BERNARD M. GORDON
MIT Engineering Leadership
PROGRAM

GEL Student Handbook

Version 3.0
08/01/2013

Bernard M. Gordon-MIT Engineering Leadership Program

Capabilities of Effective Engineering Leaders

1. **The Attitudes of Leadership - Core Personal Values and Character:**
    - Initiative
    - Decision Making in the Face of Uncertainty
    - Responsibility, Urgency and Will to Deliver
    - Resourcefulness, Flexibility and Change
    - Ethical Action, Integrity and Courage
    - Trust and Loyalty
    - Equity and Diversity
    - Vision and Intention in Life
    - Self-Awareness and Self-Improvement
2. **Relating:**
    - Inquiring and Dialoging
    - Negotiation, Compromise and Conflict Resolution
    - Advocacy
    - Diverse Connections and Grouping
    - Interpersonal Skills
    - Structured Communications
3. **Making Sense of Context:**
    - Awareness of the Societal and Natural Context
    - Awareness of the Needs of the Customer or Beneficiary
    - Enterprise Awareness
    - Appreciating New Technology
    - Systems Thinking
4. **Visioning:**
    - Identifying the Issue, Problem or Paradox
    - Thinking Creatively, and Imagining and Communicating Possibilities
    - Defining the Solution
    - Creating the Solution Concept
5. **Delivering on the Vision:**
    - Building and Leading an Organization and Extended Organization
    - Planning and Managing a Project to Completion
    - Exercising Project/Solution Judgment and Critical Reasoning
    - Innovation
    - Invention
    - Implementation and Operation
6. **Technical Knowledge and Reasoning**

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CHECKLIST FOR INITIAL SUCCESS AS A GEL:

□ Read this handbook thoroughly, and if you have questions consult with your team leader. (There is a quiz on this material during the second ELL of the fall semester).

□ Contact your GEL Advisor to arrange an in-person meeting within the first month of the fall semester.

□ Complete and submit your Engineering Practice Requirement (Appendix C) on time (See ESD.05 course syllabus). This is a graded assignment as part of the Engineering Leadership Lab (ELL)

□ Complete your initial Personal Leadership Development Plan (PLDP)

□ Attend each and every ELL. ***Arrive on-time!***
The ELL is a team-based experience, and your team is relying on you. You will be graded on your attendance, attitude, and participation.

□ Be aware of the program completion requirements for both GY1 and GY2 programs. Keep yourself on track for completion.

□ To maximize the program's potential benefit to you--immerse yourself in the program. Talk to or meet with your GEL Year Two team leader or GEL staff advisor if you have questions or suggestions. Engineering Leadership Development is a "contact sport," so get onto the "playing field!"

Program Key Ideas

Capabilities of Effective Engineering Leaders

Drawn from a wide range of industry and academic leaders, the capabilities comprise the *attitudes* of leadership: core values and character; the *skills* of leadership, relating, making sense of context, visioning, and realizing the vision; and the *knowledge* of engineering, science and technology. The capabilities provide a framework for assessment during leadership labs, the personal leadership development plan, and other activities.

Advising

Much as you have an advisor in your major, you also have a GEL advisor to help guide you through the GEL program. You will work with your advisor to ensure your completion of the program requirements; they will reach out to you to schedule a first meeting, but in general it is your responsibility to meet with them if you have any questions.

Mentorship

Distinct from advising, GEL has partnered with MIT faculty, industry members, and others to offer mentors to GEL students. These mentors are available to advise and assist students in their development as engineering leaders, both in the program and on projects outside of GEL. You are strongly encouraged to setup regular (if infrequent) meetings with your mentor – past experience shows that in the lack of such a schedule, meetings fail to happen.

Teams

During the Engineering Leadership Labs, you will work in a team with three to five other GEL 1 students, guided by a student in the second year of the program (your GEL2 Team Leader). Recognizing that your group will work better when you are comfortable with each other, your team has a small budget for bonding activities (ice cream, coffee, etc.).

Assignments

Personal Leadership Development Plan (PLDP)

Due Dates: Initial – Early October (date to be announced); Final Entry – Early May (date to be announced)

The PLDP has two main purposes: *familiarize* students with the capabilities of an engineering leader, and *encourage* them to plan for their personal and professional development. It is a self-reflective framework – you rate yourself. You are, of course, welcome to consult with your mentor, GEL2 team leader, or adviser in completing the form. For each capability, you rate (and justify your rating) your current ability in that capability, and develop a plan for how you can improve your skills.

Students continuing into GEL Year 2 will give a reflective presentation on their development as leaders (See Appendix M – “GEL Year 2 Final Assignment”).

Engineering Practice Requirement (EPR)

Due Dates: Proposal – Early October (Date to be announced); Update – Early May (Date to be announced)

The Engineering Practice Requirement is in place to ensure that all GELs leave the program with some experience on a realistic project team. *The vast majority of GEL students already are involved with such projects.* Completion of the EPR requires 1) students to submit the EPR Proposal Form, proposing a project; 2) GEL staff to approve the project; and 3) students to submit the EPR Completion Form.

Classes

GEL1 students are required to take three subjects to receive a program completion certificate. Attendance for these classes is required – many of the activities are hands-on or otherwise experiential in nature.

ESD.05 - Engineering Leadership Lab (for GEL1s)

2 hours each Friday – fall AND spring terms required

The Engineering Leadership Lab (ELL) is designed to give students practice developing the capabilities of an engineering leader. In a safe environment (one where failure doesn't mean the loss of real money or market share!), student teams are given realistic challenges, and then receive feedback on their performance. Sage advice is provided from industry members with experience in the field. Much like teams in an industry setting, active participation and commitment from all team members is crucial!

ESD.051 – Engineering Innovation and Design
ESD.054 – Engineering Leadership

GEL2 classes

Students admitted to the second year of the GEL program are required to complete the following additional classes.

***15.668 – People and Organizations**
***In the event that 15.668 isn't offered during a given term, acceptable alternates will be announced**
ESD.050 – Engineering Leadership Lab (for GEL2s)
ESD.052 – Project Engineering

GENERAL INFORMATION

"How the program started, and why"

Housed in MIT's School of Engineering, the Bernard M. Gordon-MIT Engineering Leadership Program provides a transformative national model for the development of next-generation technical innovators and leaders who are equipped to understand and address significant engineering problems in real-world situations.

Launched through a $20 million gift (with a matching requirement) by the Gordon Foundation — the largest gift made to MIT's School of Engineering for curriculum development — the program aims to supplement MIT's technical education with the leadership skills that prepare the nation's young engineering leaders for productive and effective careers in engineering companies.

Reflecting the mission of the Gordon-MIT Engineering Leadership Program, benefactor Bernie Gordon (MIT '48, M.S. '49) says: "You need to study a breadth of subjects and you need broad technical ability. But you also need discipline, integrity, strong character, right attitude, and an understanding of other human beings."

In this program, our educational task is to provide opportunities for all engineering students to further develop, deepen, and broaden their engineering leadership capabilities.

Specifically, we seek to educate and develop the character of outstanding MIT students as the potential future leaders of engineering practice and development.

HISTORY

In early 2008, a series of workshops was held at MIT, bringing together program stakeholders with diverse view of engineering leadership: alumni, students, faculty, and leaders from industry, the military, the community and from other leadership programs at MIT, resulting in the *Capabilities of Effective Engineering Leaders* that emerged as a consensus of this group.

The *Capabilities of Effective Engineering Leaders* is the guiding document upon which the GEL curriculum is built. The document is based on the Four Capabilities model, developed at the MIT Sloan School of Management (Ancona 2007), and anchored in the scholarship of leadership.

To help students develop these capabilities, we have created three approaches:

- To engage ***all*** engineering students (about 600) we partner with departments to provide activities, class sessions, materials, and workshops on leadership, teamwork, and project engineering.
- A large number of students (about 300) participate during their sophomore year in the Undergraduate Practice Opportunities Program (UPOP) where they develop and practice job skills and participate in a mentored summer internship.

- ***Many*** students (about 100) enter the GEL Year One program (GY1). GY1 is a one-year program of two short courses, hands-on engineering leadership labs and a project, a mentoring experience, and a personal leadership development plan (PLDP).
- A ***few*** students from the one-year program (about 30) continue into the more intensive GEL Year Two (GY2). In GY2, students take two more short courses, more engineering leadership labs, a second project, an InternshipPlus, additional mentoring and coaching, and deliver a compelling final presentation of their personal leadership development plan.

"The challenges we face in the 21st century — from the stable supply of energy in a carbon constrained world to the delivery of new products based on the fusion of engineering and the life sciences — cannot be accomplished by individuals or by technology on its own. We need to cultivate technically astute people who can apply their skills to guide the development of economically, socially, and environmentally acceptable solutions to technical problems."

— Dr. Susan Hockfield, Former President, MIT

About Bernard M. Gordon, Program Benefactor

For more than fifty years, Bernard M. Gordon and the teams of engineers he has led have conceived, invented, and developed a myriad of pioneering high-technology devices and equipment contributing to major advances in the fields of industrial instrumentation, medical imaging, computer systems, aerospace telemetry, and communications. Founder and Chairman Emeritus of the Board of Analogic Corporation, Bernard M. Gordon is often called the "father" of high speed analog-to-digital conversion for his many contributions to the technologies that enrich our lives. Currently Chairman of NeuroLogica Corporation, involved in advanced brain imaging, he continues as an active engineering innovator.

Awarded the National Medal of Technology by President Reagan in 1986, and elected to the National Academy of Engineering in 1991, Mr. Gordon has been honored by the Engineering Societies of New England, the Institute of Electrical and Electronic Engineers, the Franklin Institute, the Boston Museum of Science, and Eta Kappa Nu among others.

From his earliest contributions to the development of UNIVAC—the world's first commercial digital computer—and to the first alphanumeric dot matrix display, to scanning devices that would become the central core of modern medical imaging and counter-terrorism technology, Mr. Gordon has represented the key creative and essential role of the engineer in the development of new technology.

"What I see today is people in charge just delegating work, and they're causing people to fail because they're not giving a piece of themselves to their subordinates. A leader needs to give to others."-Bernard M. Gordon

Adapted from an article in the Spectrum, Fall 2008 by Liz Karagianis

GORDON ENGINEERING LEADERSHIP PROGRAM MISSION STATEMENT

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 its product development capability.*

**In this program, engineering leadership is defined as the technical leadership of the innovative conception, design and implementation of new products/processes/projects/materials/molecules/ software/systems, supported by the invention of enabling technologies, to meet the needs of customers and society.*

Program Goals:

- To 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

- To educate and prepare the potential future leaders of engineering innovation, invention and implementation efforts

- To increase the focus of national engineering education on the development of leaders of engineering innovation, invention and implementation

PROGRAM DESCRIPTION

GEL Year One (GY1) Program Description

In GEL Year One, students are exposed to the fundamentals of engineering leadership theory and develop, practice, and hone their leadership skills in an engineering context. Challenging, innovative, and interactive exercises are based on engineering leadership theories and designed specifically to help GY1 students become better leaders by developing and practicing the capabilities of effective engineering leaders.

During GY1, students have the opportunity to lead other students, participate as a member of a team, and observe the practical application of leadership capabilities in an engineering team setting. GY1 students get candid feedback about their performance as a leader and develop their unique "Personal Leadership Development Plan" based on that feedback and the *Capabilities of Effective Engineering Leaders*.

In weekly Engineering Leadership Labs*, GELs participate in guided reflection, emphasizing personal reflection that focuses on specific areas of improvement. Each GEL has an ELP staff advisor to assist tracking their progress completing GEL requirements and to answer any questions. To further help enhance their experience in the program, GELs seeking mentors are connected with mentors who have engineering leadership experience.

Goals of the GEL 1 year:

- Challenge GELs to become better engineering leaders by providing opportunities to develop and practice the *Capabilities of Effective Engineering Leaders.*
- Develop students' self-confidence through challenging, innovative, and interactive instruction, including engaging, hands-on experiential learning.
- Have students work in diverse teams comprising other students from multiple engineering disciplines, cultures, and backgrounds.
- Foster a sense of responsibility and confidence within students regarding delivering their professional projects and their overall team leadership skills.
- Expose students to candid evaluation and challenge them to conduct constructive personal reflection.
- Sharpen students' oral and written communications and presentation skills.
- Prepare students to become productive and effective contributors to projects and teams during their time at MIT and as they enter industry.

