Undergraduate Curriculum Committee

Executive Summary

The Ad-hoc Curriculum Committee has been charged with investigating potential innovative curriculum initiatives. Despite our high rankings and student and faculty achievements, ongoing holistic and systematic re-evaluation of the curriculum is essential to maintain our reputation for excellence. The current leadership, the work of this committee, and discussions among full-time faculty members has laid the groundwork for increased communication regarding curriculum. Common themes of professional practice, collaboration, innovation, and community engagement have emerged as a basis for a list of potential curriculum initiatives. The Ad-hoc Curriculum Committee proposes four new curriculum initiatives to be further studied:

1. *Industry Sponsored Projects*: Further build industrial context into the curriculum by having industry sponsored design and/or research projects.
2. *Interdisciplinary Project Opportunities*: Challenge interdisciplinary groups of students to work on *service learning projects*, in which student teams go out in NYC and do hands-on projects in the community, or work together to solve *Grand Challenges* (refer to Figure 3 on page 9). Ideally, these projects would involve Engineering students and faculty working together with Art and Architecture students and faculty, and external advisors.
3. *Formation of Center for Engineering Education Excellence*: Establish a research center that focuses on how students learn, teaching methods, and engineering education best practices.
4. *Thematic Cluster Options*: Introduce a new two-course "thematic cluster" sequence into the curricula. Example "thematic clusters" include: (1) Entrepreneurship/Business/Finance Cluster, (2) Engineering Practice Cluster, (3) Interdisciplinary Projects and Design Cluster (this cluster could involve Art and Architecture), and (4) Advanced Engineering and Science Research and Design Cluster.

The Ad-hoc Curriculum Committee proposes a timetable to re-evaluate the curriculum and to study these potential new initiatives. The proposal includes a 12-month timeline starting in January 2013, including a preliminary report in June 2013, and ending with curriculum reinvention recommendations. Some key components of the timeline include:

- Creating a forum to develop consensus from faculty regarding curricular initiatives across the school
- Seeking input from important constituents on concepts and skills we want to deliver and developing concept and skill maps at the department and school-wide levels
- Evaluating curricular recommendations from the National Academies, Carnegie Report, and American Society of Engineering Education
- Researching best practices and inviting engineering education leaders for professional development sessions

- Evaluating proposed initiatives and developing curriculum recommendations

By embarking on the proposed process and timeline the Faculty aims to promote a culture and mechanisms for continual scholarly and systematic engineering education innovation, thereby fulfilling Peter Cooper's visionary pedagogical goals of intellectual enrichment, entrepreneurial thinking, and active citizenship.

Undergraduate Curriculum Committee Report

Introduction

The Ad-hoc Curriculum Committee has been charged with investigating potential innovative curriculum initiatives. Our charge includes:

1. Define ourselves and our peer group.
2. Compare our program to other nationally ranked programs in our peer group
3. Redefine engineering education excellence and set the benchmark
4. What can we do well that no one else does?

Over the past months, the Ad-hoc Curriculum Committee has engaged the full-time engineering faculty members in meaningful discussions on curriculum innovation and reinvention. Several common themes emerged that are the basis for a list of potential initiatives for the School of Engineering.

The Engineering Faculty is deeply committed to the institution, to the students of The Cooper Union, and to continued excellence in engineering education. The committee proposes embarking on a path to holistically and systemically re-evaluate the curriculum with the goal of continued excellence. A culture that fosters communication among the faculties is necessary to embark on this path. The current leadership, the work of this committee and discussions at a series of meetings with full-time faculty members has laid the groundwork for increased communication about the curriculum. Included in this report is a summary of the committee's work and a timetable proposal for an in-depth curriculum study and evaluation of potential curricular initiatives for reinvention.

Current Status

The committee evaluated the present state of the curriculum as a first step in determining a vision for the future. Our mission currently states:

> *The Albert Nerken School of Engineering will create an educational culture with a commitment to excellence. We will bring together the best and brightest engineering students; we will nurture and develop their talents; we will encourage them to work and learn at their highest levels; and we will instill in them the desire and the ability to use their engineering background to fulfill their potential as knowledgeable, creative and responsible leaders in society.*

The quality and rigor of The Cooper Union's academic program in engineering has contributed to making it one of the top-ranked institutions of higher education. *U.S. News* currently ranks Cooper Union 6th in the nation among engineering schools whose highest degree is a Bachelor's or Master's (If you exclude

military academies, only two schools, Rose-Hulman and Harvey Mudd, rank higher)[1]. The electrical engineering program ranks 2nd, with only Rose-Hulman ranking higher, and the mechanical engineering program ranks 3rd, behind Rose-Hulman and Cal Poly – San Luis Obispo[2]. In 2011, *U.S. News* ranked the chemical engineering program first[3]. These rankings are based on the peer judgments of deans and senior faculty who rated each program and are evidence of our perceived academic excellence[4].

