

Gordon–MIT Engineering Leadership Program/ Undergraduate Practice Opportunities Program

Launched in July 2007 through a \$20 million pledge (with a matching component) from the Bernard M. Gordon Foundation (the largest gift made to MIT's School of Engineering for curriculum development), the [Gordon–MIT Engineering Leadership \(GEL\) Program](#) was established to educate and develop the character of outstanding MIT students as potential future leaders in the world of engineering practice, and to be a catalyst in transforming engineering leadership—thereby significantly increasing our national product development capability.

The program provides a challenging yet supportive environment to a select group of MIT engineering undergraduates in which they develop leadership and professional skills that help them to become highly effective leaders of engineering teams. This year, over 200 rising juniors and seniors applied to the program, primarily motivated by excellent recommendations from former participants. Admission into the program is based primarily on a student's commitment to participate and engage fully. The first year of the program (GEL 1) introduces students to engineering leadership experiences and development. Approximately 130 students participate. For a select group of 30 to 35 students, the second year of GEL (GEL 2) is an intensely personalized leadership and professional development program that includes opportunities for leadership practice and significant interactions with engineering industry leaders, staff, and peers.

The GEL Program has continued with its plans for expansion into the MIT graduate community and is working closely with the Office of the Vice Chancellor, and the Dean of Engineering in conjunction with the Dean's Student Advisory Group to better understand the desires of students regarding the need for engineering leadership education and professional development at MIT. Our shared mission is to provide more opportunities for graduate students to develop themselves professionally as effective and impactful leaders who will be charged with solving the world's most challenging and complex problems.

The Undergraduate Practice Opportunities Program (UPOP) predates the GEL program. It was launched in 2001 as an initiative of the dean of the School of Engineering, then Thomas Magnanti. UPOP is a yearlong program that prepares MIT sophomores to enter and thrive in the professional world through experiential learning, individual coaching, access to internships, and mentoring relationships with MIT alumni/ae and engineering industry partners. It includes an intense weeklong workshop during January as well as support for students to obtain a summer internship and gain practicum experience in their field. In 2008, when the GEL program was formed, UPOP became a part of the GEL Program, forming a natural progression from UPOP in the sophomore year to GEL 1 and GEL 2 in the junior and senior years. It is worth noting that while UPOP is a viable entryway into GEL, it is not a prerequisite.

A UPOP organizational restructuring late in AY2013 streamlined the alignment of UPOP and the GEL Program, generating improved synergy and use of resources.

In June 2016, the Biological Engineering Communication Lab moved under the Gordon Program and became the MIT School of Engineering Communication Lab. It uses a very effective franchise model to provide structured and need-driven peer coaching for papers, presentations, faculty applications, lab reports, and other related items primarily to graduate students. Participating departments and organizations at present are Biological Engineering, Nuclear Science and Engineering, the Broad Institute, Electrical Engineering and Computer Science, Mechanical Engineering, and Chemical Engineering.

Gordon-MIT Engineering Leadership Program

Educating tomorrow's engineering leaders requires an approach that incorporates students' professional, personal, and leadership progression in an environment that fosters the development of core values and which builds upon the strong technical fundamentals of a rigorous MIT education.

Students in the GEL Program enhance their departmental education by developing their leadership and teamwork skills in an engineering context, helping prepare them to be effective and successful in an engineering setting. In addition, the GEL Program provides supplemental opportunities in leadership and innovation, character development, invention, and implementation. The program is delivered through a dedicated instructional staff augmented by collaborations with engineering industry and volunteer mentors and "engineers in the room." The program also offers professional education opportunities for early- and mid-career engineering professionals.

Sustained program growth during AY2019 resulted in increasing relevance both within the Institute and beyond. A major goal of GEL is to educate and prepare future leaders in engineering innovation, invention, and implementation efforts.

Rising juniors and seniors from engineering and other select departments are encouraged to apply to the first year of the program. UPOP serves as a recommended pathway into the GEL Program (in AY2019, 51% of incoming GELs came from UPOP), but students can also enter by having demonstrated equivalent experience on an engineering project in an academic or industrial setting. Students in the GEL1 program actively participate in a set of augmenting elective subjects and immersive learning experiences that, taken together, approximate the level of an MIT concentration.