Full commitment to this program will develop, sharpen, and hone student leadership skills-making them a better engineering leader.

*** Note**: GY1 student attendance in ELLs and participation in recruiting/promotional activities is included as part of the ELL participation grade.

GEL Year Two (GY2) Program Description

In GEL Year Two, students further hone the leadership skills to which they were exposed, and which they developed, in GY1. Students in GY2 are assigned leadership positions within the cohort, providing additional opportunities to lead their fellow GELs and projects. Importantly, GY2 students are key stakeholders, and assist in advancing the Gordon program, as well as assist with the planning, leading, and evaluating the success of weekly Engineering Leadership Labs during the academic semester.

GY2 students continue to receive candid feedback about their performance as a leader; this feedback and their continued rigorous personal reflection informs the development of their individual Personal Leadership Development Plan (PLDP). A culminating event of GY2 is the Final Assignment. In this required presentation, each GY2 presents to the ELP staff a reflection of how they've developed their leadership skills as measured against the *Capabilities of Effective Engineering Leaders*.

Each GY2 student is provided an ELP staff advisor at the beginning of the academic year to assist their progress in completing the GY2 requirements and to answer any questions they may have. To further enhance their experience in the program, GY2 students are also connected with senior industry mentors who have significant engineering leadership experience.

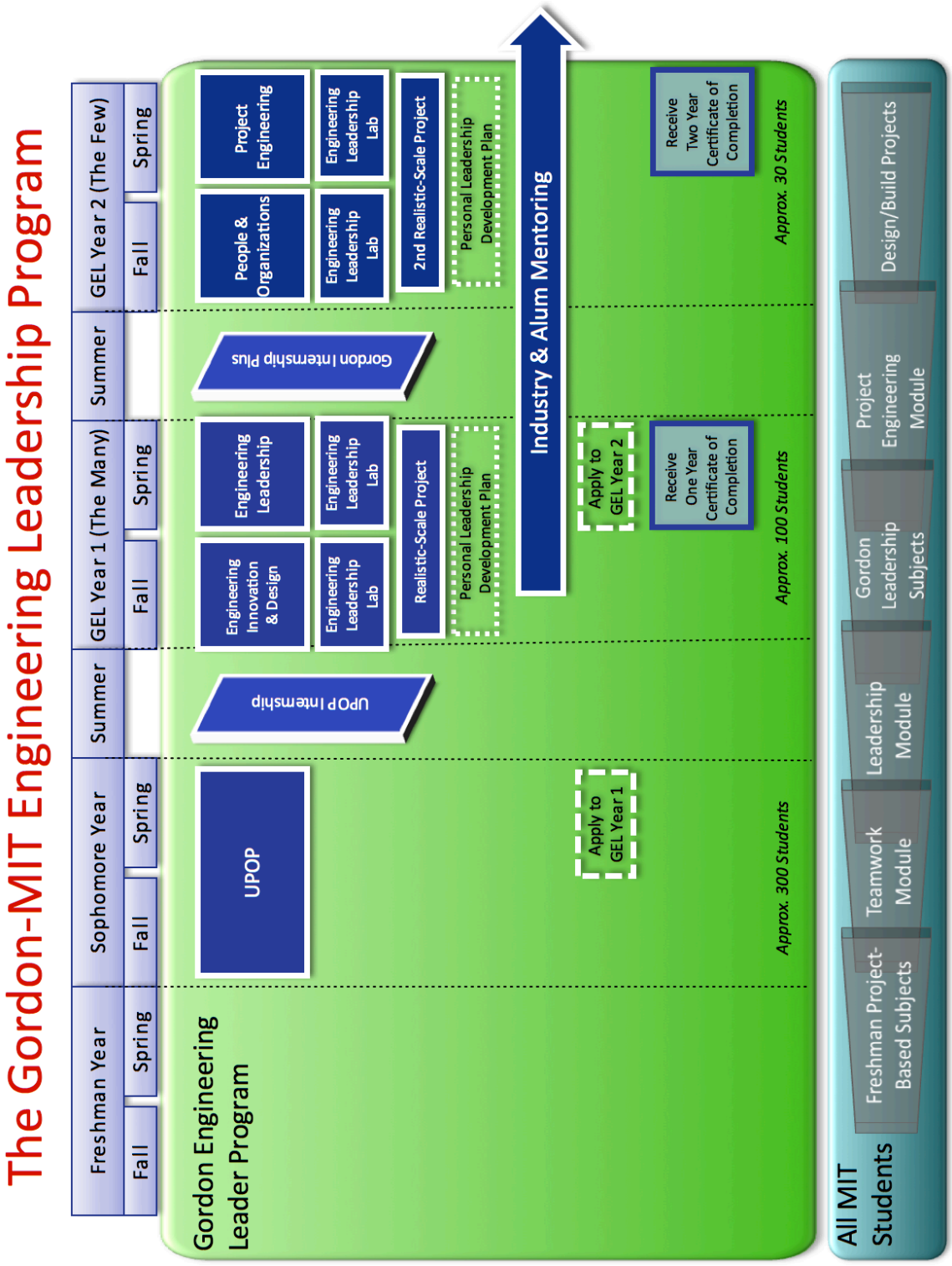
Goals of the GEL 2 year:

- Continue challenging GELs to become better engineering leaders by immersing them in the practical application of the *Capabilities of Effective Engineering Leaders.*
- Practice project engineering, organizational development, negotiation, conflict resolution, peer leadership, and other critical team-oriented skills.
- Develop self-confidence through hands-on, experiential learning.
- Have students lead diverse teams comprising other students from multiple engineering disciplines, cultures, and backgrounds.
- Foster a sense of responsibility and comfort within students regarding delivering their professional projects and when leading a team.
- Expose students to candid evaluation and challenge them to conduct constructive personal reflection.
- Sharpen students' oral and written communications and presentation skills.
- Prepare students to become successful engineers in industry.

Full commitment to this program will develop, sharpen, and hone student leadership skills-making them a better leader.

*** Note**: GY2 student attendance and participation in ELLs, student staff meetings, and recruiting/promotional activities is included as part of the ELL participation grade.

GEL PROGRAM CURRICULUM:



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GENERAL POLICIES AND STANDARDS

In order to earn a GEL Year One Certificate, you must successfully complete the following:

GY1 Program Completion Requirements: **

Two Engineering Leadership Program (ELP) 6 or 9 unit "short subjects" (See Appendix G)

1) Engineering Innovation and Design (ESD.051) [9 units]

2) Engineering Leadership (ESD.054) [6 units]

Two semesters of the weekly ESD.05 Engineering Leadership Lab (ELL)

The two semesters must be taken in consecutive Fall/Spring semesters in the year you entered the program. Attendance is tracked.

Engineering Practice Requirement (1 + 3 including 'e')*

Participation in at least **one** realistic scale project experience with an engineering component, which, taken together with other undergraduate experiences, will fulfill **three of the six requirements that students work:**

a. As an established leader of a team
b. With peers with other disciplinary backgrounds and skills (*e.g.*, other engineering disciplines, business, law, etc.)
c. With colleagues from diverse backgrounds (*e.g.*, not from research intensive universities)
d. On a real industrial deliverable
e. On a deliverable that is produced on schedule, to specification and to cost **[mandatory]**
f. With international components and perspectives

***(Must submit an Engineering Practice Requirement Proposal & Completion Forms in order to receive credit)**

A Personal Leadership Development Plan (PLDP), and submission of a fulfillment document

As part of the Gordon-MIT Engineering Leadership Program, students are required to develop and fulfill a Personal Leadership Development Plan and demonstrate its execution. Students participating in GY1 must complete all four phases of their PLDP and submit the completed form online through Stellar.

****It is the student's responsibility to track and complete all GEL requirements**

<u>GY2 Program Completion Requirements</u>: **Students must apply for and be accepted into the GY2 program.

Attaining Gordon Engineering Leader Year Two status requires the successful completion of the GEL Year One program, and in addition, the fulfillment of these requirements:

A degree from the School of Engineering (an alternative may be available by petition)

Two additional Engineering Leadership Labs (ESD.050)

- Two 6-unit semester-long subjects featuring hands-on activities, reflective sessions, simulations, and leadership practice opportunities

Two additional Engineering Leadership Program "short subjects" (See Appendix G)*

- People and Organizations (15.668)
- Project Engineering (ESD.052)

*An alternative may be substituted by petition

One InternshipPlus experience

As part of the GY2 Program you will participate in an internship with industry the summer after your GEL 1 year. To graduate from GY2 and to develop additional documentation/artifacts for use with your PLDP presentation, you will submit an **initial and a final report** to **demonstrate** that you have taken the necessary steps with your company and/or supervisor to ensure that you **maximize your experience** so that it is beyond an ordinary internship.

A Second Engineering Practice Requirement (2 + 6 including "e")**

Participation in a second realistic scale project with an engineering component, which, taken together with other undergraduate experiences** **and the realistic scale project completed in the GEL Year One Program** will fulfill the **six requirements that students work**:

a. As an established leader of a team
b. With peers with other disciplinary backgrounds and skills (*e.g.*, other engineering disciplines, business, law, etc.)
c. With colleagues from diverse backgrounds (*e.g.*, not from research intensive universities)
d. On a real industrial deliverable
e. On a deliverable that is produced on schedule, to specification and to cost
f. **[mandatory]**
g. On a project with international components and perspectives

***(Must submit an EPR Proposal & Completion Forms online in order to receive credit)**

****** In certain instances work done during the InternshipPlus *may* be able to be counted as an eligible project.**

A service responsibility to the Gordon-MIT Engineering Leadership Program. Service responsibilities could include:

- As mentors, leadership coaches or project engineers in project-based subjects in their major, or other project-based subjects
- Assisting in national outreach for the program
- Assisting in the operation of the program

Updated entries of your Personal Leadership Development Plan (PLDP), concluding with a final entry at the end of the GEL program:

- The personal leadership development plan is a personalized guide to developing the *Capabilities of Effective Engineering Leaders*, a list created with the input of industry leaders, alumni, faculty, staff and students.
- Students assess themselves and with the help of program mentors, create an individualized plan to develop these capabilities through the fulfillment of the program requirements described above, particularly the personalized aspects of the InternshipPlus and the Engineering Practice Requirement, and experiences outside the program.
- Periodic reviews and updates of the Personal Leadership Development Plan take place as students gain more leadership practice experiences.
- As discussed in Appendix M, your GEL Year 2 Final Assignment will make reference to your final PLDP.

A GEL Year 2 Final Assignment (Reflection Presentation – See Appendix M):

You will prepare and deliver a presentation that reflects on your leadership development experience throughout your two years in the GEL Program. The presentation will focus on two key elements: highlights of at least 5 key *Capabilities of Effective Engineering Leaders* that you've honed during your time in the program, as well as identifying and describing an element of the curriculum that had an impact on your personal growth. See Appendix M for assignment details.

In addition, there is a strong expectation that GELs will remain involved in the program for at least five years past graduation, for example as mentors, internship sponsors, guest speakers, members of the Industry Advisory Board, or in other capacities.

The following section provides general information about the Gordon program policies, procedures, and expectations. **Remember, this is a selective program that provides opportunities to those who seek them—you must be proactive and take the initiative.** If you don't understand something or have a question about a policy or procedure, speak with one of the ESD.05/.050 instructors, or ask your Gordon advisor.

Administrative Policies

1. Each student will be provided a GEL program advisor at the beginning of each year to answer any questions they may have. Note: Team leaders will track student progression.

2. Each student will keep the GEL Staff and the GEL student leadership informed of his/her current address, telephone number, email address or other contact information.

3. GEL Advisors will meet with each student a minimum of one time per semester to discuss program status, completion status, internships, EPR, PLDP, mentorship, course conflicts, concerns or issues.

4. Participation in assigned weekly Engineering Leadership Labs (ELLs) is required of all students.

5. Failure to comply with the GEL program requirements will result in a failing grade for the ELL.

6. GY2s must attend and participate in weekly GEL Student staff meetings to effectively assist in the planning, organizing, and advancing the ELP program.

