48-311: Refreshed the conference room with new finishes and layout improvements.
- Additional updates in Room 1-253, Room 1-343C, and Room 1-272 included shelving, office refreshes, and furniture installations.

Special Projects

- Room 48-130: Upgraded electrical systems in the Parsons lab atrium.

Safety and Compliance Initiatives

- Room 48-000: Refreshed Parsons basement hallway.
- Room B48: Compiled CRSP data for ADA compliance, restroom reviews, lab waste discharge, and greenhouse planning.

Policy and Process Improvements

- Developed a streamlined procedure for decluttering and managing surplus lab equipment in building 48.
- Created shared lab space and equipment check-out forms using Qualtrics in building 48.
- Developed a new departmental policy for undergraduate lab work.

Emergency Preparedness

- Updated the department's emergency management plan.
- Organized police training and preparedness sessions.

Community and Special Installations

- Developed a Parsons thesis library in Room 48-202 and Pierce book display cases
- Installed Boston Bean coffee station for community uses for coffee, tea, hot chocolates etc. in the Students Lounge

Objective 3: Focus on the future of CEE: Accelerated faculty hiring and junior faculty development

Faculty Promotions

- Admir Masic was promoted to Associate with Tenure July 1, 2024

Faculty Professorships

- David Simchi Levi was named the William Barton Rogers Professor in Energy for a five-year term effective July 1, 2024.
- Franz Josef-Ulm was named Class of 1958 Professor for a five-year term effective July 1, 2024.
- Jesse Kroll was named Peter de Florez (1938) Professor for a five-year term effective July 1, 2024.
- Gioele Zardini was named Rudge (1948) and Nancy Allen Professor effective July 1, 2024, for a three-year term.
- Saurabh Amin was named Edmund K. Turner Professor effective January 2025.

Annual Research Event

The department held its thirteenth annual CEE Research event, with lightning-round style research presentations and poster sessions by members of the CEE community. The event's theme was "Understanding the Biodiversity-Climate-Infrastructure nexus" co-chaired by Professors Admir Masic and Serguei Saavedra. The event was held on February 24, 2025. The annual event provided a view of the departments integrated approach to sustainability from the nano to planetary scale while fostering intradepartmental collaboration. Two student writers from the MIT Tech attended and wrote an article (https://thetech.com/2025/03/06/cee-symposium-2025) about the research event this year.

Objective 4: Leadership at MIT and beyond: Outward focus and initiatives

Over the 2025 academic year, the department continued its efforts to share new research, community spotlights, and happenings through all communication channels. In addition to the different seminar series initiatives that touch audiences at MIT and beyond.

CEE Communications and the Academic Programs Office collaborated to recruit undergraduate students to share their Course 1 experiences. Students shared their experiences through MIT News profiles. CEE spotlights and new classes this year. Additionally, this past year, two undergraduate students were hired as social media influencers. The students shared their experiences in Course 1-ENG and Course 1-12 through short video clips published on CEE's Instagram channel. Through sharing the direct student perspective and voice, Communications and the Academic Programs Office have continued to strengthen their connection with a younger audience to create more awareness about the civil and environmental engineering field.

CEE maintained its presence on social media, with a continued focus on sharing stories of students, postdocs, faculty, and staff who are the foundation of our department. Recognizing a decline in engagement on X, CEE opened a Bluesky account in January to share research articles. This past year, communications also engaged with alumni to share the diverse career roles and industry opportunities in the field. Each account has seen an increase in engagement and followers, with

LinkedIn leading at 16,893 followers. The investment in CEE's online presence enhances our ability to connect with alumni, potential students, academic community, industry leaders and news media outlets**.**

Objective 5: Alumni Engagement and Resource Development

Development and Fundraising
CEE had an exceptional fundraising year in fiscal year 2025, raising $10,293,248 in new gifts and pledges from 360 donors. This represented a 226% increase in new gifts and pledges received in fiscal year 2024. Of note, the department received several generous gifts supporting research, including one to the Concrete Sustainability Hub, as well as renewed support for graduate fellowships. The department continues to prioritize building the donor pipeline as well as increasing CEE's visibility among internal and external MIT stakeholders

Accomplishments of students, staff, and faculty

Student Outreach

The Academic Programs Office staff continued hosting our end-of-term grilled cheese dinners, complete with faculty chefs to serve the students before final exams. The APO team also supported a Random Acts of Kindness (RAK) week with stress relieving activities open to all community members, including DIY Boba and Bracelets and breakfast bar, Typewriter Time hosted by the CEE Comm Lab, and love note writing to place on the Wall of Hearts. We also held an Earth Day celebration event in Pierce Laboratory with succulent planting, swap-fest, and ending the event with the annual one-mile walk, complete with a trash clean-up along the Charles River coordinated by CEESA.

Samples of current CEE research highlights

The department's research is diverse and crosses many disciplines. During the 2025 academic year, below are some of the innovative research studies from faculty, postdocs and grad students.

- In August of 2024, Professor Michael Howland along with postdoc Jaime Liew, and doctoral student Kirby Heck, developed a comprehensive, physics-based model that accurately represents the airflow of wind turbine rotors even under extreme conditions. They published their innovation in the journal Nature Communications.