Students who demonstrate outstanding leadership potential in engineering industry and remain on track to successfully complete the first-year program requirements are eligible to apply for advancement to the selective GEL 2 program. The combined two-year program requirements approximate the level of an MIT minor.

The current projection is that 140 students will enter GEL 1 in fall 2019, up from an initial cohort of 17 in fall 2008. These students will represent 13 departments across the Institute, including all of the engineering departments. A new record of 35 students will advance to GEL 2.

The incoming GEL 1 student cohort will largely represent MIT's School of Engineering (in proportion to department size), but also include students who have expressed an interest in engineering from Courses 7, 8, 9, 11, 15, 18, and the Program in Science, Technology

and Society. Since one of the program’s objectives is to prepare GEL students to work in the engineering industry with professionals from other disciplines, it is important that GEL students learn how to collaborate effectively at an early stage in their education.

In support of the GEL Program’s ongoing efforts to develop MIT students into emerging engineering leaders, the program’s faculty and staff also collaborate with MIT’s Professional Education Program to create and deliver courses on engineering leadership and on innovation for early and midcareer engineering professionals. For the summer 2019 Professional Education course cycle, the GEL Program will have 45 participants in Engineering Leadership for Emerging Leaders and 60 participants in Mastering Innovation and Design-Thinking. Both of these courses have consistently received positive feedback, and they contribute funding to GEL’s operating budget. We are exploring the possibility of increasing our future course offerings and continuing to work with participants from local companies who can participate in the program as mentors and “engineers in the room.”

Program Expansion and Development

The GEL Program has become widely acknowledged by the Institute and engineering industry stakeholders as a valuable asset to students’ educational experience and as a successful tool for developing future leaders in the world of engineering practice. The program’s impact has strengthened at the Institute through collaborations with related programs such as the School of Engineering’s New Engineering Education Transformation (NEET) Program. Of related note, GEL is leading a joint initiative with the Department of Linguistics and Philosophy in the School of Humanities and Social Sciences to develop modules on ethics education for NEET students.

The program continues to serve its larger mission of developing students into engineering leaders. In light of recent engineering educational research that suggests common misunderstandings about engineering careers, the GEL Program is motivated to clarify the idea that students need not choose between engineering and managerial careers, nor must they leave engineering in order to pursue an executive track. Specifically, we are working to deepen the impact of the program’s undergraduate experience through enhancing the GEL internship experience. Our aim is to increase the number GEL graduates who go into engineering industry after graduation and to show them how engineering can be a meaningful career choice that adds value to the world.

GEL has partnered with Northrop Grumman to create a pilot internship program that would keep students challenged through impactful engineering assignments in which their work would contribute to the project’s larger purpose and company’s overall vision. “Impactships” will include high expectations for mentorship from internship supervisors. Mentors would be expected to engage, challenge, and critique student work. While GEL currently developed an InternshipPlus experience for incoming second-year students, most of the responsibility for finding an internship is placed on the student. Impactships would co-exist with our the InternshipPlus program but differ in that GEL would actively seek company sponsors to create one to two Impactships for GEL students under the agreement that these internships offer high-impact assignment opportunities with serious responsibilities, and pair committed and passionate sponsors with participants.

GEL plans to launch a pilot program in Summer 2020 in partnership with Northrop Grumman and Procter and Gamble/Gillette. The aim is to eventually create multiple Impactship opportunities that would mirror the diverse student engineering population.

GEL's corporate engagement and sponsorship program remains strong and has experienced sustained growth over the last three years. The purpose of the corporate engagement and sponsorship program is to increase engineering industry participation in GEL's educational pursuits and further support student internship and job search activities. In exchange, companies would have a more direct university recruitment pipeline for juniors and seniors majoring in engineering. In AY2019, the GEL Program raised \$39,500 (an increase of \$19,500 from the past year) from engineering industry sponsorships. This year's list of corporate sponsors includes Anheuser-Busch In-Bev, Apple, General Motors, Lockheed Martin, Naval Nuclear Lab, Northrop Grumman, Pioneer Natural Resources, Procter and Gamble, Shell, and SpaceX.

Currently we are looking to expand GEL's corporate engagement and sponsorship program to attract a wider and more diverse group of engineering companies. In support of our internal diversity and inclusion initiatives, we are working with engineering industry to ensure that the engineers sent to participate in our program activities are representative of today's diverse student population. With 13 majors represented in the program (of these students, almost 60% are women), it is important to provide students with opportunities to connect with engineers of different backgrounds (i.e., ages, genders, races, etc.) who can also serve as potential role models and mentors.