7. GEL students are expected to track their own program requirement progression online—the staff will maintain records and provide status updates if requested.

8. GELs requesting a waiver or substitution for a requirement must submit a request online to the GEL student website. The request must provide compelling arguments for why the request should be granted, as well as any supporting documentation or information. The request will then be presented to the GEL staff, Class instructor, or Professor for consideration. Students must first make every effort to resolve conflicts with other classes or labs.

Short Subject Grading and Policies

Grading for each of the required short subjects: Engineering Leadership (ESD.054), Engineering Innovation and Design (ESD.051), Project Engineering (ESD.052), and People and Organizations (15.668) is at the discretion of the professor(s) teaching the subject. If you have questions regarding policies or grading, please review the syllabus of each class or contact the professor(s).

ELL Attendance and Grading Policy

The Engineering Leadership Labs (ELL) are highly experiential, team-based, and hands-on. Your team relies on you to be at every lab, on time, and to participate fully. As is expected of engineering leaders in industry, student presence, active participation, reliability, punctuality, and responsiveness is required as an integral part of the course. Those who cannot comply

with this will not meet the demands of the ELLs or of the GEL program in general.

1. **Attendance Requirements**. GELs must attend all ELLs offered in both Fall and Spring semesters. The ELL is highly experiential and cannot be recreated or made up. Absences impact your team and the effectiveness of the ELL. You many not attend a different section. Attendance will always be taken. Missing more than two labs without valid reason could put you at risk for not passing the course or completing the GEL Program.

2. **Known Absence Policy.** (Note: ELLs are the core of the GEL Program—instructors will only grant excused absences if the reason is justifiable and the student takes the initiative to seek prior approval according to the policies outlined below. **However, every effort must be made to schedule/reschedule potentially conflicting events so that they do not conflict with ELLs)**

2.1 Absence Notification Procedures. Students with exceptional circumstances will be approved on a case-by-case basis by the ELL instructor team: (ex. Official Project Team competitions, verified medical circumstances, PhD interviews, out of town interviews). Students should make every effort to not schedule meetings or appointments on Fridays.

- Email **gel-absent@mit.edu** **(cc your team leader)** as soon as you have knowledge of the conflict, but no later than 2 weeks prior to the ELL to be missed. The ELL instructor team will contact you within 48 hours of the notification. To be approved for an excused absence you must provide details for the conflict and why it justifies a missed ELL.

- No missed ELL will be deemed excused if notification is received less than 2 weeks prior to the ELL. (Excluding emergency absences.)

3. **Timeliness. As with the attendance policy, late arrivals hinder the entire lab activity and impact all students.** We expect all students to be on time for the ELL. All ELLs start promptly at 5 after the hour. The following late arrival policy applies:

- Three late arrivals (arriving 10 minutes after the hour)=one absence
- Arriving more than 30 minutes late or later will result in an absence.

NOTE: Students with longer travel distances between classes should coordinate with the instructor team.

Successful completion of the ELL each semester is required for the GEL 1 and GEL 2 programs.

Grading
This is the grading rubric:

70% Attendance
20% Participation
10% Assignments

If you have an excessive number of unjustifiable missed ELLs during the semester you will be asked to resign from the GEL program.

GEL STUDENT LEADERSHIP

The GEL student staff (GY2s) works closely with the GEL program staff to plan, organize, and execute many of the organization's functions. GEL second year students have the opportunity to hold key leadership roles in this structure. The students are organized into a structure for administration, planning, and evaluation purposes. GY2 students will serve in senior staff level positions or team leader positions for one semester.

GEL LEADERSHIP RESPONSIBILITIES- GY2

Team Leader:

1. Lead assigned team. (First line "supervisor" to team)
2. Track team attendance and evaluation status and coordinate with the HR Leader.
3. Coach/mentor GY1s when they are leading exercises.
4. Evaluate GY1s as needed (assessment cards).
5. Coach/mentor all team members in performance, program completion requirements, and PLDP completion.
   Note: GEL first year students will periodically lead their team during ELL exercises.

GEL Student Leader

1. Lead GEL student cohort and the GEL student staff; lead the student staff in planning, and ensuring that all major functions are accomplished; ensure all events are conducted on time and to standard; provide leadership, guidance, and mentorship to junior GEL students.
2. Provide strong continuous link between GEL student leadership and GEL program staff via phone, email, and in person.
3. Lead weekly staff meetings with the Assistant GEL Student Leader.
4. Assist in planning ELLs with the GEL student staff and the GEL program staff.
5. Coordinate/oversee student role in other GEL activities.
6. Directly supervise the Assistant GEL Leader, Communications & Outreach Leader, Logistics Leader, Human Resources Leader, Section Leaders, Undergraduate Instruction, and the Projects Team Leader.
7. Oversee successful student planning and execution of student involvement in all GEL program activities.

Assistant GEL Student Leader:

1. Assist GEL Student Leader in effectively managing the staff, ensuring that all major functions are accomplished; serve as GEL Student Leader in his/her absence.
2. Provide strong continuous link between GEL student leadership and GEL program staff via phone, email, and in person.
3. Create timelines, milestones, and benchmarks for the student staff during meetings.
4. Organize and run weekly staff meetings that focus on a four-week planning timeline that reviews planning for general tasks one-month pre-event, and specific tasks one week pre-event.

5. Track student staff actions.
6. Oversee successful student planning and execution of student involvement in all non-GEL program activities.
7. Directly supervise the GEL Section Leaders and the GEL Team Leaders.
8. Refine duties and job description throughout the semester.
9. Perform other duties as directed or assigned.

Human Resource Leader (Also referred to as "Assessment Leader"):

1. Track the student leadership assessments (assessment cards), PLDPs (spread sheet) and engineering practice requirement (EPR).
2. Serve as the supervisory quality control agent for the assessment cards.
3. Create, record, and maintain individual and group performance summary cards of student evaluations.
4. Identify and track which GELs will be evaluated for each event.
5. Analyze assessment cards and identify capabilities that need focus for each individual, as well as class trends.
6. Track, monitor, and report GEL student attendance at all events.
7. Track, monitor, and report GEL program completion requirements.
8. Create, consolidate, and maintain a continuity book with updated job descriptions for each staff member.
9. Keep staff updated with the progress of students and evaluations.
10. Beyond the GEL Program, provide support to the wider Gordon Engineering Leadership Program as needed.
11. Refine duties and job description throughout the semester.
12. Perform other duties as directed or assigned.

GEL Communications and Outreach Leader:

1. Directly responsible for working with the Director of Communications & Outreach and Admissions Coordinator to constitute a GEL Program Communications & Outreach Committee that will:
    A. Coordinate the staffing by GEL students at MIT, and ELP outreach events where GEL displays (e.g., MIT 'Career Week', Tau Beta Pi Career Fair, CPW, Spring Career Fair, etc.) and participates in staffing for such events.
    B. Help to plan, promote, and execute GEL orientation events
    C. Identify, suggest, and--as agreed--leverage suitable opportunities to publicize and promote UPOP and GEL (e.g., secure public display space in infinite corridor)
2. Work with Communications & Outreach Committee members to increase awareness about GEL and ELP among members of the MIT community and the engineering community at large.
3. Seek, identify, and recommend cost efficiencies for program awareness/outreach wherever relevant/appropriate.
4. Beyond GEL, provide support to the wider Gordon Program as needed.
5. Refine duties and job description throughout the semester.
6. Perform other duties as directed or assigned.

Admissions Coordinator: (Gordon Student Admissions Group-GSAG)

1. Help to plan and conduct recruitment, promotion, and outreach events to attract suitable MIT students to apply for GY1,
2. Coordinate activities and supervise sub-committee chairs: outreach, tracking, study breaks, interviews.

Logistics Leader:

1. Request and coordinate all materials and equipment needed for ELLs, special events and projects.
2. Ensure all materials arrive at each specified location prior to each event.
3. Ensure that all classrooms are prepared for each event and returned to their original state upon completion. (Ensure to delegate tasks - must only attend 1 ELL; coordinate for the other two).
4. Ensure all materials and equipment are secured and returned to the GEL offices.

Section Leader:

1. Regularly meets with the Student Leader and Assistant Leader
2. Introduce the labs each week and frame the exercises.
3. Assist Gordon ELP staff with planning the ELLs.
   This is a rotating position and should change weekly.
4. Lead ELLs on a rotating basis (can be rotated between team leaders).
   This is a rotating position and should change weekly.
5. Meet weekly with Team Leaders to disseminate information about upcoming events and labs.

Projects Team Leader:

1. Coordinate with project teams.
2. Coordinate with ELP staff to identify training that may benefit project teams.
3. Actively recruit GEL students from project teams.

Undergraduate Instruction Leader:

1. Work with the ELP staff to present GEL materials to undergraduate classes when needed.
2. Supervise the Undergrad instruction team.
3. Present ELP material (Project team success, Teamwork module).

Team Member:

1. Periodically lead assigned team during ELL exercises. (Rotating basis)
2. Act as an effective member of the team.

EVALUATION AND SELF-ASSESSMENT CARDS

Assessment Card: Assesses each GEL student while they are in a leadership role. The primary evaluation will focus on the leadership capabilities. It will also list leadership capabilities to sustain or improve upon.

Students may be evaluated in all or some of the leadership capabilities during a leadership opportunity. An evaluated capability will receive one of the following: A number assessment from 1 to 5, and an overall assessment of either an: **E** – Excellent / **S** – Satisfactory / **N** – Needs Improvement.

Yellow Card: A self-reflection of each evaluated GEL student after they are in a leadership role. Upon completion of the leadership role, each GEL student will complete a yellow card and submit it online through the GEL Stellar site.* This is a time for reflection; to think about what did and did not go well and which capabilities you feel you can improve upon in the future.

The yellow card represents a vital component of your experience in GEL: It is your opportunity for candid, honest reflection.

The following affective capabilities are used to assess students while in a leadership role. These capabilities can be observed and are assessed by a trained onlooker while using an "Assessment Card." At the end of the assessed period, the observer and student, highlighting both positive and negative actions, review the assessment card.

***Attitudes of Leadership (Core Values)*:** Students should reflect on their beliefs and attitudes, and further evolve their sense of responsibility and the personal capabilities that form a foundation for effective leadership. For effective engineering leaders, these include:

Initiative (IN) – Ability and willingness to assess risk and to take initiative, to create a vision and course of action, without the help or advice of others.

Ethical Action and Integrity (EI) – An adherence to ethical standards and principles, and demonstration of the courage to act ethically and with integrity, and to practice according to the norms of professional responsibility and one's responsibility to society.

Resourcefulness, Flexibility and Change (RF) – Ability and willingness to approach problems, tasks, and situations making ingenious use of the resources of the situation and group, and to manage the use of time. A willingness to accept and respond to change, embrace various views, be adaptable, and formulate and take alternative courses of action when necessary.

Responsibility, Urgency and Will to Deliver (RU) – Determination to accomplish one's objectives, and those of the team, pragmatically and in the face of constraints, obstacles, and errors by you and others. Commitment to the absolute responsibility to persevere and deliver on time, pursuing necessary follow-up. Focus on the tasks at hand with passion, discipline, and intensity.

Decision Making in the face of Uncertainty (DM) – Ability and willingness to make decisions informed by the information at hand, factoring in risks, uncertainty and potentially conflicting objectives, even if 100% of the needed information is not available.

Trust and Loyalty (TL) – Commitment to actions that will instill trust, and to the principle that loyalty to the team yields loyalty to the leader and vision. Working to empower those around you, to make the people around you successful.

Relating: Developing key relationships and networks within and across organizations, including listening to others to understand their views, and advocating for your position. For effective engineering leaders, these specialize to:

Interpersonal Skills (IS) – Understanding and respecting the needs, capabilities, and characteristics of individuals and the group, and the resources that individuals with different backgrounds can bring to an organization. Coaching and teaching, providing and receiving evaluation and feedback, and demonstrating the essential elements of gracious professionalism necessary to be an effective engineering leader.

Advocacy (AD) – The ability to clearly explain one's own point of view or approach, advocate a position, and explain how one reached their interpretation and conclusion. Proactively assessing the extent to which you are understood. Being able to do so to those with and without technical backgrounds, and from different cultures and/or backgrounds.