To prepare our graduates to be leaders and critical thinkers capable of solving complex problems facing future generations, The Cooper Union's engineering faculty use innovative teaching techniques, including interdisciplinary problem solving, project-based learning, and in-depth research projects. The Freshman Engineering Design and Problem Solving course (EID 101) was redesigned and includes increased collaboration amongst its faculty instructors and interdisciplinary student teams. To further expand interdisciplinary learning, many new cross-disciplinary courses have been introduced. Examples include: Patent Law (EID373), Sustainable Engineering and Development (EID 357), Energetics (EID131), and Convex Optimization (EID 488). A number of courses have been added to prepare students interested in biomedical and pharmaceutical engineering. Prof. Cumberbatch engages interdisciplinary groups of students in service-learning by using engineering to improve lives in rural Africa and by teaching science and engineering to high-needs children in the Bronx. In addition to fostering educational innovation in the classroom, faculty members are taking advantage of our LEED-platinum 41 Cooper Square academic building as a learning laboratory and research test bed (Prof. Baglione and Prof. Sidebotham are using the building HVAC system to illustrate undergraduate mechanical engineering concepts and for Master's level research projects). In fact, a Transforming Undergraduate Education grant from the National Science Foundation focused on introducing concepts of sustainability into the curriculum incorporates the design and operation of 41 Cooper Square. In Engineering and Entrepreneurship (EID365) course students learn how to take an original idea to the open market culminating in a competition, where students pitch their ideas to venture capitalists.

Faculty members across the four disciplines currently employ many educational techniques that promote the development of professional "soft" skills, such as communication skills. For example, mechanical engineering students are required to give poster presentations and demonstrations at the annual End of Year show in May, electrical engineering students are required to go through project critiques, and chemical engineering students are required to give corporate technical presentations to a fictional company board as part of their design project. In addition, all engineering students receive training in communication skills through the CONNECT program.

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[1] U.S. News & World Report. 2012. "Best in Undergraduate Engineering Programs Ranking." http://colleges.usnews.rankingsandreviews.com/best-colleges/rankings/engineering-no-doctorate/spp+50, last viewed 11/21/2012.
[2] Ibid.
[3] Facts about CU. 2012 http://cooper.edu/admissions/facts, last viewed 11/23/2012.
[4] U.S. News & World Report. 2012. "Methodology: The Best Undergraduate Engineering Programs" http://www.usnews.com/education/best-colleges/articles/2012/09/11/methodology-the-best-undergraduate-engineering-programs-2, last viewed 11/23/2012.

Our graduates are highly sought after going on to high-paying careers or to advanced studies in graduate school. The majors of chemical, civil, electrical, and mechanical engineering are frequently ranked among the highest in terms of starting salaries for all undergraduate majors[5]. Our students have received prestigious awards, including numerous Fulbright Fellowships, NSF Graduate Research Fellowships, and research fellowships at top-tier institutions[6].

In spite of activities and accomplishments noted above, there have been few communication channels for disseminating current innovative features of our curriculum, as well as student and faculty accomplishments. The new School of Engineering online Content Management System and recommendations from the Ad-hoc Communications Committee should help to improve the visibility of our program and its outcomes. In addition, some rebranding of aspects of the current curriculum may help to promote the outstanding work of our students and faculty.

Notwithstanding our high rankings and curricular initiatives currently underway, the world around us is constantly changing. In order to maintain our reputation for excellence, we must continually re-evaluate the curriculum to ensure that it addresses the changing needs of the engineering profession, emerging trends in engineering and science, and advancements in teaching pedagogy. To do this requires a common vision, increased communication among all faculty members, and a mechanism for continuous evaluation of curricula across the school.