The GEL Graduate Program has experienced several new growth milestones over this past academic year. Enrollment for our graduate course 6.928 Leading Creative Teams doubled in size with 40 students in both the fall and spring semesters. There were also four Independent Activities Period workshops that focused on supporting graduate engineering and technology students to make an impact in their careers. These courses were all oversubscribed and received positive feedback from the students who completed them. The GEL Graduate Program has received approval from several engineering departments to allow our leadership courses to fulfill students' doctoral minor requirement. Simultaneously, we have adopted a "bottom up/top down" approach to best engage with the different stakeholders involved. GEL's influence on MIT's culture and its connection with members of the dean of the School of Engineering's Student Advisory Group has led to the dean of the School of Engineering making leadership education for graduate students a priority.

With continued success and plans to expand our impact on the MIT graduate community, we are thrilled to announce that the GEL Graduate Program raised \$165,000 in support of its graduate program initiative through gifts from several Industry Advisory Board members and other friends of the program. We are especially grateful to Professor Marty Schlecht, of the Department of Electrical Engineering and Computer Science, and CEO of SynQor, who generously pledged \$100,000 to support the early stages of this larger initiative. This initial funding will be used for staffing and to create two new courses, Negotiation and Influence Skills for Technical Leaders, and Engineering Leadership in the Age of Artificial Intelligence.

Gordon-MIT Engineering Leadership Program Years One and Two: Continued Growth

During the AY2019 admissions cycle for GEL 1, the program received a total of 172 applications due largely to word of mouth, increased synergy with UPOP, and an effective marketing campaign. Nearly all students who applied to the first-year program expressed a strong interest in and enthusiasm for pursuing a career in the engineering industry after graduation. Several students shared that they were already involved in a variety of hands-on engineering projects, for example through NEET, MIT's Edgerton project teams, and engineering internships. We look forward to welcoming slightly more than 140 GEL 1 students next fall and supporting their development as emerging engineering leaders. Fifty current GEL 1 students applied to advance into the GEL 2 program, which is the largest number in GEL's history. In May 2019, 105 GELs earned Certificates of Completion. Of these, 32 were from the twoyear program and 73 from the one-year program.

Another major goal of GEL is to increase the focus of national engineering education on the development of leaders of engineering innovation, invention, and implementation.

The GEL Program continued to support the Community of Practice for Leadership Education for Twenty-first Century Engineers (COMPLETE) by participating in its annual conference at Northwestern University in February 2019. As a founding member of COMPLETE, the GEL Program remains a driving force behind advancing the agenda for this burgeoning group.

Ongoing COMPLETE meetings—the purpose of which is to share best practices and advance engineering leadership—gather representatives from over a dozen institutes in North America with engineering leadership programs. Creative public relations efforts augmented the program's visibility in numerous national and trade publications, reinforcing GEL's position as the “thought leader” in engineering leadership.

In addition, the GEL Program regularly shares best practices with others by hosting numerous visits from other institutes who either have, or are seeking to establish, engineering leadership programs at their respective institutions. This year's visitors included: Bauman University (Russia); Technion (Israel); University of Andres Bello (Chile); Universidad Panamericana (Mexico City); California State University, Sacramento; Northwestern University; University of Texas, Austin; and University of California, Berkley.

GEL students in AY2019 have contributed to the national discussion involving leadership development and engineering leadership education through participation at exclusive ethics and leadership conferences at the United States Naval Academy.

The GEL Program's impact on engineering leadership education has grown to a national level through participation in the American Society of Engineering Education (ASEE). Over the last four years, GEL has played a significant role in developing the new LEAD (Engineering Leadership) Division of ASEE, which rapidly grew to become the ninth largest division within ASEE, with over 700 members who are interested or actively engaged in engineering leadership education. David Niño currently represents GEL and serves as program chair of the division while also closely working with LEAD Division colleagues from other universities.

