Strategic Plan
“Elevating Engineering Excellence via Multidisciplinary Innovation”

In Perspective: Engineering education as foundation for tomorrow’s leaders

Analytical problem-solving is the very essence of what an engineer is and does, however, it is a way of thinking that is no longer limited to engineers. Success across the modern professional environment demands the critical thinking skills that engineers use to innovate and to create. At Lehigh’s Rossin College of Engineering and Applied Science (RCEAS), we are endowed with rich traditions of engineering excellence, and it is absolutely critical that we continue to elevate and strengthen our core. Yet, at the same time, we must broaden our educational mission to attract and prepare a wider set of society’s future leaders – including those who have career aspirations outside the traditional engineering disciplines. This new, dual-mission of engineering is at the heart of this strategic plan.

Lehigh: Advancing a Tradition of Excellence and Innovation

There is a surge of engineering talent in the global workforce. To sustain the competitive edge and leadership of U.S. engineers in this workforce, top engineering schools, including RCEAS, must rise to the challenges presented by rapid technological advancements and a globally-integrated economy. As a college, we must elevate our thinking beyond short-term tactics and touch off earnest discourse on the question of broader societal concern:

How does Lehigh Engineering lead, and contribute to, the efforts that reaffirm U.S.’s position as the world’s leading innovator in this new competitive landscape?

Ideas, not goods, are the prime drivers of economic growth in the modern world. The ability to innovate is the true value engineers bring to society. However, innovation in today’s society requires far more than technical know-how. We must strive to produce “specialized engineering innovators” - engineers that possess the ability to solve multi-faceted problems while working with diverse people in a multi-disciplinary, technologically-complex environment. Simply put, these are well-rounded analytical problem-solvers – innovators well equipped to succeed among the rigor and advances of modern science and technology. Our strategy will integrate our cutting-edge research and inquiry-based education so that we will produce leaders and innovators within our disciplinary, intra-disciplinary, and cross-disciplinary programs.

The above strategy moves us toward a direction that deepens our engineering roots and traditions. At the same time, we must take steps to broaden our educational mission in order to infuse “engineering thinking” into arts, social science and business. Many of our peers and colleagues around the nation - and around the world -- have recognized that engineering education should be viewed as a critical component of a liberal education for the 21st century, where technical and analytical thinking skills

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prepare leaders and innovators who may or may not pursue engineering-focused career paths. Here at Lehigh, we are uniquely positioned to lead this new movement -- to bring the benefits of an engineering background to students who have career goals in areas such as business, law, medicine, architecture, journalism, or public policy.

A large number of our alumni have successfully used their engineering educations as a foundation in non-engineering careers. This interest in crossing disciplinary boundaries has always differentiated Lehigh engineers from their peers elsewhere. As a college, and as leaders in engineering education, we have long recognized this trend and the opportunities it presents. It is time for us to formalize the academic infrastructure that will support this unique tradition and bring it to the next level of excellence.

The above strategy represents an evolutionary step for us as a college. We will continue our efforts to encourage engineering majors to broaden themselves and gain the “softer skills” necessary for future success. And, we will continue our efforts in the engineering minor, where future artists, journalists, and economists benefit from an understanding of “engineering thinking,” just as engineers benefit from exposures to arts, humanities, and social sciences. However, we are taking this interdisciplinary thinking one step further; we are working to cultivate a new breed of cross-disciplinary innovators, in order to provide an education that produces students well-versed in dual focus areas -- in engineering and in a complementary area in social science, life science, or humanities. Such an educational environment also cultivates a multitude of thinking styles to interoperate, to think quantitatively and qualitatively, visually and literally, in abstraction and in pragmatism. It’s Renaissance thinking for the technological era, an ideal preparation for students intent upon entering professions such as law, business, medicine, architecture, journalism, design, international relations, public policy, and environmental studies, or for students who simply aspire to be independent thinkers and daring innovators. The successes of programs such as IBE (Integrated Business and Engineering), IDEAS (Integrated Degree in Engineering, Arts, and Sciences), and CSB (Computer Science and Business) have demonstrated that these students enrich and elevate all programs.

Research and exploration is fundamental to the intellectual vitality of any academic institution. As an integral part of our strategic plan, we will take concrete steps to cultivate a research and scholarship environment that is vibrant and truly multidisciplinary. While we will continue to enhance and leverage our heritage of excellence within our core engineering disciplines, we must further develop areas that aggressively traverse the disciplinary boundaries -- both intra-disciplinary (within engineering disciplines) and cross-disciplinary (into natural science, life science, and social sciences.) To achieve our mission as a premier research-teaching institution, we must build upon our existing research strength while cultivating emerging multidisciplinary areas. Our ability to leverage our strengths toward high-impact, high-growth research areas will be critical for RCEAS to continue its reputation as a world-class innovative leader; not only in physical science and technology, but also in emerging areas such as bio-, nano-, opto- and information technologies.