Peer Group Analysis

The Ad-hoc Curriculum Committee underwent a process to evaluate our standings, including defining ourselves and our peer group, as well as comparing ourselves to nationally ranked programs in our peer group. The Ad-hoc Curriculum Committee decided that The Cooper Union should be defined as a non-Ph.D. granting teaching institution. We decided it best to separate peer groups into three distinct categories: (1) a local university peer group, (2) a non-Ph.D. granting teaching institution peer group, and (3) other highly ranked schools that we compete with for students. We decided that our comparison to Research I schools like Stanford, M.I.T., and Carnegie Mellon should not be all-inclusive since we do not have a Ph.D. program, nevertheless, we *should* compare the undergraduate program and experience because these are the schools that Cooper Union competes with for students. The Ad-hoc Curriculum Committee came up with a thorough list of peer group schools and narrowed the list to seven for a more detailed study of their curricula. For the more detailed study, Ad-hoc Curriculum Committee members contacted faculty members and administrators at these respective schools directly to engage in a broader discussion as to their curriculum features, which are highlighted in the following table:

[5] National Association of College and Employers. "Salary Survey: Starting Salaries for New College Graduates." http://www.naceweb.org, last viewed 11/21/2012.
[6] Facts about CU. 2012 http://cooper.edu/admissions/facts, last viewed 11/23/2012

School	Curriculum highlights and innovative features and future trends
Stanford	• Programs range from traditional department majors to school of engineering majors (e.g. Aerospace, Biomechanical, Architectural), and product design • A related Science Technology and Society (STS) program with both BS and BA • "Technology in Society" course requirement • Entrepreneurial environment is highly touted but no course requirement • Industry-sponsored team design projects in traditional majors
Cornell	• Ivy League university with strong research and undergrad programs in sciences and engineering, top-quality architecture school, and an art school • Emphasis on STEM fundamentals and analytical skills • Multiple design opportunities: clubs/contests, team projects, design courses
Columbia	• A typical R1 research school with heavy research focus • A formal Undergraduate Research Involvement Program, where faculty members post potential undergraduate research projects. • An entrepreneurship minor offered with business school consisting of 15 credits
Stevens Institute of Technology	• Large co-op program (about 40% of students) • Common core between engineering majors for first 2 years • "Technogenesis" Entrepreneurship core course requirement • Accredited General Engineering program supports rapid development of specialized majors • 8-semester "Design Spine": First 5 semesters are interdisciplinary design courses tied to core subjects, Senior year can be discipline-specific or multidisciplinary
Rose-Hulman	• One day of the week is allocated for student projects and laboratory courses • Students are required to take specific elective courses in foreign language, global study, ideas/arts, societies/values/philosophy • Students take an introduction to design within each major • Industrial interactions and projects exist, but vary by major • Students are encouraged to do a co-op or summer internship
Olin College	• One common engineering faculty department offering ABET-accredited Mechanical, Electrical and Computer Science, and general engineering degrees • Students in the general engineering program can specialize into concentrations: Bioengineering, Computing, Design, Materials Science, Systems, or a Self-directed option • ~80% of program is common; Of total 120 credits only 6 classes are discipline specific • Every student takes design stream courses, some of which are taught in studio environment • Includes cross disciplinary Math + Science courses, for example, freshman take "Modeling and Simulation of the Physical World" course • Just-in-time teaching approach; emphasis on professional "soft" and problem-solving skills over technical depth, some technical content covered in self-directed, "scaffolded" projects • Year-long Senior SCOPE (Capstone) project sponsored by industry (sponsors retain all IP)
Bucknell	• Undergraduate degree programs include chemical, civil, mechanical, electrical, computer, and biomedical engineering, and computer science • Small undergraduate focus on engineering within a liberal arts environment • First semester is common among engineering students, but department coursework start the second semester of freshman year • Students may enter with a decided major or be undecided, however transferring from undecided to a desired major later on can be difficult due to enrollments • Every major has a two-course capstone design sequence. Some design projects are linked with local industrial clients. • There is a strong global engineering experience. This includes an international summer trip aimed at engineering and courses offered at partner institutions.
Harvey-Mudd	• One general engineering degree with no departments • Heavy industry interaction, all senior projects are industry sponsored and start 2nd semester junior year. Teams of 4-5 students and one faculty member work on the project. Project sponsors pay a fixed fee and retain all IP to the project Projects often result in conference publications and patents. • Summer research programs for students to collaborate on-campus with faculty

While it is not our goal to emulate these schools, it is important to understand the competitive landscape and identify future emerging trends among our peer groups.

