

Bernard M. 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 [Bernard M. Gordon–MIT Engineering Leadership Program](#) (Gordon ELP) was established to educate and develop the character of outstanding MIT students as potential future leaders in the world of engineering practice and development and to endeavor to transform engineering leadership in the nation, thereby significantly increasing product development capability.

The program provides to a select group of MIT engineering undergraduates a challenging and supportive environment in which they develop leadership skills that help them to become highly effective leaders of engineering teams. Each year, approximately 175 rising juniors and seniors apply to the program. Students can participate in one or two years of the Gordon ELP. MIT sophomores seeking to become Gordon engineering leaders (GELs) enter either through the [Undergraduate Practice Opportunities Program](#) (UPOP) or by having demonstrated commensurate experience in an engineering project in an industrial or academic setting.

The first year of the program, Gordon Engineering Leader Year One (GEL1), introduces students to engineering leadership experiences and development; approximately 120 students participate. For an exclusive group of 30 to 35 students, the second year of the program, Gordon Engineering Leader Year Two (GEL2), is an intensely personalized leadership development program that includes opportunities for leadership practice and significant interactions with industry leaders, staff, and peers.

UPOP predates the GEL program. It was launched in 2001 as an initiative of the dean of the School of Engineering at that time, 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 and industry partners. In 2007, when the GEL program was formed, UPOP became a part of Gordon ELP, forming a natural progression from UPOP in the sophomore year to GEL1 and GEL2 in the junior and senior years. (Although UPOP is a welcome foundation for GEL, it is not a prerequisite.) An organizational restructuring of UPOP late in AY2013 streamlined the alignment of UPOP and Gordon ELP, generating improved synergy and use of resources.

Gordon–MIT Engineering Leadership Program

In AY2015, the program continued to focus on its mission to educate and develop tomorrow's engineering leaders with a new approach that encompasses students' professional, personal, and leadership progression. Gordon ELP creates an environment that promotes core values and complements the strong technical fundamentals that typically define the rigorous MIT educational experience.

Students in the program enhance their departmental education by developing their leadership and teamwork skills in an engineering context, helping to prepare them

better to be effective and for success in an industry setting. Gordon ELP provides augmented opportunities in leadership and innovation, invention, and implementation. The program is delivered through an alliance of MIT departments, other MIT programs, and alumni interacting synergistically with undergraduates and maturing engineers in professional master's programs. The program also offers professional education opportunities for early- and midcareer engineering professionals. As a result of this year's efforts to sustain program growth—both with regard to student engagement and philanthropic support—the program achieved a higher level of recognition than before, both within and outside the Institute. Gordon ELP has demonstrated significant progress toward program goals.

Goal: Educate and prepare the potential future leaders of engineering innovation, invention, and implementation efforts.

Rising juniors and seniors from engineering and other departments are invited to apply to GEL1. UPOP serves as a viable entryway into Gordon ELP, but students can also enter by having demonstrated equivalent experience in an engineering project in an academic or industrial setting. Students in GEL1 participate in a set of augmenting elective subjects and immersive learning experiences that, taken together, approximate the level of an MIT concentration.

A group of 30 to 35 students who successfully complete the first-year program requirements can elect to advance to the second year of the program. For these students, GEL2 provides a wide range of intensely personalized leadership development activities featuring a high degree of interaction with industry leaders, faculty, and peers. The aggregate two-year program requirements approximate the level of an MIT minor.

It is expected that 146 students will enter GEL1 in fall 2015, up from an initial group of 17 students in GEL1 in fall 2008. These incoming students will represent 16 departments across the Institute, including all of the engineering departments. A new record of 33 students will advance to GEL2.

Incoming students in GEL1 will largely represent MIT's School of Engineering (mostly from Courses 2 and 6), but there will also be students from Courses 4, 5, 7, 8, and 18 who have expressed an interest in engineering. Because one of the program's objectives is to prepare GEL students to work in industry with professionals from other disciplines, it is important that GEL students learn how to collaborate effectively early in the program.

In addition to Gordon ELP's ongoing efforts to support undergraduates, the program's faculty and staff also work closely with [MIT Professional Education](#) to create and deliver courses on engineering leadership and innovation for early and midcareer engineering professionals. During AY2015, Gordon ELP offered a professional Short Program on [Engineering Leadership for Early-Career Professionals](#) (30 participants), one on [Engineering Leadership for Mid-Career Professionals](#) (28 participants), and one on [Mastering Innovation and Design-Thinking](#) (58 participants). These received positive feedback and contributed significant funds to the GEL operating budget. We hope to expand our offerings in the future as we have identified half a dozen participants from

such organizations as the MIT Lincoln Laboratory and Genzyme, Inc. have offered to participate in Gordon ELP as mentors and “engineers in the room.” Four of these are female, which will help to provide more role models for female students.