In support of the GEL Program’s mission to disseminate best practices in engineering leadership education, program staff actively participated in this year’s annual ASEE Conference in Tampa, FL in June 2019. Executive Director Leo McGonagle participated in a panel discussion as a part of ASEE’s LEAD Division presentations called “Rapid Fire Panel Discussion” where he provided an overview of the program and shared best practices and lessons learned since the program’s inception in 2007.

Staffing Update

We have been working closely with the Office of the Dean for the School of Engineering to lead a comprehensive search for a new faculty co-director in light of the retirement of Professor Joel Schindall, who served for 17 years as the Bernard Gordon Professor of the Practice, including 11 years as founding industry co-director of GEL and seven years as acting faculty co-director. Professor Schindall officially retired this past June, was honored by MIT, and received emeritus status. After a two-year process, we share with much pleasure that our faculty search has been successful. Professor Olivier de Weck of the Department of Aeronautics and Astronautics (Course 16) has been named the GEL Program’s new faculty co-director. Professor de Weck has been heavily involved in GEL and taught the undergraduate 6.914 Project Engineering course since the program’s inception. In addition, Professor de Weck possesses engineering industry experience having recently returned from sabbatical as Airbus’s senior vice president for technology planning and roadmapping.

In addition to our search for a new faculty co-director, we convened a national search for a new industry co-director. Before the start of the fall 2018 semester, we welcomed Reza Rahaman as the GEL Program’s new Bernard M. Gordon industry co-director and senior lecturer. Rahaman had a distinguished career in industry, culminating as the vice president for research, development, and innovation at Clorox. In that role he was accountable for developing innovation strategies for a diverse set of businesses and ensuring robust technology roadmaps and innovation pipelines to deliver growth and profit targets for 45% of the company’s portfolio (\$2.7 billion in net customer sales). In addition to his passion for developing leaders, Rahaman is passionate about workplace equality and is the vice-chair of the board of Out & Equal Workplace Advocates, the world’s premier nonprofit promoting LGBT+ workplace equality. Rahaman received his BSc in Chemical Engineering from Imperial College, University of London, and his MSCEP in Chemical Engineering Practice and PhD in Chemical Engineering from MIT (under Alan Hatton).

Future Plans

- Increase MIT alumni engagement with the program by expanding outreach efforts
- Launch new GEL marketing and outreach campaign to attract more underrepresented minority groups and broader audiences
- Work closely with Resource Development to solicit potential program supporters to provide funds to expand program and fund development of a graduate program

- Continue to work with Office of the Dean of the School of Engineering's Student Advisory Group and the Office of the Vice Chancellor to develop a strategic plan for a universal leadership training program for graduate students
- Deepen the GEL undergraduate program through piloting Impactships
- Expand GEL's corporate engagement and sponsorship program to attract a wider and more diverse set of engineering companies, and encourage them to send guests who can support our diversity and inclusion initiative to celebrate engineers of different ages, genders, and races
- Diversify GEL's mentor roster to be more representative of current majors and women engineers (close to 60% of the GEL student population is female)
- Deepen staff understanding of Inclusion and Diversity issues by ongoing sensitivity and unconscious bias training
- Increase outreach and awareness of MIT Professional Education courses to companies vested in supporting the leadership and professional development of young engineers
- Explore new opportunities for collaboration with those MIT departments where GEL can lend its expertise in engineering leadership to help channel new innovations
- Continue to help lead strategic planning, along with partner universities, as part of ASEE's LEAD Division

Undergraduate Practice Opportunities Program

The [Undergraduate Practice Opportunities Program \(UPOP\)](#) is a self-selecting, yearlong, professional development program whose mission is to prepare sophomores to successfully integrate into and thrive in the professional world, and to be strong contributors to their organizations. Each year, UPOP supports several hundred MIT sophomores. Applicants come from all Institute majors and represent almost half the sophomore class, providing a rich cross-section of the student body.

In AY2019, of the 512 students who applied, 288 completed the Team Training Workshop requirement (weeklong workshops over MIT's Independent Activities Period, and a three-day workshop over Indigenous People's Day Weekend) and a cohort of 276 students completed all the requirements of the yearlong program, including participation in and reflecting on the summer internship or practicum. Approximately 51% of the Gordon-MIT Engineering Leadership Program applicants were originally UPOP students. The programs work closely together in GEL recruitment campaigns.