Preliminary Findings

The pace of technology and innovation and the increasingly global professional workplace puts new demands on engineering educators. In addition to core math, science, and engineering fundamentals including disciplinary depth, today's curriculum requires teaching interdisciplinary breadth, communication, teamwork, critical thinking, global and societal context, leadership, creativity, and modern engineering tools. Figure 1 illustrates the subjects and skills necessary to prepare professionals capable of solving problems of the 21st century[7].

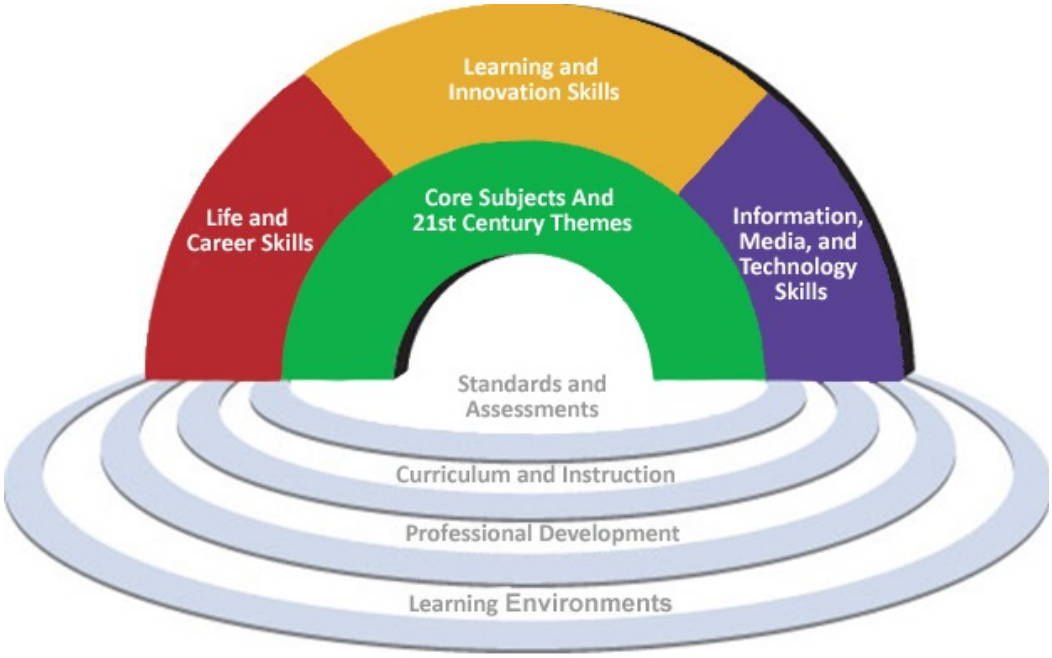

Figure 1: 21st Century Student Outcomes and Support System

The Ad-hoc Curriculum Committee surveyed the full-time School of Engineering faculty at The Cooper Union on a 5-point Likert scale as to the importance of various curricular outcomes and how well we deliver these outcomes. The chart in Figure 2 illustrates that the faculty perceives technical skills to be very important and that we currently deliver technical skills very well. This conclusion concurs with anecdotal accounts from employers and graduate school faculty advisors.

[7] Partnership for 21st Century Skills. 2007. "21st Century Outcomes and Support System." http://route21.p21.org, last viewed 11/18/2012.

