

## Office of Engineering Outreach Programs

The [Office of Engineering Outreach Programs \(OEOP\)](#) continues to pursue its long-standing goal of diversifying the science and engineering community by making it possible for students from underrepresented minority groups and underserved backgrounds to develop the skills and confidence needed to pursue careers in technical fields. The office is currently pursuing several additional goals. OEOP intends to

- attract students from across the country to OEOP programs,
- increase the number of students the office serves annually, and
- continue to assess the effectiveness of its programmatic activities.

### Programmatic Accomplishments

#### Student Demographic Data

During fiscal year 2019, OEOP served a total of 324 students in MIT's Minority Introduction to Engineering and Science (MITES) program, the MIT Online Science, Technology, and Engineering Community (MOSTEC) program, and the Saturday Engineering Enrichment and Discovery (SEED) Academy. Three SEED Academy students also participated in MITES or MOSTEC. Of these students, 50% were female; 78% were from backgrounds that are underrepresented in the science, technology, engineering, and mathematics (STEM) fields; 62% were from low-income families; and 49% were the first in their families to attend college.

#### Impact on MIT

OEOP alumni have a large impact on MIT's undergraduate population. Evaluation of the efficacy of OEOP programs suggests that students who participate in the national programs (MITES and MOSTEC) are more likely than those in the SEED Academy to apply to MIT and other selective colleges, to be admitted, and to go on to pursue a degree in a STEM field.

Since 2008, 61% of OEOP alumni have attended MIT or another "most competitive" school (as categorized in Barron's *Profiles of American Colleges*). OEOP's 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. In the fall of 2018, 208 OEOP alumni entered college. Currently, 1,132 of OEOP alumni are actively enrolled in some of the most competitive schools in the nation, including the California Institute of Technology, Carnegie Mellon University, Harvard University, and Cornell University.

During academic year 2019, 211 OEOP alumni studied at MIT. OEOP alumni account for 5% of MIT's undergraduate student population. Further, OEOP alumni account for 9% of all African American, Hispanic/Latino, and Native American undergraduate students at MIT, significantly enriching MIT's undergraduate landscape.

### **Minority Introduction to Engineering and Science: June 23–July 27, 2018**

The office served 71 students in the 2018 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. During this six-week residential experience, nine MIT undergraduates or recently graduated students—many of whom were MITES alumni—supported the students as peer role models, mentors, and coaches. The MITES students completed and presented final projects to the MIT community during the final MITES symposium, held on July 27, 2018. These students also received support around the college admissions and financial aid processes with help from the MIT admissions office.

### **MIT Online Science Technology and Engineering Community: June 27–December 19, 2018**

The office served 134 students in the 2018 MOSTEC program. MOSTEC begins with a four-week rigorous academic component; students participate in an online science writing course and complete one project course. Students could choose from astrophysics, combinatorics, electrical engineering and computer science, mobile app development, neuroscience and connectomics, or machine learning. Instructors taught classes through Google Classroom and WebEx programs; the ratio of instructors to students was 1 to 15–20. Weekly webinars and cluster meetings were run by the program administrator and cluster leaders, respectively, via WebEx; the ratio of MOSTEC staff to students was 1 to 14. During week five, students participated in a one-week conference, staying on campus and interacting with staff and instructors daily. Students also toured laboratories, met with MIT staff and faculty members, and completed two of the following workshops: Architecture, Astrophysics, Electronics, Fluid Mechanics, Mechanical Engineering, Molecular Genetics, Neural Engineering, and Software Development.

Following the conference, participants met (virtually) on a weekly basis with current undergraduates in small groups. The undergraduates offered additional support for college applications.

### **Saturday Engineering Enrichment and Discovery Academy: September 15, 2018–April 27, 2019**

During AY2019, the SEED Academy provided 123 students with rigorous, hands-on project courses taught by MIT graduate students, postdoctoral fellows, and research scientists. In addition to the academic mentoring seminar course, each student completed one of the project courses, which differed by grade.