Negotiation, compromise and conflict resolution (NC) – Appreciating the need to identify potential disagreements, tensions or conflicts, and being able to negotiate to find mutually acceptable solutions.

Diverse Connections and Grouping (DC) – Appreciating, engaging and connecting widely with those with different skills, cultures, and experiences. Building a sense of group within direct participants, and building extended networks of those that can help achieve the goals and technical solution.

Structured Communications (SC) – Being able to create a strategy and structure to formal communications, and present information orally, in written and graphical form to both engineers and non-engineers in a clear and concise manner.

Inquiring and Dialoging (ID) – Listening to others with the intention of genuinely understanding their thoughts and feelings. Creating constructive dialog, and recognizing the ideas of others may be better than yours. Listening to and being willing to learn from everybody.

Debriefing**

A debriefing is a professional discussion which focuses on GEL student performance set against an established standard for the capabilities being evaluated. Debriefings maximize learning benefits by GELs, to learn from each other and the overall situation. Debriefs are most effective when the discussion is dynamic, candid, insightful and focused. Everyone can and should participate if they have an insight, observation or question that will help the GEL leader or team identify areas of improvement or maintain strengths. Maximum participation fosters the best discussion.

A debrief is NOT a critique. A debrief is NOT a means of "grading" success or failure. A debrief should be conducted immediately following an exercise so that the information and experience is fresh in the minds of the participants; it is best if conducted within 15 minutes upon conclusion of the event. All participants should be present. GY2s should encourage GEL students to give honest opinions and use open-ended/leading questions to guide the discussion of leader and team performance.

**** Debriefs will be led by GEL program staff**

Debrief Structure

Introduction and Rules
Review of objectives and intent
    Learning Objectives- *(what was supposed to happen- were the learning objectives met)*
Summary of recent events *(what happened)*
    Planning
    Preparation
    Execution *(Supervise)*
Discussion of key issues
    Chronological order of events
    Key events/themes/issues
    Discussion of optional issues
    Tasks to sustain/improve *(3 sustains/3 improves)*

Bernard M. Gordon-MIT Engineering Leadership Program

Capabilities of Effective Engineering Leaders
Version 3.6
June 2011

Engineers design and build things that meet the needs of customers, beneficiaries and ultimately society. These tasks can only be accomplished by the concerted action of many people aligned and rallied by effective leadership. The Bernard M. Gordon-MIT Engineering Leadership Program is dedicated to empowering MIT students to make the very most of their talents and to help them set and achieve personal goals, including the leading or founding of teams and organizations which tackle and solve the problems of the market and society that can be addressed (at least in part) by technical solutions.

Specifically, we seek to educate and develop the character of outstanding MIT students as the potential future leaders of engineering practice and development. In this program, *engineering leadership* is defined as the technical leadership of change: the *innovative* conception, design and *implementation* of new products/processes/projects/materials/ molecules/software/systems, supported by the *invention* of enabling technologies, to meet the needs of customers and society.

We start with the assumption that many students entering university have already demonstrated leadership potential. At the same time, we observe that with a focus on engineering science, many engineering curricula do not adequately emphasize the development of engineering leadership. In this program, our educational task is to provide opportunities for all engineering students to further develop, deepen, and broaden their engineering leadership attitudes and skills.

We want students to graduate having developed the *attitudes* of leadership: core values and character. They need to have developed the *skills* of leadership, represented below under the headings of: relating to others, making sense of context, creating visions and realizing the vision. Finally, in order to be effective engineering leaders, they of course need to have developed a deep understanding of the underlying *knowledge* of engineering, science and technology.

These capabilities of engineering leadership were anchored in the scholarship of leadership, and a consensus building process among engineering leaders. One of the ways to describe leadership is the “skills approach”, which places emphasis on the skills or abilities that can be learned or developed (Northouse 2010). The Gordon – MIT Engineering Leadership Program *Capabilities of an Engineering Leader* was based on one such capabilities model – the Four Capabilities model, developed at the MIT Sloan School of Management (Ancona 2007). During the Winter and Spring of 2008, a series of workshops were held at MIT, bringing together program stakeholders with diverse view of engineering leadership: alumni, students, faculty, leaders from industry, military leaders, community leaders and those from other leadership programs at MIT. The first draft of the *Capabilities of an Engineering Leader* emerged as a consensus of this group, *specializing* the general Four Capabilities model to engineering. In several subsequent stakeholder engagements with engineering leaders from industry, the document has evolved to its present form.

We believe engineering leadership can best be taught and developed by linking in a timely and systematic way:

- Coursework that provides the analytical concepts and frameworks for understanding engineering leadership;
- Opportunities on and off-campus to experience and practice leadership,
- Opportunities to reflect, discuss, and gain feedback from peers, faculty and experienced engineering mentors on lessons learned from leadership activities.

In some greater detail, these leadership capabilities can be described as presented below.

1. **The Attitudes of Leadership - Core Personal Values and Character:** students should reflect on their beliefs and attitudes, and further evolve their sense of responsibility and the personal capabilities that form a foundation for effective leadership. For effective engineering leaders, these include:

    - Initiative – Ability and willingness to assess risk and to take initiative, to create a vision and course of action, without the help or advice of others. [2.4.1]

    - *Decision Making in the Face of Uncertainty* – Ability and willingness to make decisions informed by the information at hand, factoring in risks, uncertainty and potentially conflicting objectives. [2.4.1]

    - Responsibility, *Urgency and Will to Deliver* – Determination to accomplish one's objectives, and those of the team, pragmatically and in the face of constraints, obstacles, and errors by you and others. Commitment to the absolute responsibility to persevere and deliver on time, pursuing necessary follow-up. Focus on the tasks at hand with passion, discipline, intensity. [2.4.2]

    - Resourcefulness, Flexibility and *Change* – Ability and willingness to approach problems, tasks and situations making ingenious use of the resources of the situation and group, and to manage the use of time. A willingness to accept and respond to change, embrace various views, be adaptable, and maintain and take alternative courses of action when necessary. [2.4.2]

    - Ethical Action, Integrity and Courage – An adherence to ethical standards and principles, and demonstration of the courage to act ethically and with integrity, and to practice according to the norms of professional responsibility and one's responsibility to society. [2.5.1](f)

    - *Trust and Loyalty* – Commitment to actions that will instill trust, and to the principle that loyalty to the team yields loyalty to the leader and vision. Working to empower those around you, to make the people around you successful. [2.5.6]
    - *Equity and Diversity* – Commitment to treat others as equals, regardless of status or background, and to embrace diversity in organizations. [2.5.5]

- *Vision and Intention in Life* – Determining a pathway to one's eventual contribution to and impact on society, and how engineering plays a role in ones intentions. Committing to a personal vision, and the intention to inspire others. [2.5.3]

- Self-Awareness and Self-Improvement – Awareness of one's own personal, interpersonal and professional skills, and strengths and weaknesses. [2.4.5] Being prepared to continue learning, and proactively planning for one's continuing education, self-improvement, and future career. [2.4.6, 2.5.3, 2.5.4] (i)

2. **Relating:** developing key relationships and networks within and across organizations, including listening to others to understand their views, and advocating for your position. For effective engineering leaders, these specialize to:

- *Inquiring* and *Dialoging* – Listening to others with the intention of genuinely understanding their thoughts and feelings. Creating constructive dialog, and recognizing the ideas of others may be better than yours. Listening to and being willing to learn from everybody. [3.2.7]

- *Negotiation, Compromise and Conflict Resolution*-- Appreciating the need to identify potential disagreements, tensions or conflicts, and being able to negotiate to find mutually acceptable solutions. [3.2.8]

- *Advocacy* – The ability to clearly explain one's own point of view or approach, advocate a position, and explain how one reached their interpretation and conclusion. Proactively assessing the extent to which you are understood. Being able to do so to those with and without technical backgrounds, and from different cultures. [3.2.9]

- *Diverse Connections and Grouping* – Appreciating, engaging and connecting widely with those with different skills, cultures, and experiences. Building a sense of group within direct participants, and building extended networks of those that can help achieve the goals and technical solution. [3.2.10]

- Interpersonal Skills – Understanding and respecting the needs and characteristics of individuals and the group, and the resources that individuals with different backgrounds can bring to an organization. Coaching and teaching, providing and receiving evaluation and feedback, and the essential elements of gracious professionalism necessary to be an effective engineering leader. [3.1] (d)

- Structured Communications – Being able to create a strategy and structure to formal communications, and present information orally, in written and graphical form to both engineers and non-engineers in a clear and concise manner. [3.2, 3.3] (g)

3. **Making Sense of Context:** making sense of the world around us, and coming to understand the context in which the leader is operating - making a mental map of the

complex environment, and explaining it simply to others. For effective engineering leaders, these specialize to:

- Awareness of the Societal and Natural Context – An awareness and understanding of the world's problems, challenges, and opportunities, and the historical and contemporary role of engineering in addressing them. An understanding of the natural context, and the need for sustainability. Specifically identifying opportunities for new (or previously not implemented) engineering solutions and systems to address these needs. [4.1] (j, h)

- Awareness of the Needs of the Customer or Beneficiary – An understanding of the specific needs of those who will benefit from the envisioned engineering solution: the customers who will buy it, the users who will use it, the beneficiaries who will directly or indirectly benefit from it. [4.3.1]

- Enterprise Awareness – Understanding the goals and culture of the enterprise in which one works, the shared beliefs, goals and strategies of the enterprise, and norms for working successfully and bringing about change. Literacy in broader business concepts and analysis, and in particular engineering project finance. [4.2]

- *Appreciating New Technology* – Understanding the emergence and implications of new science and technology, and how they might enable or enhance new solutions and systems. [4.2.6]

- Systems Thinking – Thinking holistically. Possessing an ability to view complexity, focus on critical features, identify inter-relationships and emergent qualities, and create abstractions and models that simplify comprehension. [2.3]

4. **Visioning:** creating purposeful, compelling and transformational images of the future, and identifying what could and should be. For effective engineering leaders, these specialize to:

- *Identifying the Issue, Problem or Paradox* – Synthesizing the understanding or needs or opportunities. Clarifying the central issues, framing the problem to be solved, or identifying the underlying paradox to be examined. [4.3.1]

- Thinking Creatively, and *Imagining and Communicating Possibilities* – Understanding how to create new ideas and approaches. Creating and communicating visions for new technical products and systems, and new engineering-based enterprises, that deliver new capabilities. [2.4.3]

- Defining the Solution – Identifying a vision for the solution, and setting achievable goals for performance (including quality), budget and schedule. These are guided by the views of the customer, reflect the possibilities of technology, meet regulatory and political constraints, and consider competitive forces and the needs of internal stakeholders. [4.3.1]

- Creating the Solution Concept – Creating and selecting the concept and architecture for the technical solution, which might be innovative or evolutionary, and then defining the specifications and interfaces of the solution so that realization can be effective. [4.3.2, 4.3.3]

5. **Delivering on the Vision:** leading transformation by designing processes and approaches to delivering on the vision, to move from abstraction to innovation, invention and implementation, i.e., to get the engineering done. For effective engineering leaders, these specialize to:

- Building and Leading an Organization *and Extended Organization* – Building an organization by recruiting key players with complementary and superior skills, defining team processes, roles and responsibilities, setting expectations, creating incentives and motivating the team. Lead an organization by employing appropriate modes of leadership under various conditions, and leading group decision-making. Assess organizational and individual performance. Observe, reflect and build on the leadership qualities of others. Develop approaches to incorporating competence outside of one's enterprise in an extended organization. Understand how to manage change. [4.2.4] If desirable, create a new engineering-based entrepreneurial enterprise. [4.2.3]

- *Planning* and Managing a Project to Completion – Choosing a development strategy (waterfall, spiral, etc.), and devising a plan of action, and alternative plans if needed, to achieve the goals and deliver on time. Identifying and removing obstacles. Controlling the project to the plan. Identifying when the project is off plan and re-planning appropriately. Managing and apportioning the resources of the team, to achieve the desired outcome within the human, time, financial and technological resources available. Controlling and managing program margins, risk, configuration and documentation. Understanding the financing and the economics of the project. [4.3.4]

- *Exercising Project/Solution Judgment* and Critical Reasoning – Questioning and critically evaluating and applying judgment to solutions proposed by others, and to corroborating inputs. Evaluating evidence, and identifying the validity of key assumptions - Critical thinking [2.4.4] Understanding alternatives that may be developed or are being developed by others, including competitors. Taking into account the evolution of existing systems when proposing new systems.