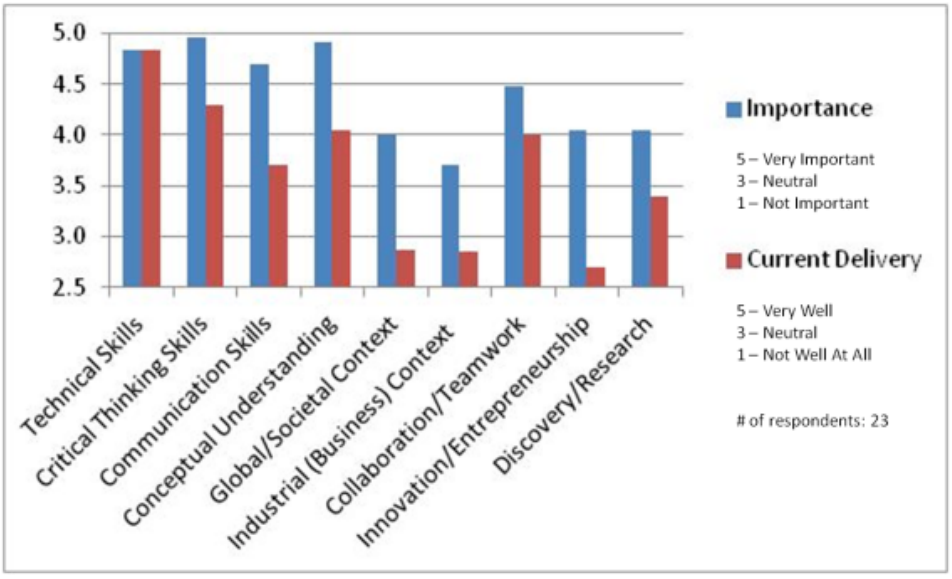

Figure 2: Results of Faculty Survey on Importance and Delivery of Student Outcomes

Some areas where there are gaps between the importance of the student outcome and the delivery include communication skills, innovation/entrepreneurship, and global/societal context. The solution in the past has been to continually incorporate these newly identified skills into the core curriculum, but space in the curriculum is limited. Going forward as part of our re-evaluation process, an approach is proposed in which the faculty first determines which concepts and skills are important for our graduates in their future careers. Then we propose mapping the introduction of concepts and skills throughout the curriculum to determine how we can most effectively and efficiently deliver these core concepts and skills.

Another component that should be incorporated into the delivery of engineering education is the vast research and literature on *How Students Learn*[8]. Strong theory and developing of analytical skills is seen as a strength of the Cooper Union engineering program, one that is appreciated by many graduates, especially the large proportion that go on to pursue advanced technical degrees. Yet it is important to link theory to engineering practice and engage students in experiences that reflect professional practice[9]. Contemporary pedagogical methods, such as inductive learning, problem-based learning and just-in-time learning, should be evaluated and further implemented where appropriate, as determined by the faculty[10]. Lastly, to produce students capable of solving the problems of the 21st century we need to strengthen our teaching of global and societal context. Examples by which we can achieve this

[8] National Research Council (NRC). 2005. *How Students Learn: History, Mathematics, and Science in the Classroom*. Washington, DC: National Academies Press. http://www.nap.edu/catalog/11102.html, last viewed 11/20/2012.
[9] Sheppard, S.D., K. Macatangay, A. Colby, and W. M. Sullivan. 2008. *Educating Engineers: Designing for the Future of the Field*. The Carnegie Foundation for the Advancement of Teaching. Wiley Press.
[10] Prince, M.J. and R.M. Felder. 2006. Inductive Teaching and Learning Methods: Definitions, Comparisons, and Research Bases. *Journal of Engineering Education.* 92(2): 123-125.

include the incorporation of service-learning projects or by having student teams work to solve the Grand Challenges depicted in Figure 3.