We are entering a new era in engineering research and education, one where the outcome of engineering innovation and the essence of engineering thinking contribute to the needs of a far broader constituent base than ever before. As a college, we have the ability to redefine engineering and recapture the breadth of opportunities that await graduates of a top engineering program such as ours.
A vision for the future

The new vision of Lehigh Engineering is to take on the dual-mission of leading first-class engineering research and education, and advancing new frontiers through the fusion of multidisciplinary knowledge. To realize this vision, Lehigh Engineering will focus on the following objectives:
- raising strategic scholarship areas to world-class stature;
- creating exceptional and deliberately aligned educational programs;
- adapting programs and curricula to operate smoothly across the boundaries of classical engineering disciplines; and,
- partnering with faculty in arts and science, business and economics, and education to create an intellectual environment that is truly multidisciplinary.

As previously mentioned, Lehigh’s Rossin College of Engineering and Applied Science has a unique opportunity to make this vision a reality and be in the forefront of a national movement to reinvent engineering research and education for the 21st century.

Pursuing the Vision – Core Values

The values for which Lehigh Engineering has earned its reputation will continue to be upheld in the years ahead, and form the core of this strategic plan. These values are:
- Educational and Research Excellence;
- Service to Diverse People and Communities; and,
- Leadership through Innovation and Integrity

Taking a Stand - Intellectual Signatures

Building on its tradition of excellence and innovation, Lehigh Engineering will offer its students unique intellectual signatures that are distinctly and unmistakably Lehigh.
- Enriching intellectual understanding with practical experience
- Enhancing core disciplinary insights through multidisciplinary explorations
- Complementing inspirations to innovate with aspirations to lead
- Elevating compassionate worldviews with enlightened global perspectives

Overall Strategic Goal -- Enhancing Lehigh’s Stature

By following this strategic plan, the College of Engineering will build upon its rich heritage by pursuing the following goals:
- To be recognized as a leader among the top engineering schools in the U.S.;
- To continue to attract and promote exceptional students, faculty and staff and to provide an environment that nurtures creativity, collaboration, innovation and productivity;
- To achieve international distinction for Engineering undergraduate and graduate education;
- To achieve prominence for cutting edge research and innovation; and,
- To enhance Lehigh Engineering’s global recognition through deep, penetrating contributions to the global community.
I. Undergraduate and Master’s Studies

Engineering education for a multitude of professional paths

Lehigh will maintain its traditional strength in providing a distinctive engineering education that produces world-class, full-service engineers equipped with in-depth technical understanding and a global perspective; engineers who can take on multi-faceted technical leadership roles and coordinate large-scale initiatives involving global teams.

Lehigh will also develop and strategically integrate an innovative curriculum that will shape the future direction of engineering education and transform engineering into the liberal education of the 21st century. Lehigh will strive to excel in preparing graduates for positions of leadership within the global marketplace and in professional schools such as business, law, medicine, design and architecture, and public policy.

Throughout, Lehigh will insist upon maintaining and advancing the academic rigor, leadership integrity and creative innovation that provide the foundation of Lehigh’s reputation of distinction.

Strategic Goal 1:

Enhance freshman matriculation and retention, and increase representation of women and underrepresented minorities

Tactical Initiatives:

• Develop focused recruiting tactics that continue to attract the best and brightest
  o Identify and promote distinct characteristics for Lehigh engineers
  o Promote engineering as the liberal education of the 21st century
  o Develop special programs and activities designed to promote Lehigh visibility to underrepresented groups
• Enhance first-year experience from both academic and student life perspectives
  o Implement/support first-year experience task force recommendations
  o Improve first-year student advising to include peer mentoring
• Develop Rossin Junior Fellows Program for recruiting and freshman mentoring

Strategic Goal 2:

Enhance college-wide curricula via synchronized and continuous reevaluation, renewal, and revision

Tactical Initiatives:

• Coordinate departmental review and revision of all engineering curricula
  o Eliminate obsolete course carryovers and topical duplications
  o Explore opportunities for inter-departmental collaboration
  o Benchmark teaching loads against competition
  o Add courses that reflect the innovative, analytical, and technical demands of each engineering field and provide greater depth/breadth to the engineering curricula
  o Integrate leadership training/engineering ethics component
• Address link between Engineering 1 and the Major
• Establish distinction between Master’s vs. pre-PhD courses to encourage undergraduate participation in graduate classes

• Align master’s degree programs for undergraduate majors as a means to integrating undergraduate and master’s studies
  • Create 4+1 and 3+2 programs
  • Develop creative models to implement 3 + 2 programs; 3 + 2 programs can be multi-disciplinary but must have sequencing issues addressed

• Promote undergraduate research and inquiry based learning
  • Expand Undergraduate Research Symposium
  • Introduce research possibilities early
  • Offer cross-college research collaboration
  • Cultivate/prepare students for graduate work
  • Provide presentation opportunities for students
  • Offer alumni based panels
  • Position co-op programs as an integral part of inquiry based learning

Strategic Goal 3:

Position the College for the dual-mission of preparing specialized engineering innovators and cross-disciplinary professionals.