Gordon Engineering Leader Years One and Two: Continued Growth

During AY2015, Gordon ELP sustained its growth trajectory, with 174 students applying for admissions to GEL1. Although the leading source of applicants was UPOP (67%), word of mouth among students is effective in helping to spread program awareness, generating 33% of the applications in AY2015.

In terms of preparing future leaders of engineering innovation, invention, and implementation efforts, 60 GEL students earned Certificates of Completion in May 2015; 24 students were from the twoyear program and 36 from the oneyear program.

Goal: Prepare all MIT engineering students to be more inclined to contribute to engineering innovation, invention, and implementation efforts and to be more effective contributors to such efforts.

Gordon ELP continues to meet this goal by supporting and enriching departmental programs throughout the Institute as well as through UPOP. During AY2015, a combined total of more than 1,000 students benefited from Gordon ELP activities in MIT’s School of Engineering.

Since its establishment, Gordon ELP has strived to enrich engineering leadership at the departmental level. During AY2015, Gordon ELP’s efforts to improve the design and structure of the engineering curriculum resulted in a change to ESD.054 Engineering Leadership. Formerly an intensive, oneweek, sixunit subject, this is now a threeunit subject that is required in both the fall and spring terms.

Goal: Increase the focus of national engineering education on the development of leaders of engineering innovation, invention, and implementation.

During AY2015, Gordon ELP played a key role in advancing the Community of Practice for Leadership Education for Twentyfirst Century Engineers (COMPLETE), cohosting with the Gordon Institute of Engineering Leadership at Northeastern University the annual COMPLETE Conference in March 2015. Combined outreach efforts by MIT and Northeastern augmented Gordon ELP’s visibility by gathering more than 10 national and international institutes with engineering leadership programs to share best practices and advance the practice of engineering leadership. As a founding member of COMPLETE, Gordon ELP remains a driving force behind advancing the agenda of this burgeoning group.

As tomorrow’s engineering leaders, students in Gordon ELP in AY2015 contributed to the national discussion about the landscape of engineering education through participation at exclusive ethics and leadership conferences at the United States Military Academy, the United States Naval Academy, and the United States Air Force Academy.

Also notable is Gordon ELP's participation at the 2015 Grace Hopper Celebration of Women in Computing, sponsored by Apple. Three female students represented Gordon ELP at the conference.

In support of Gordon ELP's mission to disseminate best practices in engineering leadership education, program staff planned and led an experiential engineering leadership laboratory workshop for educators and participated in a panel discussion on "Engineering Leadership versus Engineering Management" at the annual American Society of Engineering Education Conference in Seattle, Washington, in June 2015.

Staffing Changes and Relocation

During AY2015, Bruce Mendelsohn, Gordon ELP's communications and outreach officer, and Rick Schuhmann, the engineering leadership senior lecturer, left MIT. Instructional developer Elizabeth HuttnerLoan left Gordon ELP for a position at MIT's Department of Urban Studies. Gordon ELP has since hired three new staff members, including senior lecturer David Niño, student programs and leadership specialist John Feiler, and communications and outreach coordinator Eileen Milligan. All staff report to Leo McGonagle, executive director of Gordon ELP.

In fall 2015, the Gordon ELP offices are scheduled to relocate to Room 35433. The new office space will provide more workspace for the Gordon ELP staff and meeting areas for students.

Undergraduate Practice Opportunities Program

In AY2014, UPOP conducted a thorough assessment of the organization's vision, mission, and goals, generating a new mission statement:

UPOP's mission is to prepare sophomores to successfully integrate into and thrive in the professional world and to be strong contributors to their organizations.

With that mission in mind, UPOP supported a record number of MIT sophomores during AY2015. Although UPOP remains a voluntary, yearlong program, a record 566 members of the Class of 2017 applied to UPOP in fall 2014. Applicants came from all Institute majors and represent almost half the sophomore class.

Of the 566 who applied, 521 applicants were admitted; 355 students completed the Team Training Camp requirement (week-long workshops over MIT's Independent Activities Period in January); and 347 students completed all the requirements of the yearlong program. This means that approximately one in three students of the MIT Class of 2017 will have completed UPOP's full yearlong program, gaining skills essential to successfully integrate into and thrive in the professional world.

