

MIT 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 and underserved backgrounds to develop the skills and confidence needed to pursue careers in technical fields. In addition, OEOP is currently pursuing several other 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 and Student Demographic Data

During AY2021, we served 340 students from the MIT Online Science, Technology, and Engineering Community (MOSTEC) and the Saturday Engineering Enrichment and Discovery (SEED) Academy. We could not offer the Minority Introduction to Engineering and Science (MITES) program due to the pandemic. In an effort to serve our MITES applicants, OEOP considered interested 2020 MITES applicants for the MOSTEC program. The office received over 2,300 applications for the MITES and MOSTEC programs. In the face of the pandemic, the OEOP management team planned for an expanded MOSTEC program, increasing our staff by 39% to accommodate the expanded MOSTEC 2020 class of 230 students (up from 137 in 2019).

OEOP's students are diverse: in addition to representing 34 states, 51% of our students are female; 78% are from racial backgrounds that are underrepresented in science, technology, engineering, and mathematics (STEM) fields; 71% are from low-income backgrounds; and 51% are the first in their families to attend college. OEOP's program brand places a unique emphasis on a positive educational environment that cultivates strong ties between teachers and students and a community of supportive peers. This model creates a sense of belonging among students while building self-confidence in their STEM abilities, both of which are critical to students' success.

Impact on MIT

OEOP alumni have a large impact on MIT's undergraduate population. Evaluations of the efficacy of our programs suggest that students who participate in a national program (i.e., MITES or MOSTEC) are more likely to apply to MIT and other selective colleges, be admitted, and go on to pursue a degree in a STEM field.

Of the 2018–2019 OEOP alumni who enrolled in college, 64% attended MIT or another "most competitive" school as classified by Barron's *Profiles of American Colleges*. Our alumni have a six-year graduation rate of 89%, as compared with the national average of 59%. Moreover, 79% of OEOP alumni earn undergraduate STEM degrees and enter careers as scientists or engineers. In fall 2020, approximately 230 OEOP alumni entered college. Currently, 90% of our alumni are actively matriculated in some of the most competitive schools across the nation, including the California Institute of Technology, Carnegie Mellon, Harvard, and Cornell.

MIT Online Science Technology and Engineering Community

July 1, 2020 to December 13, 2020

We received approximately 2,300 MITES/MOSTEC applications, from which 252 students were admitted and 230 enrolled. Our virtual pivot allowed us to accommodate the 2020 MITES class by expanding MOSTEC from 137 to 230 juniors. As noted, we increased the MOSTEC staff by 39%, hiring two additional instructors, two online facilitators, and one additional head facilitator.

During MOSTEC's first five weeks, students completed two online courses and collaborated virtually to create a project. Courses included Science Writing, Astro Physics, Connectomics, Neuroscience, Mobile App Development, and Computational Biology. Instructors presented real-life challenges, and students created solutions online in class and chat rooms. We produced our first virtual final symposium, where students presented their projects and listened to guest speakers including Senator Alex Padilla. Approximately 740 people attended, including family members, staff, and guests. Students also attended a virtual college fair where 34 colleges exhibited.

Following the symposium, participants met virtually on a weekly basis with current undergraduates in small groups, where they received additional support on their college applications. MOSTEC offered admissions corners via a Slack chatroom where participants could access instructors for assistance with and feedback on college essays and mock college interviews. We also offered question-and-answer (Q&A) conversational speed-networking sessions where participants interacted with current MIT undergraduates, graduates, and STEM professionals including OEOP alumni.

Saturday Engineering Enrichment and Discovery Academy

September 12, 2020 to May 15, 2021

The OEOP fall semester launched virtually on September 12, 2020, serving 111 Lawrence, Cambridge, and Boston students. In keeping with our mission to increase diversity in STEM education access, 76% of SEED students came from ethnic backgrounds typically underrepresented in STEM fields, 55% identified as female, 60% were from low-income backgrounds, and 61% were the first in their families to attend college.

Each semester, students met for eight weeks online on Saturdays from 9:45 am to 2 pm and regularly worked together outside of class for at least three hours. In addition to our project-based curricula, students participated in academic mentoring seminars that provided critical advice about the college application process while preparing students for the college experience by teaching them important life skills including time/stress management, goal setting, and organization.

Our first virtual SEED final symposium was held on November 21, 2020, and attended by 189 people, including students, teachers, and family/community members. Our spring 2021 SEED semester launched virtually on February 27, 2021, with 102 students. SEED's online final symposium was held on May 15 with 186 attendees. Our keynote speaker was Asegun Henry, an associate professor in the Department of Mechanical Engineering.

Outside the virtual classroom, SEED students received academic tutoring, had access to an OEO virtual college fair with 34 exhibits, and were given guidance on applying to college and pursuing STEM. In addition, students and parents took part in online webinars on topics including financial aid and choosing the right college, and students had opportunities for contact with underrepresented and underserved STEM professionals who shared information about their personal and professional experiences.