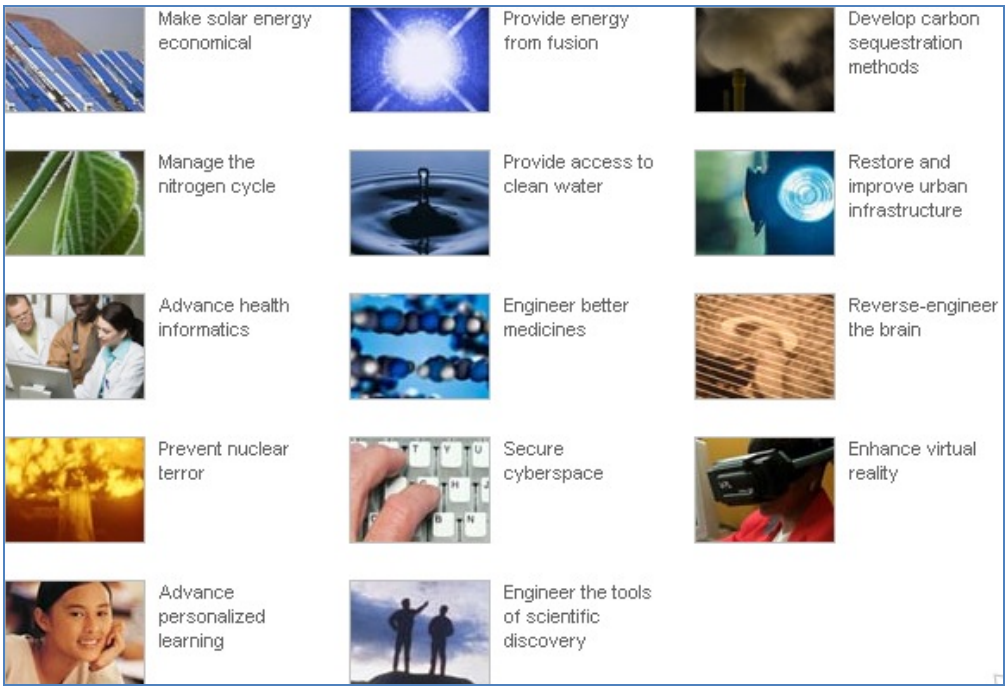

Figure 3: Grand Challenges [Source: www.engineeringchallenges.org]

Innovation and Entrepreneurship

The Ad-hoc Curriculum Committee recognizes that our students go on to pursue a variety of career paths, ranging from industry, finance, medicine, law to advanced graduate studies. The value and importance of different skills may vary depending on the individual career path and therefore it is important that some degree of student choice and flexibility exist in the curriculum. At the same time, we aspire to produce leaders and innovators independent of career choice and certain professional and innovation skills should be common outcomes across the school. In today's competitive global marketplace, our graduates in any field need to be more than analytically and technically excellent – they must also be creative and think innovatively.

Given this, the Ad-hoc Curriculum Committee discussed developing a sequence of courses on innovation and entrepreneurship. The committee chair exchanged ideas with Owen Davis, Managing Director of NYCSeed, an organization that provides funding, mentoring and support to create the next generation of companies in New York City. Owen expressed the primary benefit of teaching innovation is to provide students "*with a framework and a set of skills to evaluate new opportunities* not only theoretically but quantitatively, strategically, and realistically." The School of Engineering already has many electives available to all students on entrepreneurship, innovation, business and engineering economics, and management science. In the Engineering and Entrepreneurship course (EID 365), students go through the business formation process by developing a business plan and pitching their companies to venture capitalists. Student interest in entrepreneurship is further evident in the formation of the Cooper Union

Entrepreneurs Society (CUES). Expanding the entrepreneurial curriculum work already underway would appeal to future prospective students. A future opportunity exists for partnerships between the undergraduate programs and the entrepreneurship certificate program, Vision2Reality, proposed by the Graduate Tuition Committee. In addition, opportunities to partner with the Applied Sciences NYC initiative should be explored[11].

Peter Cooper founded The Cooper Union with the goal of graduating active citizens with technical mastery, entrepreneurial skills, and a sense of social justice. Over 150 years later, engineering education leaders are still stressing the importance of these pedagogical goals and calling for more effective adoption of these principles[12]. Adopting new curriculum initiatives that encourage innovation, collaboration, and community engagement would help Cooper Union remain true to the guiding vision of its founder and continue to set Cooper Union apart among other institutions of higher learning.

Potential Curriculum Initiatives

The Ad-hoc Curriculum Committee is proposing several new curriculum initiatives to be further reviewed and studied by both the standing Curriculum Committee and the full-time faculty for future consideration and adoption. Below are four major curriculum initiatives that the Ad-hoc Curriculum Committee suggest should be the subject of future study:

1. Industry Sponsored Projects

- *Description*: Further build industrial context into the curriculum by having industry sponsored design and/or research projects.
- *Benefits*: Cooper Union students gain professional skills by working on a hands-on, client-driven design projects helping them develop their communication skills and enhance their potential career opportunities. Having students work on industry projects improves visibility for Cooper Union and has the potential to generate revenue.
- *Risks*: Faculty needs to ensure meaningful projects.
- *Needs*: Need industrial liaison support.

2. Interdisciplinary Project Opportunities

- *Description*: Challenge interdisciplinary groups of students to work on *service learning projects*, in which student teams go out in NYC and do hands-on projects in the community, or work together to solve *Grand Challenges*. Ideally, these projects would involve Engineering students and faculty working together with Art and Architecture students and faculty, and external advisors.

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[11] NYCED. Applied Sciences NYC. http://www.nycedc.com/project/applied-sciences-nyc, last viewed 11/23/2012.