- 7th grade (Class of 2023), Engineering Design
- 8th grade (Class of 2022), Environmental Engineering
- 9th grade (Class of 2021), Mechanical Engineering
- 10th grade (Class of 2020), Robotics
- 11th grade (Class of 2019), Robotics
- 12th grade (Class of 2018), Electronics

Outside the classroom, OEOP provided SEED Academy students with the following:

- Free academic tutoring in all subjects;
- Tours of local colleges, including the Franklin W. Olin College of Engineering, Brown University, Wentworth Institute of Technology, MIT, Tufts University, Harvard University, and the Worcester Polytechnic Institute;
- Guidance on applying to and getting into college and pursuing science and engineering majors once there;
- A college fair where more than 35 of the country's top colleges and universities appeared, including MIT, Harvard University, Boston University, Boston College, Yale University, Princeton University, Stanford University, and the California Institute of Technology;
- Free online webinars for students and parents on topics such as financial aid and choosing the right college; and
- Contact with STEM professionals from underrepresented minority groups and underserved communities who spoke to students about their career trajectories and personal experiences.

In 2018, OEOP changed the SEED Academy's application deadline from December to November. This shift in date resulted in a record number of 164 applications. During January, the office invited 84 students to interview for the spring SEED Academy spots. In February 2019, OEOP accepted 23 new students for the spring SEED Academy.

### ***Evaluation***

The office uses both quantitative and qualitative metrics to assess program success and to help instructors prepare curricula that are tailored to meet the students' needs. OEOP also examines other measures of success, including graduating students' college enrollments, their choices of major, and the time it takes them to obtain a degree. Students complete pre- and post-program surveys to measure their self-efficacy, resilience, and level of interest in STEM fields and in college. Post-program surveys also track students' semester-to-semester growth and provide timely feedback on OEOP's curricula and class content. OEOP also administers surveys to our alumni that help us track their post-college careers choices.

Based on students' assessments and feedback, OEOP students achieved the following in AY2019:

- expanded understanding of and interest in STEM curricula
- increased interest in pursuing STEM careers
- higher expectations for and understanding of the college application process
- greater interest in majoring in technical fields

Perhaps just as telling is the feedback from OEOP's students. At the end of the semester, one graduating SEED Academy senior offered this remark: "SEED has enabled me to learn so much more about science and engineering than I could have possibly learned at school, and gave me many amazing opportunities to interact with other students passionate about science and work on cool projects to apply my knowledge."

The following quotes are responses to a question about whether the MITES program increased participants' confidence:

- "MITES humbled me, but now I know what I'm capable of. The classes affected my confidence the most."
- "Being surrounded by a bunch of gifted students, and then being told that I'm like them really built up my confidence."
- "The coursework made me much more confident in my ability to tackle anything challenging, and complete it."

### **Recruitment**

In addition to changing the SEED Academy application deadline, OEOP successfully expanded its multifaceted recruitment strategy to serve additional students in Greater Boston and Lawrence. The office took the following steps:

- Called, emailed, and mailed informational packets to Greater Boston school officials, including teachers and guidance counselors.
- Visited 19 Greater Boston middle schools and high schools—including schools in Lawrence and Worcester—to recruit students in person and spread the word among staff members.
- 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 by encouraging them to share information with school peers.
- Conducted informational webinars to answer prospective applicants' questions and concerns.

The office's executive director made a recruitment trip to Detroit to increase the number of underrepresented minority group members from that region in the MITES and MOSTEC programs. Ebony Hearn '01 met with Detroit community members, guidance counselors, and teachers. The visit resulted in a substantial increase in Detroit-based applicants to MITES and MOSTEC.

### **Partnerships**

In FY2019, OEOP increased engagement with local and national conversations on best practices in STEM education and outreach. Office staff shared their experience with colleagues and met professionals in other outreach organizations. The goal was to

expand OEOP's knowledge of best practices in STEM education through a number of outreach and speaking engagements.