Student Program Growth

UPOP enrollment has increased steadily since 2006, reflecting more demand from MIT undergraduates for the unique programming provided by UPOP, which offers students abundant opportunities to practice and integrate the skills they will need for career success.

UPOP requirements include individual coaching sessions with UPOP staff; an intense, week-long Team Training Camp workshop over Independent Activities Period, with experiential modules taught by MIT faculty and industry professionals; topical seminars led by staff, industry professionals, and MIT alumni; securing a career-relevant summer internship experience; submitting written reflective reports over the summer during the internship experience; and completing follow-up meetings with staff.

The UPOP curriculum expanded to offer more topical workshops in the fall and spring semesters, with greater opportunities to engage with MIT alumni and employers. Additional customized employer events this year allowed students to learn more about career opportunities available to them and to practice engaging with employers. These events were also a source of revenue. Additionally, a thorough review of the Team Training Camp curriculum resulted in two new modules that expanded the content that is taught within the course's themes of communication, decision making, and team development.

Summer 2015 Internships

UPOP students are required to participate in a summer experience within an organization to help advance professional goals. The majority of UPOP students participated in industry internships, both domestic and international, offered by large corporations, small start-ups, corporate facilities, research organizations, and government offices. More than 43% of industry internships were acquired through UPOP-established employer connections. Students also participated in the Undergraduate Research Opportunities Program, in research opportunities at other institutions, in teaching and tutoring experiences, and in volunteer activities. A notable achievement is the increase in the percentage of students participating in traditional industry internships; it rose from 62% to 73% in AY2015.

- Total UPOP students: 347
- Total industry internships (domestic and international): 253
- Number of UPOP-specific or UPOP-connected internships: 109

Top Summer 2015 Intern Employers

The Northrop Grumman Corporation hired 10 UPOP students. Google and MIT Lincoln Laboratory each hired seven. Ab Initio and Accenture each hired four students, and DirecTV, Akamai, Cisco, Dassault Systèmes, edX, the Jet Propulsion Laboratory, Morgan Stanley, TripAdvisor, and Vecna Technologies each hired three students.

Employer Engagement and Sponsorship

In AY2015, UPOP saw its largest pool of actively engaged volunteers, sponsors, and intern employers. More than 100 companies posted UPOP-specific job opportunities for sophomores and more than 125 companies registered for the Team Training Camps' capstone events—the January networking luncheons.

UPOP augmented its traditional offerings of company field trips and educational events with more than a dozen company-sponsored events. Industry sessions included alumni

panels with Schlumberger Ltd. and TMK IPSCO, “lunch and learns” with Pioneer Natural Resources, and tech talks and information sessions with Akamai Technologies and JP Morgan.

UPOP’s industry fundraising initiative doubled in size over the past academic year. In AY2014, UPOP raised close to \$50,000 in operational funding from employers; in AY2015, that figure was \$100,000. UPOP is on a path to match or increase that level in AY2016.

MIT Alumni and Mentor Support and Involvement

UPOP continued and expanded the mentorship program within the Team Training Camps during Independent Activities Period, where MIT alumni and other industry professionals volunteer for a week (seven consecutive days) to participate in the workshops as mentors for a team of seven or eight students. Mentors are essential for teaching curriculum content and guiding student discussions. Of the 48 mentors who participated in AY2015, 36 were repeat participants from past years and 12 were new. Additionally, several alumni delivered topical seminars to UPOP students on subjects ranging from patent law to entrepreneurship.

Many MIT alumni (50) and UPOP alumni (28) participated as industry guests at events within the yearlong curriculum. UPOP engages with 280 community members, many of whom are MIT and UPOP alumni, through a monthly newsletter that provides updates and highlights of the yearlong program. To continue advancing the goals of UPOP through alumni and mentor involvement, the program established a UPOP Advisory Board comprising 22 MIT alumni. The board met for the first time in July 2014 and a second time in July 2015.

UPOP Alumni

UPOP also worked toward the goal of expanding the participation of UPOP alumni in the program by adding two UPOP alumni mentors over the past two years. UPOP alumni also participate as peer advisors in the fall semester’s “Popcorn Friday – Ask an Alum” series. Additionally, UPOP refined the Industry Rotations series in the spring semester to invite UPOP alumni and early-career MIT alumni to engage current UPOP students in discussions about their career paths. UPOP alumni continue to be involved as industry volunteers, employers of interns, and sponsors on behalf of their organizations.