UPOP requirements include participation in either one of the two intense team training workshops. These workshops feature experiential modules taught by MIT faculty and other industry professionals focusing on themes of communication, problem-solving, and teamwork. Topical seminars are led by staff, industry professionals, and MIT alumni. UPOP students must also work toward securing a career-relevant summer practical experience, submit written reflective reports during their summer experience, and complete follow-up meetings with staff in the fall semester of their junior year.

This past year, UPOP has made increasing the sense of community within the program a top priority. A new student leadership program called PopSTARS (Student Taskforce Advancing Retention and Success) was formed to provide program participants an opportunity to connect with and be mentored by UPOP graduates in the current MIT senior class. Orientation was also redesigned so students could actively engage with and observe the greater UPOP community comprised of current student alums, graduated student alums, mentors of the program, and company representatives.

Program Retention

UPOP began its first year of operations in AY2002 with approximately 73 students. Annual applications to UPOP now average between 42% to 49% of the sophomore student body, reflecting the demand from undergraduates for UPOP's unique programming. UPOP has maintained a steady retention rate of over 54% since implementing some significant changes in AY2013. The program provides a support network of community members, customization, and flexibility to participants, and UPOP staff prides itself on its ability to provide one-on-one advising and internship coaching, workshops, and "meet and greet" sessions with various resource groups on campus. The program also maintains an open-door policy throughout the year for advising and coaching needs on a drop-in basis. As such, the program is a resource for UPOP alums throughout their time at MIT and beyond. A steady number of juniors and seniors continue to use our career advising and community resources frequently.

As mentioned, a core requirement of the program is attendance at one of UPOP's two, weeklong workshops. This presents a scheduling conflict for many sophomores, who are, for example, involved with the Alumni Association's Externship Program, MISTI Global Teaching Labs, and the increasing number of other campus programs offered over IAP. Many of the students who drop out of UPOP do so because of this scheduling conflict, and it is also an impediment to application numbers.

To convert this problem into an opportunity, UPOP offers immense flexibility in integrating the "conflicts" into part of the yearlong curriculum requirements. For students who participate in a qualifying activity, the program offers a three-day alternative version of UPOP's weeklong IAP Team Training Workshop. UPOP continues to support almost half of its admitted students with tailored outreach based on their UPOP applications, as well as by holding IAP Conflict Clinics where students meet individually with UPOP staff to discuss their options to complete the program. In addition, a variety of workshops and events held throughout the year allow students to tailor the program to best fit their individual needs, interests, and schedules.

PopSTARS Initiative

Given the number of sophomore graduates of the program, UPOP has anywhere from 500–600 juniors and seniors who have completed the program. The STARS initiative was created to provide an increased amount of peertopeer engagement as well as an opportunity for leadership education for the program's peer advisors. Their role as peer career advisors manifested itself in student recruitment, performing resume reviews, mentoring, and creating community-building events. The peer career advisors had over 650 resume revision interactions (in person and via email). They were also the source of

inspiration for the First Year Major Mixer event that brought over 30 UPOP alums into a setting where they could share their experiences in their departments with current first year students.

Summer 2019 Internships

As the practicum part of the program, UPOP students are required to participate in a summer experience within an organization to help develop and expand their professional experience. The majority of UPOP students participated in industry internships, both domestic and international, from large corporations to small startups, in sectors including corporate, research, and government. Students also participated in the MIT Undergraduate Research Opportunities Program (UROP), research opportunities at other institutions, teaching and tutoring experiences, and volunteer activities. Some 70% of UPOP students participated in a traditional industry internship. Roughly half of these internships were acquired through a UPOP-established employer connection.

- Total number of UPOP Students: 275
- Number of industry internships, domestic and international: 197 (of which 91 were through a direct UPOP connection with the employer)
- A majority of the remaining UPOP students found UROPs or other career-relevant summer positions
- The small percentage of students who were unable to secure an internship participate in a summer mini-course relating to professional development concepts

Top Summer 2019 Intern Employers

Facebook (six hires), Keolis Commuter Services and MIT Lincoln Laboratory (five each), and Amazon and IBM (four each)

Employer Engagement and Sponsorship

In AY2019, UPOP attracted a pool of actively engaged volunteers, sponsors, and intern employers. More than 50 companies posted UPOP-specific job opportunities for sophomores, and nearly 100 registered for each of the two capstone events as part of the Team Training Workshops: the January Networking Luncheons.