In March, OEOP staff attended a summit in Mountain View, CA, hosted by the Hopper Dean Foundation for their grant recipients. Fellow attendees included representatives from Carnegie Mellon University, the University of Washington, the University of California, Berkeley, Washington University in St. Louis, and Stanford University. Attendees discussed OEOP's efforts to broaden its participation in artificial intelligence and computing science.

OEOP partnered with Microsoft and a San Francisco-based law firm to organize "Prepared to Prevail: Careers in Tech," a panel discussion held in San Francisco that featured OEOP alumni and local nonprofit organizations interested in supporting diversity in STEM fields and in industry. OEOP also participated in the Artificial Intelligence for All Conference at Stanford University.

The office gave a presentation on OEOP's activities to MIT's Resource and Development staff and to deans and practitioners at local colleges' schools of engineering. Local schools to which the presentation was made included Boston University, the Franklin W. Olin College of Engineering, Tufts University, Northeastern University, Boston College, and Harvard University.

In an effort to increase the number of program participants from geographically diverse regions and improve OEOP's national visibility, the office is increasing recruitment and outreach efforts to areas beyond Boston. In September 2018, OEOP's Executive Director Ebony Hearn '01 traveled to Detroit, where some major donors to OEOP are located. Ms. Hearn met with local teachers, education-focused community groups, and school leadership members to promote OEOP's programming and mission. Following this trip, MITES and MOSTEC applications from Detroit students increased fivefold. Closer to home, Ms. Hearn made similar efforts to enlist the aid of donors, community members, and educators in Worcester, MA, and the number of MITES and MOSTEC applicants from Worcester increased from two to 15.

The office works with youth-focused nonprofits as well as with teachers and guidance counselors from schools across the country to recommend and recruit students to OEOP programs. As an active member of the National Partnership for Educational Access, OEOP regularly participates in the partnership's conferences and professional development workshops. The office also continued to collaborate with Boston After School and Beyond to improve the staff's knowledge of socio-emotional skill building and ability to measure socio-emotional skill growth, and to build a network with staff from other after-school programs.

OEOP is an active member of the 50K Coalition—an alliance of professional societies, colleges and universities, and corporations—whose mission is to graduate 50,000 engineers from underrepresented minority groups annually until 2025.

## Finances and Funding

The office is able to provide free programming because it secures more than 80% of its budget from outside sources. OEOP works with MIT's central development office and staff within the School of Engineering to solicit funds from individuals, foundations, and corporations. Specific sustainability measures include:

- Scheduling regular meetings with funders to discuss their funding goals and the OEOP's program accomplishments and needs;
- Participating in MIT's annual 2019 24-Hour Challenge on March 14th (Pi Day), where 302 donors gave (far exceeding our 225 goal), and we raised a total of \$65,748 with the help of two anonymous donors;
- Having the executive director deliver presentations about OEOP programs to groups at MIT, including junior faculty members and department heads at MIT's School of Engineering, with the goal of sharing OEOP's work and attracting instructors and mentors to its programs;
- Hosting corporate networking events that are attended by OEOP corporate sponsors and recent OEOP alumni; and
- Increasing OEOP alumni activity, holding events in Boston, San Francisco, and New York City; more than 100 OEOP alumni gave \$337,000 in gifts and pledges this year.