We collected and incorporated participants' feedback, ensuring that students had an engaging, hands-on transformational experience that expanded their interest in STEM, increased their understanding of STEM career opportunities, and guided them through the college admissions and financial aid application processes. All 19 of our 2021 SEED seniors are currently enrolled at selective or highly selective colleges.

SEED Academy Fall 2020 Curriculum

Grade	Graduating class	Course title
8	2024	Materials Science
9	2023	Mechanical Engineering
10	2022	Computer Science
11	2021	Website Development
12	2020	Engineering Design/Architecture

SEED Academy Spring 2021 Curriculum

Grade	Graduating class	Course title
8	2025	Environmental Engineering
9	2024	Civil Engineering
10	2023	Robotics
11	2022	Biological Engineering
12	2021	Engineering Design (senior capstone)

We will launch the fall 2021 SEED Academy in person, with an orientation on September 18 followed by seven Saturday sessions that will culminate with a final symposium on November 20.

Evaluation

OEO relies on the National Clearinghouse Database and MIT's Institutional Research enrollment data for success metrics, such as graduating students' college enrollment, choice of major, and the time it takes to obtain a degree. In addition, students complete pre- and post-program surveys to measure their interest level in STEM and college, self-efficacy, and resilience. Post-program surveys also track students' semester-to-semester growth and provide timely feedback on our curriculum/class content. OEO examines other measures of success as well, including graduating students' college enrollment, choice of major, and post-college career choices.

Based on OEO student assessments, students achieved the following:

- Expanded understanding of STEM fields and increased levels of interest in the STEM curriculum
- Greater understanding of the college application process, resulting in higher expectations for admittance and more applications per student to a wider array of colleges
- Enhanced interest in majoring in technical fields and pursuing STEM careers

Student feedback is also an important measure of success, including comments such as these below.

SEED Academy is a program I will never forget. Because of SEED, I fell in love with science and engineering. I learned a lot from people who inspired me and pushed me to explore my passions. I also made connections that will last a long time that I would not have made otherwise. Every Saturday I attended the program I was surrounded by people successful in their field, as well as incredibly smart kids. I owe SEED Academy for my newly found willingness to be confident and try new things, which is something I will always carry with me through my college career and life.

I am truly thankful for experiencing MOSTEC.... I have grown so much as a person and gained confidence in myself. I have found a community in which I feel a sense of belonging. MOSTEC has helped me become the best version of myself. I feel academically and emotionally prepared for college.

Our alumni's career trajectories are another measure of OEOP programs' success. Below are links to OEOP alumni whose accomplishments and stories were featured online and in the media.

[Danielle Geathers](#) MOSTEC '17, MIT '22: In 2020, Danielle became the first Black woman ever to serve as [MIT's student body president](#). Now a rising MIT senior, Danielle is pursuing a BS in mechanical engineering. Upon graduation, she intends to pursue a career in patent law and hopes to close the racial innovation gap.

[Nikayah Etienne](#) MITES '14, MIT '19: First-generation college student Nikayah was part of the Teaching Systems Lab while at MIT, where she worked on several education-based research projects. Currently, she is a mechanical engineer with the Escape and Life Support Team at Lockheed Martin, where she has worked since 2019. She is also a member of Lockheed Martin's Diversity and Inclusion Council.

[Ashia Wilson](#) MITES '06, Harvard '11, University of California at Berkeley (UC Berkeley) '18: With a degree in applied mathematics and philosophy from Harvard and a statistics PhD from UC Berkeley, Ashia joined MIT's Department of Electrical Engineering and Computer Science (EECS) in January as an assistant professor. She is the first Black woman to serve as an EECS faculty member.

Recruitment

In accord with OEOP's mission to diversify the STEM community, we place special emphasis on recruiting students from underserved and underrepresented backgrounds. In an effort to increase our MOSTEC participants' geographic diversity and improve our national visibility, OEOP has increased outreach to areas beyond Massachusetts. Due to

COVID-19, all of our recruitment efforts took place virtually via Zoom. They included two Q&A sessions with alumni for students interested in MOSTEC, two program overviews for educators, five open office hour sessions where we offered MOSTEC application assistance and support, and an essay writing workshop where we gave pointers on answering long-form MOSTEC application questions.

Due to COVID-19, we did not accept new SEED Academy students in the seventh, eighth, and ninth grades, and thus did not implement our typical SEED student outreach and recruitment activities during the reporting period. Despite this, we invited some students who were waitlisted from the previous year. Also, in an effort to maintain relationships and further staff engagement, we invited our teacher recruitment contacts to the SEED final symposium.

Partnerships

In AY2021, we expanded the local and national dialogue and engagement surrounding best practices in STEM education. With the recent pivot to virtual, OEOP staff also dedicated significant resources toward developing online curricula and activities that engaged our students. The pandemic forced those in the STEM education field to reshape their curricula and add support to assist students with this challenging transition. We shared our experiences and met with colleagues to increase our knowledge of best practices through collaborations, outreach, and speaking engagements, as outlined below.