In addition to UPOP's traditional offerings of company field trips and educational events, UPOP also hosted eight corporate-sponsored events.

UPOP initiated an industry sponsorship campaign in AY2014. The campaign raised \$48,000 that year, but the program now averages more than \$140,000 per year in corporate sponsorship funding.

MIT Alumni and Mentor Support and Program Involvement

UPOP continued and expanded the mentorship program within the timeframe of the Team Training Workshop. This was an opportunity for MIT alumni and other industry professional volunteers to participate in the workshops as mentors for teams of seven to

eight students. Mentors are essential for facilitating delivery of curriculum content and guiding student discussions. Of the 53 mentors who participated in AY2019, 45 were repeat participants from past years and eight were new. Additionally, as part of the series UPOP Presents, MIT alumni and friends of the program delivered topical seminars for the MIT community during IAP and the spring semester on subjects including Little Known Women Inventors, Business Fundamentals, and Successful Disruption When the System Fights Back. Ninety-eight MIT alumni participated as industry guests at events within the yearlong curriculum. UPOP also engages with over 480 community members, many of whom are MIT and UPOP alumni, through a monthly newsletter that provides updates and highlights of the program.

To continue advancing the goals of UPOP through mentor and alumni involvement, the program established a UPOP Advisory Board in 2014 that meets once a year and comprises 20 or more MIT alumni and other industry professionals who work actively with UPOP on curriculum review and revision.

Financial Support

In addition to their participation as mentors and seminar and module presenters, MIT alumni and other friends of the program have been generous financial supporters, enabling UPOP to reach its goal of a five million dollar endowment fund through their outright gifts and pledges. A total of 158 individual donors contributed more than \$1,140,000 to the program in AY2019. UPOP also participated for the first time in the MIT Annual Fund's 24-hour challenge on Pi Day. Through a mentor's generous \$15,000 challenge pledge and the participation of over 100 donors, UPOP received almost \$25,000 in gifts.

Alumni

UPOP alumni continue to be involved as industry volunteers, intern employers, and sponsors on behalf of their organizations. In AY2019, 35 graduated UPOP alumni participated in the program as industry volunteers.

Staff

UPOP has five full-time staff members reporting to Reza Rahaman, industry co-director of UPOP, Gordon ELP, and the Communication Lab. UPOP's full-time staff comprises two student program positions—a student program administrator and a student program coordinator—an employer relations program manager, a mentor liaison and outreach coordinator, and a communications and operations coordinator.

Facts

- A total of 512 Class of 2020 sophomores applied to UPOP in fall 2018. In September 2018, 253 Class of 2020 students graduated from UPOP.
- UPOP's corporate sponsorship program raised more than \$140,000 in AY2019.
- UPOP's efforts to increase diversity among its mentor pool to better reflect the UPOP student population resulted in two new mentors of color (total of eight) and two new women mentors (total of 17).

The combined GEL and UPOP programs impacted more than 1,000 students throughout the year. The programs were supported by corporate funding in the form of grants and company sponsorships, as well as by contributions from a pool of committed individual donors.

Future Plans

- Expand outreach and increase awareness of UPOP among the incoming first years, their parents, the MIT admissions and orientation staff, and Educational Counselors
- Expand outreach and increase awareness of UPOP through engagement with the Alumni Leadership Conference
- Diversify UPOP’s mentor roster to be more representative of the diversity of students in the UPOP program
- Explore the expansion of UPOP to the first-year student population
- Expand opportunities for mentor and alumni engagement and increase UPOP visibility through vehicles such as the UPOP Presents seminars
- Continue fundraising efforts with corporate sponsorships and MIT alumni donors
- Participate with the MIT Annual Fund’s 24-hour challenge on Pi Day’s targeted fundraising campaign to the UPOP alumni and mentor base (almost 3,000 members)
- Continue to recruit and retain a significant percentage of MIT sophomores while maintaining overall quality of programming
- Continue to review and refine the yearlong and team training workshop curricula to best prepare MIT sophomores for the transition from the world of academia to the world of work
- Expand the roster of employers who engage with and hire UPOP students

MIT School of Engineering Communication Lab

The [MIT School of Engineering Communication Lab](#) is a professional development resource that uses discipline-specific peer coaching to improve the technical and professional communication skills of graduate students, postdoctoral researchers, and undergraduates. Since its successful launch in 2012 within a single department (Biological Engineering), the MIT Communication Lab has grown to include branches within six departments and institutions: Biological Engineering, Chemical Engineering, Electrical Engineering and Computer Science, Mechanical Engineering, Nuclear Science and Engineering, and the Broad Institute. Each departmental Communication Lab comprises a team of four to 16 trained graduate students and postdocs—the Communication Fellows—and one half-time manager. A central senior program manager oversees the organization.

