

Office of Engineering Outreach Programs

The [Office of Engineering Outreach Programs \(OEOP\)](#) continues to pursue its long-standing goal to diversify the science and engineering community by empowering students from underrepresented minority groups and underserved backgrounds to develop the skills and confidence needed to pursue careers in technical fields. In addition, OEOP is currently pursuing several additional goals. The office aims to achieve several goals:

- Attract students from across the country to OEOP programs.
- Increase the number of students the office serves annually.
- Continue to assess the effectiveness of the office's programmatic activities.

Programmatic Accomplishments

Student Demographic Data

In fiscal year 2018, OEOP served 348 students between MIT's Minority Introduction to Engineering and Science (MITES) Program, the Engineering Experience at MIT (E2@MIT) Program, the MIT Online Science, Technology, and Engineering Community (MOSTEC) Program, and the Saturday Engineering Enrichment and Discovery (SEED) Academy. Of those 348 students:

- More than three-quarters (77%) were from minority groups that are underrepresented in science and engineering (African American/Black, Hispanic or Latino, or Native American);
- More than half (51%) were women;
- More than two-thirds (67%) were from low-income backgrounds; and
- Nearly half (47%) would be the first in their families to earn a four-year college degree.

Impact on MIT

OEOP alumni have a large impact on MIT's undergraduate population. Evaluation of the efficacy of the office's programs suggests that students who participate in a national program (such as MITES, MOSTEC, or E2@MIT) are more likely to apply to MIT and other selective colleges, be admitted, and go on to pursue a degree in science, technology, engineering, or mathematics (STEM) field. Since 2008, 61% of OEOP alumni have attended MIT or another "most competitive" school as classified by Barron's *Profiles of American Colleges*. OEOP alumni have a six-year graduation rate of 89%, compared with the national average of 59%. More, 80% of OEOP alumni earn undergraduate STEM degrees and enter careers as scientists or engineers.

During academic year 2018, 213 OEOP alumni studied at MIT. OEOP alumni account for 4.7% of MIT's undergraduate student population. Furthermore, OEOP alumni account for 11% of all African American/Black, Hispanic or Latino, and Native American undergraduate students at MIT, significantly affecting MIT's undergraduate landscape.

Minority Introduction to Engineering and Science: June 10, 2017–July 21, 2017

OEOP served 75 students in the 2017 MITES program. Each student completed a course in calculus, physics, life sciences, and humanities, as well as one hands-on engineering elective in architecture, machine learning, electronics, engineering design, or genomics. In this six-week residential experience, 23 undergraduate students, many of whom were MITES alumni, supported the students throughout the program and afterward as peer role models, mentors, and coaches. At the end of the program, students completed and presented final projects to the MIT community during the MITES Symposium. Finally, students received support and help around the college admissions and financial aid processes from MIT Admissions.

Engineering Experience at MIT: July 23, 2017–July 30, 2017

E2@MIT served 35 students in the final year of E2@MIT. During the one-week residential enrichment program, students completed a rigorous, hands-on project course in electronics, synthetic biology, or underwater robotics. Students also attended admission and financial aid sessions with representatives from MIT, toured laboratories, and met MIT faculty, students, and alumni.

MIT Online Science Technology and Engineering Community: June 29, 2017–January 11, 2018

OEOP served 108 students in the 2017–2018 MOSTEC program. In the first month of this six-month program, students participated in an online science writing course and completed one project course in astrophysics, combinatorics, electrical engineering and computer science, mobile app development, neuroscience and connectomics, or machine learning.

At the end of their course, students traveled to MIT and presented their final projects during the five-day MOSTEC conference. Students also toured laboratories, met with MIT staff and faculty, and completed two of the following workshops: architecture, astrophysics, electronics, fluid mechanics, mechanical engineering, molecular genetics, neural engineering, or software development. After the conference, students continued to interact online through weekly webinars with STEM professionals, admissions and financial aid officers, and researchers who discussed current topics in science and engineering. Each week, they also met virtually with current undergraduates in small groups where they received additional support with their college applications.