- **Biogen/Lemelson:** We enhanced our virtual curriculum through a collaboration with the Biogen Community Lab and the Lemelson-MIT Program. On March 6, Biogen staff gave a presentation on biotechnology and Alzheimer's disease that offered students an in-depth view of medical inventions to treat Alzheimer's. The virtual event attracted students from Spain, Portugal, the Lemelson-MIT Program, and the SEED Academy.
- **Lincoln Laboratory:** With 11 years of experience running our successful online MOSTEC program, OEOP continues to serve as a leader at MIT in the K–12 virtual programming world. In addition to sharing the MOSTEC program's evolution and development in a campus-wide learning group, we are currently collaborating with Lincoln Lab's [Beaver Works program](#), a rigorous, world-class STEM program for talented rising high school seniors. We are utilizing an altered version of the lab's [RACECAR](#) curriculum for our 10th-grade robotics course, and a SEED instructor participated in teacher training for this earlier in the winter.
- **MIT Edgerton Center:** We are using the Edgerton Center's molecule kits and camera sets for remote learning in our eighth-grade environmental engineering course.
- **National computer science education convening:** OEOP was awarded a two-year grant in 2019 to support computer science education in all OEOP programs. Ebony Hearn participates in a monthly convening of all award recipients, including the University of California at Berkeley, Howard University, Georgia Tech, Cornell, and Carnegie Mellon. This group is creating a guidebook of best practices in broadening participation in computer science from K–12 through the professoriate.

- Steve Fund/supporting students' social-emotional wellness: We heard from SEED parents whose children's mental health was negatively impacted by the pandemic and the societal pivot to virtual learning. Given these social-emotional challenges, we continued our collaboration with the Steve Fund, which supports the mental health and well-being of young Black, Indigenous, people of color (BIPOC). We also initiated a partnership with Peace at Home, a parent center that supports and educates parents to provide guidance to their STEM-interested tweens/teens.

Finances and Funding

OEOP is able to provide free programming because we secure over 60% of our budget from outside sources. We work 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:

- Identifying, cultivating, soliciting, and stewarding major donors, mostly MIT alumni, with the support of MIT School of Engineering and central development staff. The goal is to improve overall giving to the OEOP endowed funds.
- Monitoring spending closely and identifying opportunities for cost sharing to help build up a reserve in the case that fundraising is impacted, as it was this past fiscal year with a \$250,000 decrease in sponsorship from corporations.
- Participating in MIT's annual 24-Hour Challenge on March 11, where 201 donors gave and we raised a total of \$42,889.
- Delivering presentations about our programs to groups at MIT, including the MIT Alumni Association, junior faculty, and department heads in MIT's School of Engineering, with the goal of sharing our work and attracting volunteers, instructors, and mentors to our programs.
- Hosting corporate networking events attended by OEOP corporate sponsors and recent OEOP alumni.
- Increasing OEOP alumni activity and philanthropy, with office staff members continuing their efforts to identify, cultivate, and solicit donations from alumni.

In addition, OEOP received grant funding from the following foundations and corporations:

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

Exxon Mobil Foundation	Merck & Co. Inc.
Fidelity Charitable Gift Fund	Microsoft Corporation
Fidelity Foundation	P&C Fund for Charitable Giving
Google Foundation	San Francisco Foundation
Hopper Dean Foundation	Schwab Fund for Charitable Giving
Johnson Family Foundation	Shell
Linde Family Foundation	Texas Instruments Fund
Lloyd G. Balfour Foundation	

Personnel

Appointments

Lynsey Ford joined OEOP in February 2021 as program administrator for SEED. In this role, she is responsible for the planning and execution of the multi-year program, including logistics, student and staff well-being, training and management, and fostering relationships with families and schools in the Boston, Cambridge, and Lawrence areas. Ford holds a bachelor of science in chemical engineering from Brown University. She is deeply passionate about fun science education and diversity in STEM.

Carissa Leal joined OEOP in June 2021 as senior administrative assistant. She is responsible for the hidden mechanics that keep the office running at top speed. Prior to joining the office, Leal worked in various other administrative support positions, including posts at Simmons University, the MIT Sloan School of Management, the Broad Institute, and the Girl Scouts of Eastern Massachusetts. Leal holds a BA in literature with a focus on medieval studies and theater from Saint Michael's College and an MLA from Harvard University's School of Extension Studies in Literature.

LaShauna Walker joined OEOP in July 2021 as alumni relations and fundraising officer. She is responsible for managing OEOP's fundraising strategy, soliciting donors, and building and engaging the OEOP community. Prior to joining the office, Walker was associate director of class giving at the MIT Alumni Association where she successfully managed reunion gift campaigns for the 30th, 35th, and 45th classes. She has creative fundraising skills and is committed to creating meaningful volunteer experiences. She holds an associate degree from Roxbury Community College and a bachelor's degree from the University of Massachusetts, Boston.

Departures

SEED Academy program administrator Anahita Zare left the office in October 2020.

Ebony Hearn
Executive Director