- Innovation – Designing and introducing new goods and services to the marketplace. Based on goals and concept, identify, advocate for and amass the required resources (financial, etc.), design a solution with the appropriate balance of existing and new technology, reuse and new development, and flexibility and adaptability. Consider current and future competition. Consider sustainability in the design and implementation. Validate the effectiveness of the outcomes. [4.4] (c)

- *Invention* – Imagining possibilities based on emerging technology or science, and inventing a practical device, material, process or way of working that enables or enhances a new good or service. Adhere to and exploit intellectual property regimes.

- Implementation and Operation – Applying the methods of engineering development to implementation of engineering outcomes and systems. Consider quality, variability, robustness and appropriate testing. Operate the solution effectively in such a way that the needs of the customer and society are repeatably and reliably met. Design, implement and operate the project, product or system [4.5, 4.6], or model, manipulate and make the material or bio-molecule.

6. **Technical Knowledge and Reasoning:** Essential to the effective execution of engineering leadership is a deep working knowledge of a technology or discipline. While normally developed in the standard curricular course of study, this knowledge is no less essential for an engineering leader. It includes an ability to understand, decompose and recombine different elements of a technical problem through application of a deep understanding of technical knowledge [1.0] (a,k), engineering reasoning and problem solving [2.1] (e), and the approaches to inquiry and experimentation that may be necessary to develop or refine a new technology needed for a product, process or system [2.2] (b).

Notes on Sources:
The important inputs for this description of capabilities are:

1. The MIT Sloan Leadership Model, reflected in the Harvard Business Review article "In Praise of the Incomplete Leader" by Deborah Ancona, Thomas W. Malone, Wanda J. Orlikowski, and Peter M. Senge (February 2007). The topical organization of the above capabilities into Sensemaking, Relating, Visioning and Realizing the Vision (called by them Inventing) is due to this work.
2. The "CDIO Syllabus, a Statement of Goals for Undergraduate Engineering Education" a taxonomy of desirable engineering knowledge, skills and attitudes of engineers, originally presented in a report by Edward Crawley in January 2001 (see www.cdio.org) and later included in the book Rethinking Engineering Education, the CDIO Approach by Edward Crawley, Johan Malmqvist, Soren Ostlund, and Doris Brodeur, Springer, 2007. The notations in [square brackets] above correlates topics with the CDIO Syllabus, and notations in italics show significant additions to the topics in the CDIO Syllabus. The CDIO Syllabus was updated in June 2011 to capture many of the topics in italics.
3. The accreditation standards for engineering education, contained in ABET 2000, as described in "Criteria for Accrediting Engineering Programs: Effective for Evaluations During the 2000-2001 Accreditation Cycle," Revised March, available at http://www.abet.org. The notations in (parentheses) above correlate topics to the ABET requirements section 3 a-k.
4. The deliberation for the Bernard M. Gordon - MIT Engineering Leadership Program on 18 December 2007, and subsequent development of summary documents by the group.

APPENDIX A

About the GY1 Personal Leadership Development Plan (PLDP)

As part of the Gordon-MIT Engineering Leadership Program, students are required to develop and fulfill a Personal Leadership Development Plan (PLDP) and demonstrate its execution. Students participating in GY1 must complete all three phases of their PLDP and submit the completed form online through the GEL site.

Directions:

1. Place an "x" or a "✓" on the line after the rating that best describes your current level in each Capability, and fill in the month/year of the rating
2. Provide a brief rationale for that rating
3. Write a plan for developing low-rated Capabilities; such as practicing the Capability in a project, with a team, through a specific subject, being coached, etc.
4. Periodically, update your ratings, placing a "x" or a "✓" by the rating that best describes your current level in each Capability, and filling in the month/year of the rating
5. In your final semester of Gordon ELP participation, place an "x" or a "✓" on the line after the rating that best describes your current level in each Capability after you have engaged in development activities as described in your plan.
6. Provide a brief rationale for the final rating.

Complete your **self-assessment**.
Rate your current level in each of the Capabilities of Effective Engineering Leaders and include your rationale. Although the Capabilities are described in detail, please rate yourself on the Capability as a whole. Be realistic and honest when doing your assessment and provide the rationale for your answer.

Rating Levels:
Although the Capabilities are described in detail, please rate yourself on the Capability as a whole. The rating levels are:

Not yet possess - have no real capability, don't know what this means, or have only been, exposed in passing, don't yet see the value of, need to learn everything about

Introductory level - have a little capability, know something about, can describe, accept the need for, need to learn a lot more and have a lot of practice to be good at

Intermediate level - have some capability, understand and could discuss, beginning to internalize, still need to learn more, and practice to become proficient

Advanced level - have good capability, know well enough that I could explain and demonstrate, or coach someone else, embrace this idea completely, need to develop more advanced capability

Example:

1.6. Trust and Loyalty a. Commitment to actions that will instill trust, and to the principle that loyalty to the team yields loyalty to the leader and vision b. Working to empower those around you, to make the people around you successful	**Dates** Initial Mid Final Not yet possess _x__ ___ ___ Introductory level ___ __x_ ___ Intermediate level___ ___ ___ Advanced level ___ ___ ___

Rationale: I haven't had much opportunity to demonstrate this capability yet.

Plan: In the Design-Build-Fly Project, I will work to identify my three team members' strengths, assign tasks that align with their strengths, and give them responsibility to complete the task, thereby empowering those around me to be successful.

APPENDIX B

About the GY2 Personal Leadership Development Plan (PLDP)

As part of the Gordon-MIT Engineering Leadership Program, students are required to develop and fulfill a Personal Leadership Development Plan (PLDP) and demonstrate its execution. To graduate from GY2, you will deliver a final presentation (See Appendix M) as **evidence** of the fulfillment of your plan, and compellingly **present** a **personal reflection** to a Program Committee (not required for GY1). Students participating in GY1 must complete all four phases of their PLDP and submit the completed form online through Stellar. Both tangible and non-tangible examples of improvement must be collected and presented and you should be honest in your assessment.
You will be encouraged to periodically review and update your plan with your mentor, and to create a portfolio for the evidence supporting your development of these Capabilities. Evidence could include a brief description of a time that you managed risk, or listened to and incorporated the ideas of others, or persevered on a difficult task to its completion, and the inclusion of design documents, models, artifacts, testimonials, goal book, etc. You can use as reference your Internship Plus, the Engineering Practice Requirement and your experience as a student outside the program.

How to do it?
Step 1: Complete your **self-assessment**.
Rate your current level in each of the Gordon-MIT Capabilities and include your rationale. Although the Capabilities are described in detail, please rate yourself on the Capability as a whole. Be realistic and honest when doing your assessment and provide the rationale for you answer.

Rating Levels:
Although the Capabilities are described in detail, please rate yourself on the Capability as a whole.
The rating levels are:

Not yet possess - have no real capability, don't know what this means, or have only been, exposed in passing, don't yet see the value of, need to learn everything about

Introductory level - have a little capability, know something about, can describe, accept the need for, need to learn a lot more and have a lot of practice to be good at

Intermediate level - have some capability, understand and could discuss, beginning to internalize, still need to learn more, and practice to become proficient

Advanced level - have good capability, know well enough that I could explain and demonstrate, or coach someone else, embrace this idea completely, need to develop more advanced capability

Step 2: Create and submit a **Personal Leadership Development Plan.**
*For those Capabilities for which you rated yourself as "Not yet possess" or" introductory level" you need to describe how you plan to reach a higher level of development and include **discussion and reflection** in your and final **presentation** (See Appendix M) of how you reached that level of development.*

Example:

Trust and Loyalty	**Rating:**
a. Commitment to actions that will instill trust, and to the principle that loyalty to the team yields loyalty to the leader and vision b. Working to empower those around you, to make the people around you successful	✓ Not yet possess __ Introductory level __Intermediate level __ Advanced level

Rationale: I haven't had much opportunity to demonstrate this capability yet.

Plan: In the Design-Build-Fly Project, I will work to identify my three team members' strengths, assign tasks that align with their strengths, and give them responsibility to complete the task, thus empowering them to be successful.

Step 3: Collect evidence supporting your development or attainment of at least half of the Capabilities; although your Plan (Step 2) included those Capabilities for which you rated yourself as "Not yet possess" or "Introductory" level.

Evidence could include:

- A description or reflection written by you of a time that you demonstrated a Capability, such as managed risk, or listened to and incorporated the ideas of others, or persevered on a difficult task to its completion, etc.,
- Assessment card with a Satisfactory or Excellent rating,
- Reflection Cards,
- Notes/emails from 1) internship supervisors, 2) internship co-workers, 3) fellow team members from class project teams, other academic teams, student project teams, EPR teams, student activities, athletic teams, religious groups, etc., 4) team leaders of any of those teams/groups, 5) faculty & staff, etc.
- Peer reviews (from 2.009, other classes, GEL peer reviews, etc.),
- Design documents, models, artifacts, etc.

Step 4: Prepare for submission the final version of your PLDP with the rationales for final ratings complete.

Your GEL 2 Final Assignment P**resentation** will take place in April or May, to a panel of ELP-related staff, faculty, IAB members, etc. (see Appendix M). You will be able to choose from several dates and times to present.

Your **presentation** will be no longer than 20 minutes and will include:

1. *Present highlights of your development for <u>at least 5</u> key capabilities*. Start by considering which experiences (some may be in the program, some may not) have contributed to your growth and development in these capabilities. Explain how these experiences have allowed you to build skills and understanding. (For example: How did your Internship+ experience enable you to move from "Not yet possess" to "Intermediate" in Advocacy?)
2. Also, *select an aspect of the GEL curriculum you found to be significant regarding your development*. Explain what you learned and how this knowledge might help you in the future. Note: This is an opportunity to influence the GEL program. Your input will help us improve the program for future students.

Caveats:

- You are **not** expected to have reached the Advanced Level of all of the Capabilities, perhaps one Capability at most.
- After two years as a GEL, it **is** expected that you should be at least at the Introductory level for all of the Capabilities, which at a minimum means you know something about the Capability or could describe it.

Appendix C

Gordon Engineering Leadership Program
Engineering Practice Requirement

Rev. 3.0 9/14/10

Gordon Engineering Leaders in the one-year program will participate in at least one realistic scale project experience with an engineering component, which, taken together with other undergraduate experiences, will fulfill 3 of the 6 requirements that students work:

a. As an established leader of a team
b. With peers with other disciplinary backgrounds and skills (*e.g.,* other engineering disciplines, business, law, etc.)
c. With colleagues from diverse backgrounds (*e.g*., not from research intensive universities)
d. On a real industrial deliverable
e. On a deliverable that is delivered on schedule, to specification and to cost (mandatory)
f. On a project with international components and perspectives

Requirement (e) is mandatory for all GY1 students. The purpose of this document is to assist in interpreting the Engineering Practice Requirement and describing different scenarios which satisfy it. Students who continue on to GY2 are required, during the second year, to participate in at least one additional project experience with an engineering component and to complete all 6 requirements.

1. Interpreting the Engineering Practice Requirement

The requirement applies to all GELs. It is composed of 1 + 3 parts. Each student, over the course of their first year in the program, will participate in at least one (1) "realistic scale project experiences." These projects should be of sufficient scale and realism that they give a feel for the authentic engineering process of conceiving, designing, implementing and operating engineering products, processes, projects, molecules, materials, software, services or systems. These projects or experiences should have a significant engineering component, but may also have substantial non-engineering components. The InternshipPlus can, if it has a substantial engineering component, count as one of the two projects required of GY2 students.

For GY1 students, these projects, taken together with other undergraduate experiences, should provide exposure to three of six situations in which engineering leaders often find themselves:

As an established leader of a team: Established leaders (a) use the leadership capabilities defined by the Gordon Program (character, vision, sense-making, realizing the vision, relating, technical knowledge) and (b) are recognized by their team members as holding the responsibilities of leadership.