[12] American Society of Engineering Education. 2012. *Innovation with Impact: Creating a Culture for Scholarly and Systematic Innovation in Engineering Education.* www.asee.org/innovationwithimpact, last viewed 9/16/2012.

- *Benefits*: Promotes Peter Cooper's legacy of giving back (*societal context*) and civic engagement, improves visibility for Cooper Union, exploits NYC location, and encourages multiple perspectives and *teamwork*.
- *Risks:* Relies on buy-in for participation and mutual collaboration from Art and Architecture schools.
- *Needs:* Need to find meaningful, highly visible projects. Requires coordination for participation with Art and Architecture. Need to introduce course specifically allocated for inter-school collaboration and/or schedule common time across all three schools.

3. Formation of Center for Engineering Education Excellence

- *Description*: Inaugurate a research center that concentrates on how students learn, teaching methods, and engineering education best practices; Create mechanisms for discussion of meaningful curricular reform involving all parties; Study how to efficiently and effectively deliver Math+Science+Engineering+HSS concepts and skills; Encourage and facilitate professional development and team teaching; Better integrate professional skills, such as, technical writing and oral presentation skills.
- *Benefits*: Helps us to maintain our focus and commitment to undergraduate engineering education excellence. Established and recognized Center would help in obtaining government and foundation funding.
- *Risks*: Needs to be financially sustainable. Risk that center exists but does not engage in meaningful curriculum innovations (generating a specific timeline as proposed in the next section mitigates this risk).
- *Needs:* Needs to involve experts on learning from psychology and education disciplines.

4. Thematic Cluster Options

- *Description*: Introduce a new two-course "thematic cluster" sequence into the curricula. Students would have a menu of "thematic clusters" to select from. Example "thematic clusters" include: (1) Entrepreneurship/Business/Finance Cluster, (2) Engineering Practice Cluster, (3) Interdisciplinary Projects and Design Cluster (this cluster could involve Art and Architecture), and (4) Advanced Engineering and Science Research and Design Cluster.
- *Benefits*: Allows a degree of customization to the curriculum without jeopardizing rigor; Given our students follow a variety of careers paths, e.g., graduate school, industry, finance, the ability to select a cluster that aligns with their interests is appealing.
- *Risks*: Need to develop meaningful clusters that align with the school's vision and develop 21st century skills.
- *Needs:* Need to determine how departments would integrate the clusters into the curriculum. Need faculty and other subject matter experts to develop and maintain the thematic clusters.

The fourth Thematic Cluster Option combines aspects of other proposed initiatives and provides students with an opportunity to personalize the curriculum by giving them a menu of options that allow

them to build skills in areas identified as important (e.g., innovation and entrepreneurship, industry context, interdisciplinary collaboration, research skills, etc.).

Other options the Ad-hoc Curriculum Committee considered were requiring a provisional patent application or a digital portfolio.

Proposed Evaluation Timetable

The Ad-hoc Curriculum Committee proposes a timetable to systematically and holistically re-evaluate the curriculum and to study these and other potential new initiatives. The proposal includes a 12-month timeline beginning in January 2013, ending with curriculum reinvention recommendations supported with research.

The Faculty proposes that either the Curriculum Committee or a new standing committee consisting of members voted on by the Faculty undertake the following proposed tasks. The Ad-hoc Curriculum Committee is willing to work together with the Curriculum Committee or new standing committee to help evaluate and carry out these tasks.

January – March 2013:

- Develop a forum to seek input and develop consensus from faculty regarding curricular initiatives across the school. Potential forums include a Faculty Retreat or Regular Tuesday Club Hour Curriculum Meetings.
- Create an advisory panel with key constituents (faculty, students, alumni, employers) and/or engage current advisory board and seek input on concepts and skills we want to deliver (both at the departmental and school level).

January – June 2013:

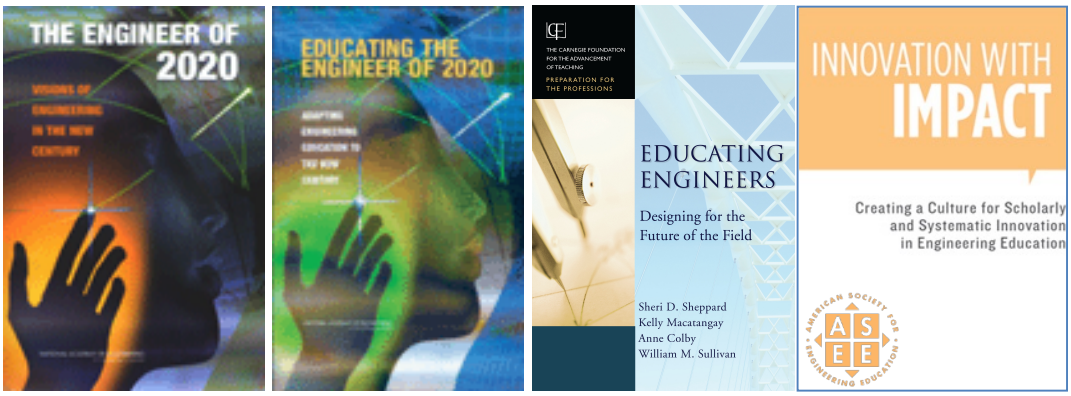
- Evaluate recommendations from the National Academies in *Educating the Engineer of 2020*[13] and *The Engineer of 2020*[14], from the Carnegie Report in *Educating Engineers* by Sheri Sheppard, et al.[15], and from American Society of Engineering Education (ASEE) in *Creating a Culture for Scholarly Innovation in Engineering Education*[16].

[13] National Academy of Sciences, National Academy of Engineering, Institute of Medicine, and National Research Council. 2005. *"Educating the Engineer of 2020: Adapting Engineering Education to the New Century."* Washington, DC: National Academies Press. http://www.nap.edu/catalog/11338.html, last viewed 11/18/2012.

[14] National Academy of Engineering (NAE). 2004. *The Engineer of 2020: Visions of Engineering in the New Century.* Washington, DC: National Academies Press. http://www.nap.edu/catalog/10999.html, last viewed 11/17/2012.

[15] Sheppard, S.D., K. Macatangay, A. Colby, and W. M. Sullivan. 2008. *Educating Engineers: Designing for the Future of the Field*. The Carnegie Foundation for the Advancement of Teaching. Wiley Press.

[16] American Society of Engineering Education. 2012. *Innovation with Impact: Creating a Culture for Scholarly and Systematic Innovation in Engineering Education*. www.asee.org/innovationwithimpact, last viewed 9/16/2012.



- Research best practices and most effective approaches to delivering concepts and skills (Problem-based learning, Inquiry-based learning, Just-in-time learning, etc.)
- Develop concept/skill maps at the departmental and school-wide levels to look for opportunities to improve the efficiency of developing student skill sets
- ***June 30, 2013:*** **Preliminary Report**

June – August 2013:

- Invite recognized engineering education leaders for professional development sessions. Possible invitees include Sheri Sheppard, Richard Felder, Michael Prince, Phil Wankat, Leah Jamieson, Elaine Seymour, Sheryl Sorby, Eli Fromme, Ken Bain, and/or Olin College's Initiative for Innovation in Engineering Education[17] leaders.
- Investigate potential opportunities for integration and collaboration with new NYC Applied Sciences Initiative[18]

August – December 2013:

- Refine and evaluate proposed initiatives, including:
  - *August 2013:* Industry sponsored projects
  - *September 2013:* Interdisciplinary project opportunities
  - *October 2013:* Thematic Cluster options
  - *November 2013:* Formation of Center of Engineering Education Excellence
- Make recommendation for curricular changes and implementation plan
- ***January 15, 2014:*** **Final Report with Recommendations**

Creating the proposed forums and performing the proposed tasks will increase faculty communication and collaboration on curriculum. We aim to foster an environment that supports professional development with regards to learning theories and pedagogical best practices.

Conclusion

While the evidence in our rankings and our student and faculty achievements demonstrate that we deliver an excellent undergraduate engineering program, we must continually re-evaluate ourselves and look for further opportunities for improvement and reinvention. The challenges the institution faces

[17] Olin College Initiative for Innovation in Engineering Education. http://i2e2.olin.edu, last viewed 11/23/12.
[18] Applied Sciences NYC. http://www.nycedc.com/project/applied-sciences-nyc, last viewed 11/24/12.

present tremendous opportunity. The Faculty is committed to continuing a constructive and productive dialog about how to best ensure that The Cooper Union School of Engineering's sustains its legacy as a premier institution of higher learning for many years to come. By embarking on the proposed process and timeline we aim to cultivate a culture and develop mechanisms for continual scholarly and systematic engineering education innovation.