- In September of 2024, Prof. Benedetto Marelli, postdoc Yilin Zhang, and a team of four others at MIT developed a new filtration material that could remove long-lasting chemicals from water. Their findings were published in the journal ACS Nano.

- In October of 2024, Prof. Heidi Nepf and graduate student Ernie Lee found through their study that restoring coastal marshes provides cost effective coastal protection. Their findings were reported in Communications Earth and Environment.

- In January of 2025 Institute Professor Penny Chisolm and colleagues revealed new findings illuminate how Prochlorococcus' nightly "cross-feeding" plays a role in regulating the ocean's capacity to cycle and store carbon. Their findings were published in Science Advances.

- In February of 2025, Prof. Gioele Zardini and colleagues at ETH Zurich developed a planning tool that can help independent entities decide when they should invest in joint projects. The research presented at the 2025 American Control Conference (ACC).

- In April of 2025, a new machine learning method from Prof. Cathy Wu and graduate students in IDSS streamlines complex transportation planning problems. Their findings were presented at the International Conference on Learning Representations.

- In May of 2025, Prof. Benedetto Marelli and researchers from MIT and the SMART program develop a new technology for extending the shelf life of produce. Their study published in the journal NANO Letters.

Awards and Recognition

The faculty, students, and postdocs in CEE have received significant awards in the 2025 academic year, reflecting their excellence and impact within the Institute and beyond.

Faculty

- In August 2024, Prof. Jesse Kroll was awarded a Spark Climate grant for atmospheric methane research.
- In October 2024, Prof. Ruben Juanes was named American Physical Society (APS) Fellow. Professors Saurabh Amin, Dara Entekhabi, and Darcy McRose received 2024 Seed Awards.
- In November 2024, Prof. Michael Howland was named 2025 Young Investigator Program awardee from the Office of Naval Research.
- In December 2024, Prof. Gioele Zardini received the 2024 ETH Doctoral Dissertation Award.
- In January 2025, Professors Jinhua Zhao and Gioele Zardini were awarded a grant from the U.S. Department of Energy to enhance transit accessibility for underserved communities.
- In February 2025, Prof. Lydia Bourouiba was awarded an NSF grant to co-launch a pandemic prevention research center, Prof. Moshe Ben-Akiva was elected to the National Academy of Engineering, and Prof. Darcy McRose was named a 2025 Sloan Research Fellow.
- In March 2025, Prof. Markus Buehler received the 2025 Washington Award.
- In May 2025, Prof. Franz-Josef Ulm was honored as an ASCE Distinguished Member.
- In June 2025, Prof. Saurabh Amin received the 2025 Common Ground Excellence in Teaching Award.

Graduate Students and Postdocs

- In August 2024, graduate student Jevan Yu was awarded a Future Investigators in NASA Earth and Space Science and Technology (FINESST) Fellowship.
- In September 2024, postdoc Meng Li was awarded a U.S. Department of Agriculture fellowship.
- In April 2025, graduate student Anouk Fontaine received the Marvin E. Goody Award.
- In May 2025, graduate students Marc Foster and Lexy Lamar were named 2025 Martin Fellows.
- In June 2025, graduate students Isabella Stewart and Skylar Gering were awarded U.S. Department of Energy Computational Science Graduate Fellowship.

Faculty, Staff & Students

In May of 2025, CEE hosted its annual awards banquet at the Samberg Conference Center to honor the entire community, from students and faculty to postdocs and administration; these awards celebrate all that is CEE.

- Eldar Urkumbayev received the CEE Leadership and Community Award
- Estefano Reyes Madriz received the CEE Best Undergraduate Research Award.
- Wonu Abiodun was awarded the Juan Hermosilla (1957) Prize.
- Rita Zambrano won the Leo (Class of 1924) and Mary Grossman Award.
- Lauren Aguilar received the Paul L. Busch (1958) Prize.
- Matthew Goss earned the CEE Best Doctoral Thesis.
- Graduate students Suryataja Jammalamadaka and Ignacio Arzuaga Garcia received the Trond Kaalstad (Class of 1957) Fellowship.
- Austin Saragih received the Maseeh Annual Award for Excellence as a Teaching Assistant.
- Zane Schemmer won the Tucker-Voss Award.
- Yu-Tong Shao was presented with the inaugural Professor Jerome J. Connor Memorial Award for Best Thesis (MEng).
- Postdoc Bradley Frank received the CEE Postdoctoral Scholar Mentoring, Teaching and Excellence Award.
- Staff members Michelle McManus and Sal Netherton were presented with the CEE Excellence Award.
- Prof. Darcy McRose received the Maseeh Excellence in Teaching Award.
- Prof. Cathy Wu received the Ole Madsen Mentoring Award.
- Prof. Andrew Whittle was honored with the Distinguished Service and Leadership Award.

MIT School of Engineering Awards
CEE staff member, Lili Zhu received the Infinite Mile Award from the School of Engineering in recognition of her extraordinary contributions and excellence. For their explementary teaching and mentoring, Prof. David Des Marais received the Samuel M. Seegal Prize, and Prof. Jesse Kroll received the 2025 Capers and Marion McDonald Award.

Submitted by:

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More information about the Department of Civil and Environmental Engineering can be found at http://cee.mit.edu/

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