Since 2016, the Communication Lab has been a member of the Gordon Engineering Leadership Program umbrella, synergizing with the other GEL member programs’ emphasis on experiential professional development.

The Communication Lab has four distinctive features:

- *Discipline specificity:* Training graduate students and postdocs within a given department to act as communication coaches for their fellow department members means that these Communication Fellows can engage with their clients about both the communication and the science. Their coaching is informed by a deep understanding of field expectations, language, and culture. Each Communication Lab can also customize its practices and resources according to its department’s demographics, rhythm, and culture.
- *One-on-one peer coaching:* Communication Fellows ask their clients strategic questions to help them analyze high-level communication principles like audience, message, and structure. The Communication Fellows do not provide line-editing or grammar fixes. Their high-level focus encourages clients to create their own solutions and learn transferable communication skills.
- *Authentic tasks:* Clients can bring any professional or technical communication task to the Communication Fellows for input, including papers, presentations, faculty applications, and lab reports.
- *Just-in-time:* Working on authentic, deadline-driven needs gives clients immediate and genuine motivation to learn communication principles. Hence, the Communication Lab aims to provide clients with resources in a manner tied to real deadlines—for example, offering workshops four weeks prior to the National Science Foundation’s Graduate Research Fellowship deadlines, and encouraging attendees to come to the Communication Lab for one-on-one coaching during the subsequent weeks.

The Communication Lab also has an impact on department members beyond clients.

- The peer coaches, who are carefully selected and paid a modest stipend, receive valuable skill development from the training workshops and other development activities, from their experience in coaching their clients, and from working together as a team.
- Many faculty members have stated that the program results in better publications and presentations, and also reduces their workload.
- The cross-departmental model allows the overall program to develop, evaluate, and refine a repository of tested material. This has already led to a website that is widely used both within and outside of MIT—the CommKit—a research paper that has been published and presented at the American Society of Engineering Education, and a weeklong summer institute to help share this knowledge with other universities.

The Communication Lab is a flexible, adaptable, and lean program, which uses student leadership and minimal staffing to support diverse communication initiatives. Since opening for coaching in 2013, the Communication Lab has served more than 2,400 unique clients with over 5,600 hours of one-on-one coaching, across more than 6,900 appointments. In addition, the Lab has partnered with over 85 subjects and academic programs, and offered hundreds of workshops to audiences including academic

subjects, undergraduate research programs, and interest groups for underrepresented minorities and women. Finally, to date, 137 Communication Fellows have been trained, representing a think tank of exceptionally articulate and creative student leaders.

Staffing Updates

During this academic year, the Communication Lab's staff comprised one full-time senior program manager (Diana Chien, promoted from program manager), six 50% full-time-equivalent (FTE) departmental managers, a 10% FTE administrative assistant, and an hourly curriculum designer/instructor. The senior program manager trained one new departmental manager for the Chemical Engineering Department.

The former Department of Electrical Engineering and Computer Science (EECS) manager departed in May 2019, after almost four years with the Communication Lab; this position was filled during summer 2019, with the new manager who is expected to arrive in September 2019.

EECS also approved for their manager position an increase from 50% FTE to 100% FTE, reflecting the bandwidth needs of MIT's largest department. This will be the first 100%FTE Communication Lab departmental manager position.

Accomplishments and Awards

Overall in AY2019, the Communication Lab continued to thrive in its core mission of providing one-on-one communication coaching, with average usage rates of at least one session per day in each member department.

Usage in our newer departments continues to grow. Compared with 2017, Chemical Engineering (ChemE), EECS, and Nuclear Science and Engineering hosted 9%, 17%, and 35% more appointments, respectively. Usage in our oldest department, Biological Engineering (BE), has held steady at approximately 500 appointments per year for the past several years.