With peers with other disciplinary backgrounds and skills and **with colleagues from diverse backgrounds**: The intent of these requirements is for students to have experiences that take

them beyond their peer group and, specifically, away from the homogenous teams typically formed, by necessity, in MIT classes. These two statements require working with groups that exhibit (a) a diversity of disciplinary interests outside of the student's field of study (*e.g*. with other kinds of engineers, with those with management, marketing, manufacturing, operational background, etc.) and (b) a diversity of experience and skills (*e.g.*, different kinds and levels of education, different kinds of intelligence and ability to contribute, a theoretical vs. more pragmatic approach to problems, etc.).

On a real industrial deliverable: Participating in the effort to design a authentic deliverable product or process destined for real end users or customers, preferably in an industrial setting.

On a deliverable that is delivered on schedule, to specification and to cost (MANDATORY): Engineers deliver things that work on schedule and budget, or they fail – there is often "no partial credit". Implicit here is that the project *had* a schedule, a specification, and a budget. Note that while this might be the same deliverable as the previous requirement, it is not necessarily so.

On a project with international components and perspectives: This requirement asks for engagement with issues arising in international work. There are three main ways of gaining this experience. (1) In an international setting – work on a project outside the US. (2) Design for an international application – engage real-world international project requirements. (3) Work with international colleagues – be a member of international project team, *e.g.* a joint MIT-Delft project team.

While GY1 students are required to satisfy 3 of the above, and GY2 students required to satisfy all 6, it is important to note that no one project must meet all the requirements – further, some of the requirements can be met in the realistic scale projects, and some of the requirements may be also be met by "other undergraduate experiences," a term flexible enough to permit a number of possible solutions.

2. Implementation Roadmaps

The requirement is designed specifically so students have many options to meet it. GY1 students must demonstrate that they have satisfied both parts of the formal requirement (the "1 + 3, including e" formulation: one realistic scale project, plus three of the six specific requirements including part e). This obligation contains the opportunity for a student to create a completely personalized route to fulfilling the requirement – so long as the student can set forth a convincing argument for their choices.

In the following scenarios the letters refer to the six labeled requirements on Page 39. This list is by no means definitive and serves only to illustrate options.

Alternative 1: GY1 student enters the program already a member of the Solar Car team in which they lead a subgroup that delivers a working solar power system on time and to cost

(points a and e). Over IAP the student travels to Spain to volunteer on a political campaign (point f).

Alternative 2: GY1 student participates in an IDEAS team solving problem in Ghana, delivering the solution within spec, schedule, and budget (points d, e, f).

Alternative 3: GY2 student serves as a member of a 100k team with a real engineering deliverable (project #1, point b). Summer after Junior year is spent at sea as part of ROTC commitment (points a, c). The student then takes D-Lab II and delivers on schedule, spec and cost (project #2, points d, e, f).

This requirement represents a sizable component of the overall GEL program and several resources are available to assist in navigating it. Chief among these, especially in the early stages of the program, is the Gordon staff. Please contact one of the ESD.05/.050 instructors for any further clarification or advice.

APPENDIX D- COMPLETE ONLINE

Engineering Practice Requirement (EPR) Proposal

Name: _____ **Date**: _____

Activity Name: _____

Approximate completion date: _____

Description (Indicate which aspects of the work satisfy the requirements below):

Estimated time commitment (average hours/week & overall duration):

Which of the "1+3" or "2 + 6" Engineering Practice requirements will this work satisfy?

□ Project #1

□ Project #2

□ 1. Established leader

□ 2. Other disciplines

□ 3. Diverse backgrounds

□ 4. Industrial deliverable

□ 5. Schedule, spec, budget

□ 6. International component

Gordon Engineering Leadership Program

Engineering Practice Requirement Proposal

Name: [redacted] **Date:** 9/1/12

Activity Name: _____

Approximate completion date: Spring 2013

Description (please indicate which aspects of the work satisfy the requirements below):

OnStar developer challenge

Estimated time commitment (average hours/week & overall duration):

3-4 h/wk Semester

Which of the "2 + 6" Engineering Practice requirements will this work satisfy?

- ☑ Project #1
- ☐ Project #2
- ☑ 1. Established leader — I'm leading the team
- ☐ 2. Other disciplines
- ☑ 3. Diverse backgrounds — Our team has a variety of majors and backgrounds
- ☑ 4. Industrial deliverable — We must deliver to OnStar by 1/1/13
- ☑ 5. Schedule, spec, budget — We have a $100 budget, deadline, and a spec
- ☐ 6. International component

v2.0 rev. 2/18/09

APPENDIX E-COMPLETE ONLINE

Gordon Engineering Leadership Program

Engineering Practice Requirement (EPR) Completion Form

Name: _____ Date: _____

Briefly describe how and when you have satisfied each of the components of the requirement:

Project #1	
Project #2	
"As an established leader of a team"	
"With peers with other disciplinary backgrounds and skills"	
"With colleagues from diverse backgrounds"	
"On a real industrial deliverable"	
"On a deliverable that is delivered on schedule, to specification and to cost"	
"On a project with international components and perspectives"	

Gordon Engineering Leadership Program

Engineering Practice Completion Form

Name: __[student name]_____ Date: _____1/1/13___

Briefly describe how and when you have satisfied each of the components of the requirement:

Project #1	MIT Rocket Team NASA University Student Launch Initiative
Project #2	
"As an established leader of a team"	Team Treasurer and Experimental Propulsion Lead October 2012-present
"With peers with other disciplinary backgrounds and skills"	Each member is a specialist in a different aspect of the rocket, from electronics to rocket recovery to structures, etc. I specialize in the fabrication of the rocket's structural body. Throughout the year.
"With colleagues from diverse backgrounds"	The team is composed of mostly AeroAstro undergrads, but also physics and electrical engineering undergrads. We all work collectively on the project throughout the year.
"On a real industrial deliverable"	The team has to create reports documenting the design of the rocket along the design process. Reports are read and judged by NASA engineers. Submitted throughout the year.
"On a deliverable that is delivered on schedule, to specification and to cost"	Reports have all been submitted on time and rocket met all NASA requirements. Culminated in a successful launch in Huntsville AL on 4/22/12
"On a project with international components and perspectives"	Many electronic parts used on the rocket were from international vendors. Additionally, the scientific findings of the rocket can benefit the Amateur Rocektry enthusiasts throughout the world. Data from flights has yet to be analyzed.

EXAMPLE #2

Gordon Engineering Leadership Program

Engineering Practice Completion Form

Name: ____[student name]_____ Date: ____1/1/13____

Briefly describe how and when you have satisfied each of the components of the requirement:

Project #1	ESD.051 Engineering Innovation and Design final speech recognition project *Fall 2010*
Project #2	2.009 Product Engineering Process capstone project *Fall 2011*
"As an established leader of a team"	Project 1: I was the group leader of the three person team
"With peers with other disciplinary backgrounds and skills"	Project 1: My skill base is mechanical engineering while one team member's was industrial design and the other team member's was coding
"With colleagues from diverse backgrounds"	Project 2: 2.009 team demographics – 7 male, 6 female; 6 Caucasian, 2 Asian, 2 African American, 3 Hispanic; 2 members who grew up outside of America (Mexico and Brazil)
"On a real industrial deliverable"	Project 2: Ended with an alpha prototype of a RFID bike lock
"On a deliverable that is delivered on schedule, to specification and to cost"	Project 2: The prototype was completed by the December 12 due date, built according to class objectives, and using less than the $2000 budget
"On a project with international components and perspectives"	Project 1: Had to consider if the user did not speak English. Included a keypad alternative navigation method to address this issue.

APPENDIX F

InternshipPlus (GY2)

If selected to be a second year GEL, as part of the GY2 Program you must actively seek out and participate in an internship with industry the summer after your junior year. To graduate from GY2 and to develop additional documentation/artifacts for use with your PLDP, you will submit an **initial and a final report** to **demonstrate** that you have taken the necessary steps with your company and/or supervisor to ensure that you **maximize your experience** so that it is beyond an ordinary internship or UROP. Your employer will also evaluate your performance and constructive feedback will be provided from members of the staff.

Suggestions on how you can transform a regular internship into an InternshipPlus:

1) Understand the **vision, mission, strategy** and **objectives** of the organization and identify how your project is **aligned** with the organization.

2) Identify key **stakeholders** in the organization that would potentially benefit from your work, try to understand their needs and identify potential opportunities to expand your responsibilities and experience.

    - *Explain the Gordon-MIT Engineering Leadership Program and the InternshipPlus experience. Talk about your role in GEL, and your responsibility to expand your internship experience, increase your engineering leadership skills, and /or to learn more about day-to-day engineering leader actions and activities in the company.*
    - *Seek out and establish a relationship with an engineering leader in your company as a mentor, and learn from him/her. Document what you learned.*
    - *If you can, arrange to "shadow" an engineering leader in the company: Ask if he or she has a project on which you can assist or lead.*

3) **Broaden** your internship responsibilities and experience by proposing and arranging expanded responsibilities and experience to your manager, which enables you to **assist** or **lead** a project in the organization.

    Prepare a proposal, ask for a short meeting and present it to your manager. Leave the meeting with expanded responsibilities and experiences.

4) Build a **network** and explore potential job opportunities for the future.

    Attend special events, internal meetings, group lunches and dinners. Use every opportunity you have to meet new people, understand their role in the organization and create relationships for your professional future.

5) Learn the organizational **culture** and how engineering leadership contributes to and influences it.

Work with your manager to develop a list of activities you can do to enhance your understanding of the organizational culture.

How to approach Senior Management:
Devise questions to capture their attention:

Understand your manager's **challenges**:

- What are the biggest challenges business units face in achieving the objectives of the organization?
- What are the biggest challenges engineers face in achieving the objectives of their business units?
- What are the technical aspects of these challenges?
- What are the relevant parties to the challenges, and what are their perspectives?
- Where does the challenge emerge – at the level of mission or at the level of objectives, strategy, and tasks?

Understand your manager's **leadership style:**

- How do they inspire others?
- How do they manage conflict in a team?
- How they take the best from each member of a team with different personalities?
- How do they manage effective meetings?
- How do they manage brainstorming sessions?
- How do they develop trust and loyalty in their teams?
- How do they create diverse connections inside the organization?

Understand how your organization develops **leadership capacity** in their employees:

- To what extent do people know where they stand in their organization and their potential for growth and advancement?
- Do they have an annual individual statement of objectives and their annual review?
- Do they use peer or 360 degrees feedback? How?
- Do they have an agreed-upon plan for how employees are going to reach their potential?
- To what extent are senior managers expected to identify and mentor their successors?

How do I demonstrate that I did an InternshipPlus?

- Submit thorough **Initial report** on time.
- Submit thorough **final report** on time.

APPENDIX G

BERNARD M. GORDON
MIT Engineering Leadership
PROGRAM

GEL Undergraduate Student Petition

Student Name: _____ MIT ID #: _____
Mr./ Ms. First Name, Last Name

Student Email: _____ Student Phone #: _____

Local Mailing Address: _____

GEL Academic Advisor: _____
First Name, Last Name

Major :

Please list other declared major/minor and advisor name: _____

****

Petition Statement

I am petitioning for _____ to substitute for
Subject number and title

_____ .
GEL subject number and title

Explanation/ other petition request: Describe your motivation and justification for this petition.

Attach the subject description and syllabus (prior academic year syllabus will be acceptable).

_____ _____
Student Signature Date

Return completed form to the GEL Academic Office, 33-413.

Approved: ___ Not Approved: ___

If not approved, reason(s):_____

_____

Departmental Signature_____
Signature Date

BERNARD M. GORDON
MIT Engineering Leadership
PROGRAM

GEL Undergraduate Student Petition

Student Name: _____ MIT ID #: _____
Mr./Ms. First Name, Last Name

Student Email: _____ Student Phone #: _____

Local Mailing Address: _____

GEL Academic Advisor: Joel
First Name, Last Name

Major: Course 2

Please list other declared major/minor and advisor name: _____

Petition Statement

I am petitioning for 15.301 Managerial Psychology to substitute for
Subject number and title

15.668 People and Organizations.
GEL subject number and title

Explanation/ other petition request: Describe your motivation and justification for this petition.
I have a major requirement that conflicts with 15.668 -
Attach the subject description and syllabus (prior academic year syllabus will be acceptable).