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

3M  
 484 Phi Alpha Foundation  
 Apple Matching Gifts Program  
 Amelia Peabody Foundation  
 Ayco Charitable Foundation  
 Baxter International Foundation  
 Bank of America Charitable Gift Fund  
 Benevity Community Impact Fund  
 Boeing  
 The Boston Foundation  
 Charles Hayden Foundation  
 Corning, Inc.  
 D. E. Shaw & Co.  
 D. E. Shaw Research  
 Dorothy Lemelson Trust  
 ExxonMobile Foundation

Fidelity Foundation  
 Fidelity Charitable Gift Fund  
 Google Foundation  
 Hopper-Dean Foundation  
 Johnson Family Foundation  
 Lloyd G. Balfour Foundation  
 Linde Family Foundation  
 Lockheed Martin Corporation  
 Merck & Co., Inc.  
 Microsoft Corporation  
 Moses Kimball Fund  
 Novartis Institutes for Biomedical Research  
 P&C Fund for Charitable Giving  
 San Francisco Foundation  
 Schwab Fund for Charitable Giving  
 Shell  
 Texas Instruments Fund  
 Vertex Pharmaceuticals, Inc.  
 Wells Fargo Foundation

## Personnel

### Appointments

**Ronald Pannell II, SEED program assistant (joined September 2018).** Ron supports the daily functions of the SEED program. His background in higher education includes work in various educational offices, such as the Office of Student Engagement, the Office of the Registrar, and the International Education Programs office. He is looking forward to carrying out the mission of the SEED Academy to empower students from underrepresented and underserved groups, believing that education is the key to upward mobility and financial security. Ron is currently studying for a master's degree in public administration at the University of Massachusetts, Lowell. The master's program is a continuation of his studies in political science as an undergraduate at Fayetteville State University in North Carolina.

**Annie Grant, MOSTEC program coordinator (joined October 2018).** Annie began work as the MOSTEC program coordinator in fall 2018. Originally from Virginia, she joined OEOP with a background in science education, outreach, and youth development. Annie received her bachelor's degree in gender studies with a minor in environmental science from the University of Virginia in 2011. On graduation, Annie began her teaching career in Memphis, TN, as a 2011 Teach For America corps member. She spent the next six

years teaching elementary- and middle-school science in urban and rural communities across Tennessee. While earning a graduate certificate in geographic information systems from East Tennessee State University, Annie hosted professional development sessions for teachers of kindergarten through 12th grade (K–12). She also served as a liaison between the university, local schools, and community organizations while spearheading several environmental and STEM outreach initiatives that served more than 300 students in grades K–12. Annie is anticipating joining her passions for social justice, science, and leadership development to make high-quality STEM opportunities more accessible.

**Laura Beretsky, grant writer (joined March 2019).** Originally from New York City, Laura has more than 25 years of development and fundraising experience. Before joining OEOP, Laura provided development consulting and grant writing for out-of-school and after-school programs for Boston- and Cambridge-based nonprofits. Raising funds for these organizations provided her with insight about the critical role out-of-school and after-school programming plays in increasing academic and economic success for youths from under-resourced groups. Laura has a degree in communications from the University of Massachusetts, Amherst.

**Dora Gonzalez, communications administrator (joined May 2019).** Dora contributes to communications strategies, executes marketing activities to build awareness and stimulate engagement in OEOP programs, and helps generate financial support for OEOP activities. Dora has extensive experience in developing and implementing successful campaigns that support organizational strategic goals and increase audience reach and brand awareness. Prior to joining OEOP, she was senior associate at the strategic communications firm Sharon Merrill Associates. At Sharon Merrill, she counseled public and private companies on investor relations and public relations issues, including corporate messaging, media relations planning and execution, digital communications, social media campaign strategies, internal communications, and event planning. Dora’s achievements include winning an American Business Award for Best Twitter Feed and two Stevie Awards for Women in Business for Sharon Merrill Associates. Dora holds a master’s degree in communication management from Emerson College and a bachelor’s degree in journalism and media studies from the Monterrey Institute of Technology in Monterrey, Mexico.

## Departures

Jazzmyne Washington, MOSTEC coordinator (departed August 2018)

Tasha Harris, SEED program assistant (departed June 2018)

Tobias Bennett, grant writer (departed September 2018)

Adia Wallace (departed October 2018)

**Eboney Hearn**  
Executive Director