Depending on the department, 30% to 67% of clients are repeat users, showing that users find value in working with the Communication Fellows.

- Increasing repeat usership in the larger departments of EECS and Mechanical Engineering (MechE), which have lower repeat usership, is a major strategic aim.
- Surveyed users reported that they felt that the Communication Lab helped them most with organization/structure, visuals, writing process, and articulating ideas.
- Depending on the department, 58% to 90% of users reported that the Communication Lab is helping them acquire the skills that they need to be successful at MIT.

Future Expansion

Civil and Environmental Engineering now plans to launch the next Communication Lab, beginning in spring 2020.

Department Communication Lab teams have refined existing communication initiatives and launched new ones, including approximately 20 workshops and other activities.

- **Biological Engineering:** Launched a new online suite of communication resources, such as templates and walk-throughs for visualizations using the popular open-source platform GitHub. BE also hosted a multi-part faculty application workshop series supporting 60 BE and ChemE members.
- **Chemical Engineering:** Hosted the department's first-ever Science Slam contest for five-minute research talks to a broad audience, which attracted a standing-room-only audience. Launched a mini-grant application and training opportunity for postdocs who wish to practice grant writing and increase their research independence.
- **Electrical Engineering and Computer Science:** Supported multiple departmental symposia and poster sessions. Collaborated with faculty to offer more long-term coaching support to clients building presentation and writing skills. Launched an experimental Quick Takes service that offered quick online-only feedback on communication pieces to lower the barrier to entry for potential coaching clients.
- **Mechanical Engineering:** In their first year of operations, MechE hosted a busy schedule of coaching (201 appointments for 98 unique clients) and other programming, including the design of six new, well-attended workshops.
- **Nuclear Science and Engineering:** Sustained a PhD writers' support group that improved member time to graduation. Began a revamp of their online CommKit resources.
- **Cross-departmentally:** Various taskforces developed new workshops and online resources about presentation skills for teaching assistants.

The Senior Program Manager led cross-departmental development and outreach to other organizations, including the following activities.

- Oversaw completion of a major revision of the Communication Fellow Training Curriculum in collaboration with the Communication Lab's curriculum designer
- Oversaw a large data collection and analysis effort for the Communication Lab's first educational study, which will quantify the impact of Communication Fellows' coaching on documents, and on clients' skills
- Did outreach and collaborated with MIT Career Advising and Professional Development, English Language Studies, and Writing, Rhetoric and Professional Communication
- Published the Communication Lab's second scholarly paper with the American Society of Engineering Education, describing the process of adapting the Communication Lab model to other institutional contexts and was written as a cross-institutional collaboration with the Brandeis and Rose-Hulman Institute of Technology Communication Lab leaders (previously trained by the MIT Comm Lab)

In June 2019, the Communication Lab held its third Summer Institute—a four-day workshop for external institutions that aim to create their own Communication Labs.

- The workshop was attended by participants from five institutions: North Carolina State University, Oklahoma Medical Research Foundation, Purdue University, Singapore University of Technology and Design, and the University of Southern California.
- The workshop received overwhelmingly positive feedback and raised approximately \$18,000 for the program.
- Previous Summer Institute participants have launched their own initiatives: Brandeis Division of Science, Boston University Biological Design Center, and Northeastern Engineering now have their own Communication Labs. California Institute of Technology launched a graduate and undergraduate science communication curriculum. Hofstra University launched a director of science writing position.

Future Plans

Improving Internal Reach

For the largest member departments (EECS and MechE), we would like to expand outreach—particularly via partnerships with individual faculty and academic subjects—in order to increase awareness and repeat usership.

Educational Development

The Communications Lab expects to complete and publish an educational study in order to refine our coaching practices, as well as to continue disseminating our model.

We plan to design and support new forums for engagement and innovation among the Communication Fellows, such as the upcoming hackathon in August 2019 that will be held to design new coaching tools for presentations. We also will continue to collaborate with other MIT programs focused on experiential learning and peer-to-peer education.

Improving Sustainability

To improve sustainability, the Communications Lab will reevaluate systems and staffing to ensure scalability as we continue to grow. For example, we will test models for staffing cross-departmental communication laboratories that would make it easier for smaller departments and programs to participate.

We will also continue to explore and develop sources of additional funding, such as grants and donations, to support expansion of the program and increased capacity for educational innovation.

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