Saturday Engineering Enrichment and Discovery Academy: September 16, 2017–May 12, 2018

OEOP provided 130 SEED Academy students with rigorous, hands-on project courses taught by MIT graduate students, postdoctoral fellows, and research scientists. In addition to the Academic Mentoring Seminar, fall and spring courses for each grade included:

- Engineering Design (seventh grade)
- Material Science and Environmental Engineering (eighth grade)
- Civil Engineering and Mechanical Engineering (ninth grade)
- Computer Science and Robotics (10th grade)

- Electronics and Robotics (11th grade)
- Biological Engineering and Robotics (12th grade)

Outside the classroom, OEOP provided SEED students with:

- Free academic tutoring in any school subject through Students of Strength (a new partnership);
- Local college tours of Tufts University and Harvard University;
- Guidance on applying to and getting into college and pursuing science and engineering majors once there;
- Free online webinars for them and their parents on topics such as financial aid and how to choose the right college; and
- STEM professionals from underrepresented minority groups and underserved backgrounds who spoke to students about their career trajectories and personal experiences.

College Preparation in SEED Academy

In summer 2017, OEOP redesigned the curriculum for the Academic Mentoring Seminar, a key SEED Academy course, to improve program continuity and maximize instructors' opportunities to build on the lessons for college preparation that students learned in previous semesters. The new seminar curriculum launched in spring 2018. The office also hosted its first college boot camp, to which OEOP alumni were invited to come and share their stories and advice about transitioning to college. This summer, OEOP will spend time in focus groups evaluating these changes and adjusting the curriculum.

Evaluation

According to OEOP's most recent data, MITES, MOSTEC, E2@MIT, and SEED alumni are prepared to tackle the challenges of the 21st century. Following participation in these programs, students displayed significant growth in their communication, collaboration, and critical thinking skills. After the fall 2017 MITES, MOSTEC, and E2@MIT programs:

- More than 90% (91%) of our students stated that their teamwork skills improved;
- More than 90% (91%) of our students felt more comfortable sharing their ideas with others;
- Almost as many (86%) of our students felt more prepared to master the most difficult material in their college courses; and
- The same proportion (86%) of our students felt more able to advocate for themselves to meet their personal needs.

Students also noted increased confidence in their ability to balance academic coursework with their outside obligations to family, work, and extracurricular activities. Following the 2018 academic year, SEED Academy found:

- More than four-fifths (85%) of its students felt more prepared to master the skills taught in their college courses;

- More than four-fifths (84%) of its students felt more prepared to balance their time between schoolwork, employment, and extracurricular activities;
- Almost as many (83%) of its students felt more prepared to ask professors about course material; and
- Just over four-fifths (81%) of its students felt more able to make changes when things do not go as planned.

Recruitment

In 2018, OEOP successfully expanded its multifaceted recruitment strategy to serve additional students in Boston and Lawrence, MA. To recruit additional Greater Boston students, the office:

- Called, emailed, and mailed informational packets to Greater Boston school officials, including teachers and guidance counselors;
- Visited six Greater Boston middle schools and high schools to recruit students in person;
- Emailed and mailed informational packets to Institute partners and Greater Boston-based organizations, including Boston After School and Beyond;
- Engaged current SEED Academy students in recruitment opportunities by encouraging them to share information with school peers; and
- Conducted informational webinars to answer prospective applicants' questions and concerns.

Partnerships

In FY2018, OEOP increased engagement with the local and national dialogue about best practices in STEM education and outreach. The office shared its experience with colleagues and met professionals in other outreach organizations to expand its staff's knowledge of best practices in STEM education through multiple outreach and speaking engagements. These efforts included the following:

- OEOP piloted "Discover MIT with the OEOP Day" with 100 10th-grade students from the John D. O'Bryant School of Mathematics and Science. Students participated in campus tours, watched demonstrations by undergraduate and graduate students, attended an admissions workshop, and went to a panel discussion in collaboration with the MIT Office of Minority Education, the MIT Office of Graduate Education, the MIT Admissions Office, and six departments at MIT.
- OEOP collaborated with Boston After School and Beyond to improve its knowledge of socioemotional skill learning and learn how we can better measure our students' growth in socioemotional skills (while also networking with other STEM outreach providers in the area).
- The executive director and manager of programs participated in the Lemelson Foundation's Invention Education Convening in Alexandria, VA, where they met professionals from other outreach organizations, made presentations on the OEOP programs, and contributed to the dialogue on making invention education accessible to all.