Student Signature _____ Date 5/5/12

Return completed form to the GEL Academic Office, 33-413.

Approved: ✓ Not Approved: ___

If not approved, reason(s): _____

_____

Departmental Signature Bernie Gordon 5/6/12
Signature Date

APPENDIX H

GEL Completion Form

Student Name: _____ MIT ID #: _____
Mr./ Ms. First Name, Last Name

Student Email: _____ Student Phone #: _____

Local Mailing Address: _____

GEL Academic Advisor: _____
First Name, Last Name

Major:

Please list other declared major/minor and advisor name: _____

Class	**Semester(s) and Year Completed**
ESD.050	_____
ESD.051	_____
ESD.052	_____
ESD.054	_____
15.668	_____
EPR	_____
PLDP	_____

Petitions (if any): **Class and Semester Petitioned**

_____

_____ _____

Student Signature Date

Return completed form to the GEL Academic Office, 33-413.
Approved: ____ Not Approved: ____

If not approved, reason(s):_____

_____

Departmental Signature_____
Signature Date

BERNARD M. GORDON
MIT Engineering Leadership

GEL Completion Form

Student Name: _____ MIT ID #: _____
Mr./ Ms. First Name, Last Name

Student Email: _____ Student Phone #: _____

Local Mailing Address: _____

GEL Academic Advisor: Joel
First Name, Last Name

Major: Course 2

Please list other declared major/minor and advisor name: _____

Class	Semester(s) and Year Completed
ESD.050	FALL 11, 10 SPRING 11, 12
ESD.051	FALL 10
ESD.052	IAP 12
ESD.054	IAP 11
15.668	SPRING 12
EPR	GEL Year 1 Year 2
PLDP	FALL 10 SPING 11 Fall 11

Petitions (if any): **Class and Semester Petitioned**

N/A

Student Signature _____ Date 5/6/12

Return completed form to the GEL Academic Office, 33-413.
Approved: ✓ Not Approved: ___

If not approved, reason(s): _____

Departmental Signature _____ Signature Date

APPENDIX I

Required Short Subjects for GELs

ESD.054 Engineering Leadership

U(, ,); partial term
Prereq: Permission of instructor
Units: 2-2-2
Exposes students to the models and methods of engineering leadership within the contexts of conceiving, designing, implementing and operating products, processes and systems. Introduces models and theories, such as the 4 Capabilities Framework and the Capabilities of Effective Engineering Leaders. Discusses the appropriate times and reasons to use particular models to deliver engineering success. Includes guest speakers, team projects, and video analysis of team performance. Preference to students in the Bernard M. Gordon-MIT Engineering Leadership Program.
E. Crawley

ESD.051J Engineering Innovation and Design

U(,)
(Same subject as 6.902J)
Prereq: None
Units: 4-0-5
Lecture: *MW3-5* (35-225)
Project-based seminar in effective design-thinking. Develops skills to conceive, evaluate, plan, organize, lead, and implement engineering design projects. Covers techniques to sharpen creative thinking and critical analysis of designs, using an iterative process, as well as techniques for managing project scope and balancing real-world constraints against limitations of technology and human cognition. Students conceive and design robust voice recognition applications using a simple web-based system. Lays foundation for departmental capstone work. Limited to 60; preference to juniors and seniors.
B. Kotelly, J. Schindall

ESD.052 Project Engineering
(This three day course is taught the last weekend of IAP and is held at Camp Cody on the shores of Lake Ossipee, NH)

U( )
Prereq: Permission of instructor
Units: 3-2-1
Credit cannot also be received for 1.040
Students attend a remote workshop where an introduction to basic principles, methods, and tools for project management in a realistic context are covered. Over remainder of term, progresses to an introduction to project management, with emphasis on finance, evaluation, and organization. In teams, students create a plan for a project of their choice; past projects include Debris Removal in Haiti and Food Preparation Robot for Restaurants. Develops skills applicable to the management of complex development projects. Topics include cost-benefit analysis, resource and cost estimation, and project control and delivery. Case studies highlight projects in both hardware/construction and software. Preference to students in the Bernard M. Gordon-MIT Engineering Leadership Program.
O. de Weck

15.668 People and Organizations

U( )

Prereq: None

Units: 3-0-6

Examines the historical evolution and current human and organizational contexts in which scientists, engineers and other professionals work. Outlines major challenges facing the management profession. Uses interactive exercises, simulations and problems to develop critical skills in negotiations, teamwork, and leadership. Focuses on practical application of these skills in a professional context. Introduces concepts and tools to analyze work and leadership experiences in internships, school activities, and fieldwork. Preference to Management minors and other undergraduates not majoring in Management Science.

T. Kochan, J. Carroll, P. Osterman

APPENDIX J

National Society of Professional Engineers Code of Ethics for Engineers

Preamble: Engineering is an important and learned profession. As members of this profession, engineers are expected to exhibit the highest standards of honesty and integrity. Engineering has a direct and vital impact on the quality of life for all people. Accordingly, the services provided by engineers require honesty, impartiality, fairness, and equity, and must be dedicated to the protection of the public health, safety, and welfare. Engineers must perform under a standard of professional behavior that requires adherence to the highest principles of ethical conduct.

I. Fundamental Canons

Engineers, in the fulfillment of their professional duties, shall:

- Hold paramount the safety, health, and welfare of the public.
- Perform services only in areas of their competence.
- Issue public statements only in an objective and truthful manner.
- Act for each employer or client as faithful agents or trustees.
- Avoid deceptive acts.
- Conduct themselves honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation, and usefulness of the profession.

II. Rules of Practice

1. Engineers shall hold paramount the safety, health, and welfare of the public.
    - If engineers' judgment is overruled under circumstances that endanger life or property, they shall notify their employer or client and such other authority as may be appropriate.
    - Engineers shall approve only those engineering documents that are in conformity with applicable standards.
    - Engineers shall not reveal facts, data, or information without the prior consent of the client or employer except as authorized or required by law or this Code.
    - Engineers shall not permit the use of their name or associate in business ventures with any person or firm that they believe is engaged in fraudulent or dishonest enterprise.
    - Engineers shall not aid or abet the unlawful practice of engineering by a person or firm.
    - Engineers having knowledge of any alleged violation of this Code shall report thereon to appropriate professional bodies and, when relevant, also to public authorities, and cooperate with the proper authorities in furnishing such information or assistance as may be required.
2. Engineers shall perform services only in the areas of their competence.
    - Engineers shall undertake assignments only when qualified by education or experience in the specific technical fields involved.
    - Engineers shall not affix their signatures to any plans or documents dealing with subject matter in which they lack competence, nor to any plan or document not prepared under their direction and control.
    - Engineers may accept assignments and assume responsibility for coordination of

an entire project and sign and seal the engineering documents for the entire project, provided that each technical segment is signed and sealed only by the qualified engineers who prepared the segment.

3. Engineers shall issue public statements only in an objective and truthful manner.
    - Engineers shall be objective and truthful in professional reports, statements, or testimony. They shall include all relevant and pertinent information in such reports, statements, or testimony, which should bear the date indicating when it was current.
    - Engineers may express publicly technical opinions that are founded upon knowledge of the facts and competence in the subject matter.
    - Engineers shall issue no statements, criticisms, or arguments on technical matters that are inspired or paid for by interested parties, unless they have prefaced their comments by explicitly identifying the interested parties on whose behalf they are speaking, and by revealing the existence of any interest the engineers may have in the matters.
4. Engineers shall act for each employer or client as faithful agents or trustees.
    - Engineers shall disclose all known or potential conflicts of interest that could influence or appear to influence their judgment or the quality of their services.
    - Engineers shall not accept compensation, financial or otherwise, from more than one party for services on the same project, or for services pertaining to the same project, unless the circumstances are fully disclosed and agreed to by all interested parties.
    - Engineers shall not solicit or accept financial or other valuable consideration, directly or indirectly, from outside agents in connection with the work for which they are responsible.
    - Engineers in public service as members, advisors, or employees of a governmental or quasi-governmental body or department shall not participate in decisions with respect to services solicited or provided by them or their organizations in private or public engineering practice.
    - Engineers shall not solicit or accept a contract from a governmental body on which a principal or officer of their organization serves as a member.

5. Engineers shall avoid deceptive acts.
    - Engineers shall not falsify their qualifications or permit misrepresentation of their or their associates' qualifications. They shall not misrepresent or exaggerate their responsibility in or for the subject matter of prior assignments. Brochures or other presentations incident to the solicitation of employment shall not misrepresent pertinent facts concerning employers, employees, associates, joint venturers, or past accomplishments.
    - Engineers shall not offer, give, solicit, or receive, either directly or indirectly, any contribution to influence the award of a contract by public authority, or which may be reasonably construed by the public as having the effect or intent of influencing the awarding of a contract. They shall not offer any gift or other valuable consideration in order to secure work. They shall not pay a commission, percentage, or brokerage fee in order to secure work, except to a bona fide employee or bona fide established commercial or marketing agencies retained by them.

III. Professional Obligations

1. Engineers shall be guided in all their relations by the highest standards of honesty and integrity.
    - Engineers shall acknowledge their errors and shall not distort or alter the facts.
    - Engineers shall advise their clients or employers when they believe a project will not be successful.
    - Engineers shall not accept outside employment to the detriment of their regular work or interest. Before accepting any outside engineering employment, they will notify their employers.
    - Engineers shall not attempt to attract an engineer from another employer by false or misleading pretenses.
    - Engineers shall not promote their own interest at the expense of the dignity and integrity of the profession.
2. Engineers shall at all times strive to serve the public interest.
    - Engineers are encouraged to participate in civic affairs; career guidance for youths; and work for the advancement of the safety, health, and well being of their community.
    - Engineers shall not complete, sign, or seal plans and/or specifications that are not in conformity with applicable engineering standards. If the client or employer insists on such unprofessional conduct, they shall notify the proper authorities and withdraw from further service on the project.
    - Engineers are encouraged to extend public knowledge and appreciation of engineering and its achievements.
    - Engineers are encouraged to adhere to the principles of sustainable development[1] in order to protect the environment for future generations.
3. Engineers shall avoid all conduct or practice that deceives the public.
    - Engineers shall avoid the use of statements containing a material misrepresentation of fact or omitting a material fact.
    - Consistent with the foregoing, engineers may advertise for recruitment of personnel.
    - Consistent with the foregoing, engineers may prepare articles for the lay or technical press, but such articles shall not imply credit to the author for work performed by others.
4. Engineers shall not disclose, without consent, confidential information concerning the business affairs or technical processes of any present or former client or employer, or public body on which they serve.
    - Engineers shall not, without the consent of all interested parties, promote or arrange for new employment or practice in connection with a specific project for which the engineer has gained particular and specialized knowledge.
    - Engineers shall not, without the consent of all interested parties, participate in or represent an adversary interest in connection with a specific project or proceeding in which the engineer has gained particular specialized knowledge on behalf of a former client or employer.
5. Engineers shall not be influenced in their professional duties by conflicting interests.
    - Engineers shall not accept financial or other considerations, including free engineering designs, from material or equipment suppliers for specifying their product.

    - Engineers shall not accept commissions or allowances, directly or indirectly, from

contractors or other parties dealing with clients or employers of the engineer in connection with work for which the engineer is responsible.