UPOP Staff

UPOP staff consists of five full-time positions: two student program coordinators, an employer relations program manager, a communications and operations coordinator, and a mentor relations and outreach coordinator. All report to Joel Schindall, director, Gordon ELP and UPOP.

Accomplishments and Awards

- Combined, the Gordon ELP and UPOP programs affected more than 1,000 students throughout the Institute.

- The combined programs earned corporate funding in the form of grants and company sponsorships as well as from a pool of committed individual donors, including program alumni.
- Some 176 MIT undergraduates applied to Gordon ELP to join GEL1 in fall 2015; 146 students representing 16 MIT departments (including all departments in the School of Engineering) will enter GEL1 in fall 2015.
- Sixty students earned GEL Program Completion Certificates in May 2015.
- Gordon ELP coordinated with MIT Professional Education to offer three professional education courses to a total of 116 participants.
- Gordon ELP recruited approximately 40 system design and management/leaders for global operations to serve as mentors for students in GEL2.
- Gordon ELP held two Industry Advisory Board meetings to receive input from engineering leaders.
- Gordon ELP played a significant role in the success of the 2015 COMPLETE Conference, which it cohosted with the Gordon Institute of Engineering Leadership at Northeastern University.
- Three new staff members were hired and joined Gordon ELP, including a senior lecturer, a student programs and leadership specialist, and a communications and outreach coordinator.
- UPOP recruiting efforts resulted in a record number of 566 student applications.
- UPOP retention efforts resulted in a record number of 347 students completing the program.
- UPOP internship coaching initiatives resulted in a record number of 253 students participating in industry internships.
- UPOP expanded the employer outreach program to include more than 2,000 companies that engage with MIT students through a year-round variety of events and activities.
- As a result of continued employer outreach, 109 students participated in internships in UPOP-connected companies.
- UPOP raised \$100,000 in operational funding from corporate sponsors in AY2015, doubling the amount raised in AY2014.
- UPOP received donations totaling \$650,000 in gifts and pledge payments for AY2015, up from \$436,000 for AY2014.
- UPOP partnered with Professor Warren Seering from the Department of Mechanical Engineering department to gather information about the careers of industry professionals.
- UPOP recruited 12 new mentors (11 MIT alumni) who participated in the Team Training Camp courses.
- UPOP expanded the curriculum with more professional development workshops, individual coaching sessions, and employer engagement events, including the “Industry Rotations” series.

Future Plans: Gordon Engineering Leadership Program and Undergraduate Practice Opportunities Program

- Continue to work closely and actively with the Office of Resource Development to solicit potential program supporters to meet fundmatching goals for Gordon ELP and for UPOP.
- Expand outreach and increase awareness of the Gordon ELP and UPOP among prospective MIT students.
- Expand outreach and increase awareness of the Gordon ELP and UPOP program among MIT alumni in an effort to increase MIT alumni engagement with the program.
- Continue coordinating with appropriate MIT personnel to facilitate moving into permanent space for Gordon ELP staff.
- Define more clearly the role of a GEL mentor and strengthen efforts to recruit engineers in industry to serve as mentors to students.
- Expand outreach and increase awareness of MIT's professional education courses to determine what the appropriate vehicle is for expansion (e.g., more residential or online course offerings, performing presentations, or offering workshops to select companies, and so on).
- Create more opportunities for collaboration with MIT's departments, where Gordon ELP can lend its expertise in engineering leadership to help channel new innovations.
- Continue to perform educational assessments related to the overall efficacy of Gordon ELP.
- Work with MIT's Innovation Initiative to incorporate leadership development into the innovation minor.
- Determine next steps for the creation of a GEL graduate program.
- Expand corporate sponsorship program for UPOP with a goal of \$150,000 to \$200,000.
- Expand UPOP fundraising efforts with a goal of raising an additional \$2.5 million in endowment funds, working closely with the Office of Resource Development.
- Research best practices of other professional development programs and research sought-after workplace skills to improve UPOP programming and remain current and relevant.
- Continue to market UPOP to attract and recruit a large and diverse class of students.
- Continue to expand the UPOP employer outreach program, including engaging new companies in emerging high-tech and engineering centers within the Southern California, Chicago, and Denver areas.

- Expand participation of UPOP alumni both to help foster a community of support for the next generation of UPOP students and for fundraising efforts.
- Increase the diversity of the UPOP mentor roster to be more representative of the current MIT student population.

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