- The executive director and manager of programs spoke with the TV broadcast network Univision to highlight [SEED Academy](#)'s recent addition of middle-school students. [Univision broadcast this segment](#) nationwide in November and December 2017.
- The executive director attended the [50K Coalition](#) convening event, where she shared several changes she would like to see in the national landscape surrounding engineering outreach efforts to students who are members of underrepresented and underserved groups.
- The executive director also participated in, and now co-chairs, the K–12 subcommittee of the 50K Coalition, a group that aims to support the graduation of 50,000 engineers from underrepresented minority groups each year by 2025.
- The executive director and manager of programs were selected to speak at an event for [STEM Pathways](#), an organization that encourages students from underrepresented groups to engage in synthetic biology.
- The executive director and manager of programs were selected to speak with the [Engineering Ambassadors Network](#), a group funded by the National Science Foundation that trains engineering students in advanced communication and leadership techniques to conduct education outreach in engineering.
- The executive director delivered remarks during the award ceremony of an alumni reception hosted by the National Academy of Engineers and the MIT School of Engineering.
- The manager of programs attended the annual [Massachusetts STEM summit](#), a conference where attendees showcased STEM initiatives and shared innovative thinking.
- Staff attended a workshop by [QuestBridge](#) to learn about their National College Match program.
- The instructor for the Architecture elective in MIT's MITES program presented a paper/poster on his design elective to teachers, highlighting the program model.

Finances and Funding

Annually, OEOP raises approximately 80% of its \$2.1 million budget from foundations, individuals, and corporations. In FY2018, the office successfully developed and maintained partnerships and other funding to sustain its programs. To do this, OEOP:

- Collaborated with the MIT Annual Fund and participated in the second annual MIT 24-Hour Challenge on March 14, 2018, where a total of \$44,637 was raised via a \$28,500 challenge gift from two donors who are MIT alumni, including one from MITES, and an additional \$16,137 from nearly 200 donors.
- Cultivated new donors, Victor Ambros (SB '75, PhD '79) and Rosalind Candice Lee (SB '76), with the help of MIT's Office of Resource Development, and secured an endowed gift of \$500,000 to expand and support MOSTEC.
- Received a \$100,000 pledge from Mike Minnich, a long-time OEOP advisory board member, to create an OEOP endowment fund that will support all OEOP programs.

- The executive director delivered multiple presentations about OEOP programs to several groups at MIT, including all department heads, junior faculty, communication officers, and coordinators in the MIT School of Engineering (16 departments), at the MIT Annual Fund, and MIT leadership and individual giving officers.

The office received additional grant funding from the following foundations and corporations:

3M Company
 484 Phi Alpha Foundation
 Amelia Peabody Foundation
 Boeing Company
 Corning, Inc.
 D.E. Shaw & Co., L.P.
 D.E. Shaw Research
 Dorothy Lemelson Trust
 Goldman Sachs Group, Inc.
 Hopper-Dean Foundation
 Johnson Family Foundation
 Lloyd G. Balfour Foundation
 Linde Family Foundation
 Lockheed Martin Co.
 Merck & Co., Inc.
 Moses Kimball Fund
 Novartis Institutes for Biomedical Research
 Shell
 Siemens Foundation
 Simmons Foundation
 The Boston Foundation

Personnel

Adriana Espinal joined OEOP in June 2018 as the MITES program coordinator. She is an alumna of the MITES program and attended the University of Florida, earning a BS in Environmental Engineering. While at the University of Florida, Adriana engaged students as the lead mentor in a summer bridge program for students from underrepresented groups in engineering. She also served as a resident assistant in an engineering residence hall. Following graduation, Adriana worked as an engineer for a global chemical manufacturing company. She also led the creation of a mentoring program for female employees to bridge the company's gender gap.

Faika Weche joined OEOP in August 2017. She oversees the budget, human resources, and operational functions of the office. Faika received her undergraduate degree in business administration with a concentration in international studies from Suffolk University and a master's of divinity degree at the Wake Forest University School of Divinity. Faika started her MIT journey as an administrative assistant, later program coordinator, in the Department of Chemical Engineering. While managing a tutoring site part-time for the Schools on Wheels of Massachusetts with more than 50 students and volunteers, she continued to discover the power of educational enrichment.

In September 2017, Anahita Zare joined OEOP as the SEED Academy program coordinator. In this role, Anahita coordinates various aspects of the program, including staffing (undergraduate, graduate, and professional teaching staff), program logistics, student recruitment and selection, and student/parent communications and engagement. Anahita earned a BS in chemistry from Florida State University and a PhD from the Chemistry Department at the University of Missouri–Columbia, working in the Jiji Group's laboratory on developing biophysical spectroscopy techniques.

Several OEOP staff left during academic year 2018, including LaTasha Harris, SEED Academy program assistant; Karla Loveall, interim E2@MIT and SEED Academy coordinator; and Meredith Lawrence, communication and alumni coordinator.

Ebony Hearn
Executive Director