

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](#) (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 curriculum to meet ELP's mission is derived from the belief that engineering leadership can best be developed by timely and systematically linking the following components:

- Immersive experiences on and off campus in which students practice, observe, and discuss engineering leadership
- Courses that provide conceptual and analytical models and frameworks that support engineering leadership
- Reflection, evaluation, and feedback from peers, faculty, and experienced engineering industry mentors on lessons learned from leadership activities

Students participate in ELP to enrich their departmental education; ELP provides augmented opportunities in leadership and innovation, invention, and implementation. The program is delivered through an alliance of MIT departments, other MIT programs, industry, and alumni interacting synergistically with undergraduates and maturing engineers in professional master's programs.

During AY2011, the program made considerable progress toward our goals, as follows.

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. ELP continues to meet this goal by supporting and enriching departmental programs throughout the Institute as well as via the [Undergraduate Practice Opportunities Program](#) (UPOP). In the aggregate, 940 students benefited from ELP activities in MIT's School of Engineering during AY2011.

In terms of enriching departmental programs, during AY2011 ELP:

- Trained 36 leadership teaching assistants (TAs) who helped deliver leadership-oriented pedagogy to more than 400 MIT students.
- Funded 10 leadership TAs (5 in the fall and 5 in the spring) in 2.009 Product Engineering Processes, 3.042 Materials Project Laboratory, 22.033 Nuclear Systems Design Project, 10.26 Chemical Engineering Projects Lab, 16.00 Introduction to Aerospace and Design, 16.83/89 Space Systems Engineering, 3.003 Principles of Engineering Practice, and the MIT 150 student design

competition. These 10 TAs received “teach-the-teacher” training in leadership, project planning, and effective teamwork and delivered that material to the students in the above subjects.

- Provided 26 unfunded TAs with an opportunity to attend teach-the-teacher training and subsequently assist the funded TAs in delivering the material to 172 students in the spring (66 in 10.26, 8 in 3.042, 30 in 16.00, 8 in 3.003, and 60 in 16.83/89) and 240 students in the fall (151 in 2.009, 30 in 16.83/89, 8 in 3.042, 15 in 22.033, and 36 in the MIT 150 student design competition).
- Offered to lead a two-hour “project team success workshop” (project planning and introduction to effective teamwork) in any project-based/team-based subject; a total of 158 students attended this workshop in AY2011.
- Engaged throughout the year with student project teams (e.g., Solar Car, Rocket Team, Design-Build-Fly), helping team leaders and members hone their team skills.

Another way ELP prepares MIT students is through its sophomore year program, UPOP. During AY2011, UPOP reached a record full-capacity enrollment of almost 350 students in its yearlong program of fall and spring seminars, a weeklong Independent Activities Period intensive boot camp, summer internships, and fall reflective sessions.

Goal: Educate and prepare the potential future leaders of engineering innovation, invention, and implementation efforts. Students can participate in one or two years of ELP. MIT sophomores seeking to join ELP enter either through UPOP or by having demonstrated commensurate experience in an engineering project in an industrial or academic setting. The first year of ELP (Gordon Engineering Leader [GEL] Year One) is open to a competitively chosen cohort of MIT engineering juniors and/or seniors. During GEL Year One students participate in a set of augmenting elective subjects and immersive learning experiences that, taken together, approximate the level of an MIT concentration.

For a cohort of GELs who successfully complete the first-year program requirements and elect to advance (20–30 students), the second year of ELP (GEL Year Two) offers an array of intensely personalized leadership development activities featuring a high degree of interaction with industry leaders, faculty, and fellow students. The aggregate two-year program requirements approximate the level of an MIT minor.

During AY2011, ELP growth accelerated its upward trajectory: student applications to join ELP increased, rising from 98 in AY2010 to 153 in AY2011. Part of the increase in applications and enrollment can be attributed to the program re-architecture undertaken during AY2011, which made the GEL Year One program accessible to a wider array of MIT students.

In terms of preparing potential future leaders of engineering innovation, invention, and implementation efforts, ELP graduated 30 GELs in May 2010. We project 125 students will enter the GEL Year One program in fall 2011, up from an initial cohort of 22 GELs in the fall of 2008. GELs entering ELP this fall represent 15 departments across the Institute, including all of the School of Engineering departments.

Goal: Increase the focus of national engineering education on the development of leaders of engineering innovation, invention, and implementation. During AY2011, ELP cohosted two “engineering leadership” meetings: the first at Penn State University in October and the second at Northeastern University in April.

These ongoing meetings—the purpose of which is to share best practices and advance the practice of engineering leadership—gathered representatives from 10 institutes in North America with engineering leadership programs. Creative and aggressive outreach efforts augmented the program’s visibility in numerous national and trade publications, reinforcing ELP’s position as the “thought leader” in engineering leadership.

Plans are under way to expand ELP offerings beyond the Institute to young engineering professionals in industry.

Accomplishments and Awards

- Graduated 30 GELs in May 2011
- Placed more than 30 GELs in summer “InternshipPlus” experiences
- Received applications from 153 students to join GEL Year One in fall 2011; accepted 110 students representing 15 MIT departments (including all departments in the School of Engineering) to GEL Year One
- Expanded weekly engineering leadership labs from two to three per day to accommodate the increased number of students
- Recruited 30 System Design and Management/Leaders for Global Operations mentors for senior GELs
- Held four Industry Advisory Board meetings to receive input from engineering industry leaders
- Added members to the Industry Advisory Board to improve the representation of women and other minorities (and thus better reflect the student composition of ELP)
- Hired a course developer to help meet the increased interest in and demand for workshops and teaching modules and to prepare the groundwork to expand ELP offerings beyond the Institute
- Produced a promotional/informational video
- Involved more than 80 visitors during the MIT 150 open house in “Deliver,” a interactive design-build team activity

In addition, both UPOP and ELP earned funding in the form of grants from OnStar, Lockheed-Martin, Florida Power & Light, and AMD as well as from a pool of committed individual donors.

Program codirector professor Ed Crawley received the prestigious Gordon Prize from the National Academy of Engineering.

Future Plans

- Continue to work closely with Resource Development to follow up with potential program supporters to meet fund-matching goals
- Actively work to obtain permanent space for office and ELP staff
- Work to continue the growth of UPOP
- Continue to expand the number of GELs completing the GEL Year One and GEL Year Two programs
- Expand engagement with departments by funding more leadership TAs, offering more workshops, and creating and offering more project-based subjects
- Conceive and design professional education workshops for engineers

Edward Crawley

Codirector

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