6. Engineers shall not attempt to obtain employment or advancement or professional engagements by untruthfully criticizing other engineers, or by other improper or questionable methods.
    - Engineers shall not request, propose, or accept a commission on a contingent basis under circumstances in which their judgment may be compromised.
    - Engineers in salaried positions shall accept part-time engineering work only to the extent consistent with policies of the employer and in accordance with ethical considerations.
    - Engineers shall not, without consent, use equipment, supplies, laboratory, or office facilities of an employer to carry on outside private practice.
7. Engineers shall not attempt to injure, maliciously or falsely, directly or indirectly, the professional reputation, prospects, practice, or employment of other engineers. Engineers who believe others are guilty of unethical or illegal practice shall present such information to the proper authority for action.
    - Engineers in private practice shall not review the work of another engineer for the same client, except with the knowledge of such engineer, or unless the connection of such engineer with the work has been terminated.
    - Engineers in governmental, industrial, or educational employ are entitled to review and evaluate the work of other engineers when so required by their employment duties.
    - Engineers in sales or industrial employ are entitled to make engineering comparisons of represented products with products of other suppliers.
8. Engineers shall accept personal responsibility for their professional activities, provided, however, that engineers may seek indemnification for services arising out of their practice for other than gross negligence, where the engineer's interests cannot otherwise be protected.
    - Engineers shall conform with state registration laws in the practice of engineering.
    - Engineers shall not use association with a non-engineer, a corporation, or partnership as a "cloak" for unethical acts.
9. Engineers shall give credit for engineering work to those to whom credit is due, and will recognize the proprietary interests of others.
    - Engineers shall, whenever possible, name the person or persons who may be individually responsible for designs, inventions, writings, or other accomplishments.
    - Engineers using designs supplied by a client recognize that the designs remain the property of the client and may not be duplicated by the engineer for others without express permission.
    - Engineers, before undertaking work for others in connection with which the engineer may make improvements, plans, designs, inventions, or other records that may justify copyrights or patents, should enter into a positive agreement regarding ownership.
    - Engineers' designs, data, records, and notes referring exclusively to an employer's work are the employer's property. The employer should indemnify the engineer for use of the information for any purpose other than the original purpose.

- Engineers shall continue their professional development throughout their careers and should keep current in their specialty fields by engaging in professional practice, participating in continuing education courses, reading in the technical literature, and attending professional meetings and seminars.

Footnote 1 "Sustainable development" is the challenge of meeting human needs for natural resources, industrial products, energy, food, transportation, shelter, and effective waste management while conserving and protecting environmental quality and the natural resource base essential for future development.

—As Revised July 2007 By order of the United States District Court for the District of Columbia, former Section 11(c) of the NSPE Code of Ethics prohibiting competitive bidding, and all policy statements, opinions, rulings or other guidelines interpreting its scope, have been rescinded as unlawfully interfering with the legal right of engineers, protected under the antitrust laws, to provide price information to prospective clients; accordingly, nothing contained in the NSPE Code of Ethics, policy statements, opinions, rulings or other guidelines prohibits the submission of price quotations or competitive bids for engineering services at any time or in any amount.

ENGINEER'S CREED

As a Professional Engineer, I dedicate my professional knowledge and skill to the advancement and betterment of human welfare.

I pledge:

- To give the utmost of performance;
- To participate in none but honest enterprise;
- To live and work according to the laws of man and the highest standards of professional conduct;
- To place service before profit, the honor and standing of the profession before personal advantage, and the public welfare above all other considerations.

In humility and with need for Divine Guidance, I make this pledge.

Adopted by National Society of Professional Engineers, June 1954

APPENDIX K

BERNARD M. GORDON MIT Engineering Leadership PROGRAM

Engineering Leadership Capabilities Assessment Card (Part I)

Record of Observation and Feedback	Check here if On-The-Spot Report

a. Summary of Observation: Summarize the most significant observed engineering leadership behaviors. Use sufficient detail to support a summary of the recorded grade indicated on page2. Use Continuation sheet if necessary.

b. Feedback: Comment on at least **1** capability to "maintain," and **1** capability that needs improvement as identified by the ratings in Part II. (If this is an On-The-Spot Report, comments are required)

Satisfactory:

Needs Improvement:

IN 1 2 3 4 5	**RU** 1 2 3 4 5
EI 1 2 3 4 5	**DM** 1 2 3 4 5
RF 1 2 3 4 5	**TL** 1 2 3 4 5
IS 1 2 3 4 5	**DC** 1 2 3 4 5
AD 1 2 3 4 5	**SC** 1 2 3 4 5
NC 1 2 3 4 5	**ID** 1 2 3 4 5

Rated Student Name	Event	Activity/Job/Position	Date
Rated Student Signature	Assessor Name	Overall Assessment: **E S N**	

(Note: Signature indicates that feedback was discussed as reflected in Part 1b above, and does not imply agreement with ratings.)

BERNARD M. GORDON MIT Engineering Leadership PROGRAM

Give a rating for each capability observed, with "1" being the lowest, and needing the most improvement, and a "5" representing the best, and needing the least amount of improvement. Improve comments are mandatory when an *"1 or 2"* rating is indicated.

Attitudes of Leadership (Core Values)	**Initiative –** Ability and willingness to assess risk and to take initiative, to create a vision and course of action, without the help or advice of others. **IN**	**Responsibility, Urgency and Will to Deliver –** Determination to accomplish one's objectives, and those of the team, pragmatically and in the face of constraints, obstacles, and errors by you and others. Commitment to the absolute responsibility to persevere and deliver on time, pursuing necessary follow-up. Focus on the tasks at hand with passion, discipline, and intensity. **RU**
	Ethical Action and Integrity – An adherence to ethical standards and principles, and demonstration of the courage to act ethically and with integrity, and to practice according to the norms of professional responsibility and one's responsibility to society. **EI**	**Decision Making in the face of Uncertainty –** Ability and willingness to make decisions informed by the information at hand, factoring in risks, uncertainty and potentially conflicting objectives, even if 100% of the needed information is not available. **DM**
	Resourcefulness, Flexibility and Change – Ability and willingness to approach problems, tasks and situations making ingenious use of the resources of the situation and group, and to manage the use of time. A willingness to accept and respond to change, embrace various views, be adaptable, and formulate and take alternative courses of action when necessary. **RF**	**Trust and Loyalty –** Commitment to actions that will instill trust, and to the principle that loyalty to the team yields loyalty to the leader and vision. Working to empower those around you, to make the people around you successful. **TL**
Relating	**Interpersonal Skills –** Understanding and respecting the needs, capabilities and characteristics of individuals and the group, and the resources that individuals with different backgrounds can bring to an organization. Coaching and teaching, providing and receiving evaluation and feedback, and demonstrating the essential elements of gracious professionalism necessary to be an effective engineering l **IS**	**Diverse Connections and Grouping –** Appreciating, engaging and connecting widely with those with different skills, cultures, and experiences. Building a sense of group within direct participants, and building extended networks of those that can help achieve the goals and technical solution. **DC**
	Advocacy – The ability to clearly explain one's own point of view or approach, advocate a position, and explain how one reached their interpretation and conclusion. Proactively assessing the extent to which you are understood. Being able to do so to those with and without technical backgrounds, and from different cultures and/or backgrounds. **AD**	**Structured Communications –** Being able to create a strategy and structure to formal communications, and present information orally, in written and graphical form to both engineers and non-engineers in a clear and concise manner. **SC**
	Negotiation, compromise and conflict resolution – Appreciating the need to identify potential disagreements, tensions or conflicts, and being able to negotiate to find mutually acceptable solutions. **NC**	**Inquiring and Dialoging –** Listening to others with the intention of genuinely understanding their thoughts and feelings. Creating constructive dialog, and recognizing the ideas of others may be better than yours. Listening to and being willing to learn from everybody. **ID**

Overall Assessment: Circle "E" Excellent, "S" Satisfactory, "N" Needs Improvement. Improve comments are mandatory when an " N" rating is indicated.

E S N

APPENDIX L

Engineering Leadership Student Self-Assessment Card			
Student	**Student**	**Activity/Job/Position**	**Date**
ACTIVITY AND PERFORMANCE SUMMARY (What was the activity and circumstances, and how did you and your team perform?)			

What did I do well (List and elaborate on 1, 2 or 3 capabilities)– see acronym list at bottom of page.

What I need to improve on: (List 1, 2 or 3)

Complete self-assessment to this point and turn in prior to receiving feedback/coaching, if possible

Student Reflection of Feedback on Performance and on Coaching Received

Student Signature **Date**

IN-Initiative – Ability and willingness to assess risk and to take initiative, to create a vision and course of action, without the help or advice of others.
TL-Trust and Loyalty – Commitment to actions that will instill trust, and to the principle that loyalty to the team yields loyalty to the leader and vision. Working to empower those around you, to make the people around you successful.
EI-Ethical Action and Integrity – An adherence to ethical standards and principles, and demonstration of the courage to act ethically and with integrity, and to practice according to the norms of professional responsibility and one's responsibility to society.
DC-Diverse Connections and Grouping – Appreciating, engaging and connecting widely with those with different skills, cultures, and experiences.
RF-Resourcefulness, Flexibility and Change – Ability and willingness to approach problems, tasks and situations making ingenious use of the resources of the situation and group, and to manage the use of time.
AD-Advocacy – The ability to clearly explain one's own point of view or approach, advocate a position, and explain how one reached their interpretation and conclusion.
IS-Interpersonal Skills – Understanding and respecting the needs, capabilities and characteristics of individuals and the group, and the resources that individuals with different backgrounds can bring to an organization. Coaching and teaching, providing and receiving evaluation and feedback, gracious professionalism.
SC-Structured Communications – Being able to create a strategy and structure to formal communications, and present information orally, in written and graphical form to both engineers and non-engineers in a clear and concise manner.
RU-Responsibility, Urgency and Will to Deliver – Determination to accomplish one's objectives, and those of the team, pragmatically and in the face of constraints, obstacles, and errors by you and others. Commitment to the absolute responsibility to persevere and deliver on time, pursuing necessary follow-up. Focus on the tasks at hand with passion, discipline, and intensity.
NC-Negotiation, compromise and conflict resolution – Appreciating the need to identify potential disagreements, tensions or conflicts, and being able to negotiate to find mutually acceptable solutions.
DM-Decision Making in the face of Uncertainty – Ability and willingness to make decisions informed by the information at hand, factoring in risks, uncertainty and potentially conflicting objectives, even if 100% of the needed information is not available.
Inquiring and Dialoging – Listening to others with the intention of genuinely understanding their thoughts and feelings. Creating constructive dialog, and recognizing the ideas of others may be better than yours. Listening to and being willing to learn from everybody.

APPENDIX M

GEL Year 2 Final Assignment

Reflection is an integral part of the GEL program. We encourage you to thoroughly look at your performance and development. Hopefully, this will become a habit that you keep throughout your career. You'll ask yourself questions like: Have I met my goals? Did I interact with my team in the most productive way? Do I have a systems perspective regarding my company and project?

Now it's time to answer the following question: Did I truly earn my certificate? Have I capitalized on the GEL opportunity to develop and grow?

For your final assignment, we'd like you to:

- **Reflect honestly on your own development regarding the Capabilities of Effective Engineering Leaders by making a final PLDP entry and reviewing previous ones.**
- **Make a presentation that meets the requirements below.**

The Presentation (Choice of several dates and times in April or May, to a panel of ELP staff):

3. *Present highlights of your development for at least 5 key capabilities*. Start by considering which experiences (some may be in the program, some may not) have contributed to your growth and development in these capabilities. Explain how these experiences have allowed you to build skills and understanding. (For example: How did your Internship+ experience enable you to move from "Not yet possess" to "Intermediate" in Advocacy?)
4. Also, *select an aspect of the GEL curriculum you found to be significant regarding your development*. Explain what you learned and how this knowledge might help you in the future. Note: This is an opportunity to influence the GEL program. Your input will help us improve the program for future students.

A few things you should know:

- You will prepare and submit presentation materials (meaning slides or related content). The experience will be no longer than 30 minutes, including presentation content and questions from the panel. The presentation itself should be around 15-20 minutes.
- The tone should be professional. While a PowerPoint presentation is not specifically required, you should give thought to providing adequate visual materials for clarification as needed.
- Include materials like assessment cards, peer evaluations, feedback from your supervisor, and other artifacts to help illustrate your points.

Caveats:

- Your reflection should be honest and genuine; you are **not** expected to have reached the Advanced Level of all of the Capabilities, perhaps one Capability at most.
- Don't spend a lot of time collecting artifacts to incorporate into your presentation. Instead, focus on reflection.
- Try to concentrate on development that occurred during engineering-related experiences.

GEL Social Media Sites

Facebook: https://www.facebook.com/pages/Gordon-MIT-Engineering-Leadership-Program/181102695248997

Twitter: http://twitter.com/#!/gordonmitelp

LinkedIn: http://www.linkedin.com/in/gordonelp

Flickr: http://www.flickr.com/photos/gordonmitelp/

YouTube: http://www.youtube.com/gordonmitelp

MIT Tech TV: http://techtv.mit.edu/collections/gordonelp