Tactical Initiatives for the Specialized Engineering Innovators:

• The curriculum for specialized engineering innovators will provide in-depth technical education in a specialty area, integrated with cutting-edge research and inquiry-based education aiming to produce thinkers and innovators in the context of our disciplinary, intra-disciplinary, and cross-disciplinary2 programs. Coupled with global perspectives, these engineering innovators will be in the position to assume multi-faceted technical leadership roles and coordinate large-scale initiatives involving diverse people and disciplines.
  • Conduct industry analysis and global workforce analysis to assess relevance of curriculum content
  • Increase the depth of curriculum to keep up with market changes and demands
  • Significantly Increase the participation in undergraduate research
  • Enhance experiential learning and co-op component of curriculum
  • Provide alumni based career education and information linkages
  • Incorporate growth potential areas in master’s degree programs
  • Develop integrated five-year degree programs to accommodate career goals

Tactical Initiatives for the Cross-Disciplinary Professionals:

• The curricula for cross-disciplinary professionals are designed to integrate engineering with pre-professional training suitable for careers such as law, business, architecture, journalism, and medicine. Similar to IBE and CSB, the intention of this program is to attract the highly motivated and the most talented to Lehigh Engineering. The students in these programs will

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benefit from the integrated, strategic leveraging of strengths across college boundaries within the University.

- Build collaborative networks with peer colleges in arts and sciences, business and economics, and education

- Create new pre-professional engineering curricula and programs
  - Integrate engineering core education with secondary focus, e.g.
    - Design/Architecture/Art
    - Pre-Med/Biological Sciences
    - Pre-Law
    - Journalism
    - International Relations/Political Science
    - Finance/Economics, Applied Mathematics/Computing

- Develop pilot programs combined with marketing strategies (recruiting and career education)
  - Establish strategic partnerships with external entities
  - Develop proper name for the program so that sub-group talents are recognized as equal
  - Form an advisory group
  - Develop advising structure to support a cohort

**Strategic Goal 4:**

*Offer professional resources and education for the community at large*

**Tactical Initiatives:**

- Develop and launch Professional Master’s programs that address current and emerging needs in technology-centric pursuits in key industry segments
- Create market sensitive distance learning or online programs
- Retire legacy programs that have lost market attractiveness
- Partner with CBE on MBA-E, Analytical Finance, Biopharmaceutical, and other joint master degree programs
- Explore opportunities to serve the community through Technology Transfer Programs, BF Partnership, DCED, KIZ, etc.
II. Graduate Research and Doctoral Studies

Advancing new frontiers through the fusion of cross-disciplinary knowledge

Lehigh’s reputation for engineering distinction can be clearly traced to the excellence of its graduate research and doctoral programs. Graduates from these programs achieve recognition in both industry and academia. The future success of the graduate and research programs will provide a critical foundation in Lehigh’s efforts to achieve recognition as a world-class innovative leader in engineering.

To achieve the next level of success, Lehigh needs to increase both the quality and quantity of doctoral students. Special efforts must also be made to enhance the multidisciplinary research and programs, and to increase the enrollment and contributions of women and other underrepresented groups.

**Strategic Goal 1:**

*Enhance the quality and quantity of doctoral students:*

**Tactical Initiatives:**

- Increase doctoral student base through funding allocation
  - Create college matching pools for first-year doctoral student support
  - Enlist support of centers and institutes for establishing mutually beneficial hybrid funding for first-year Ph.D. students
  - Create a net increase in RCEAS first-year Ph.D. students
  - Allow faculty to recruit from first-year Ph.D. students who have demonstrated competencies
- Establish integrated domestic student recruiting and marketing initiatives
  - Target domestic feeder programs and categorize them according to the following three classifications:
    - Peer institutions with doctoral level engineering programs
    - Institutions with strong undergraduate engineering programs
    - Liberal arts institutions with strong science and mathematics undergraduate programs
  - Implement category specific recruiting initiatives at each of the target feeder institutions identified
    - Establish and maintain supportive relationships with local faculty champions at each institution
    - Arrange for regular recruiting visits of relevant Lehigh faculty members and current graduate students to each target institution
    - Actively promote follow-up visits to Lehigh by prospective students at each target institution
- Establish integrated international student recruiting and marketing initiatives
  - Target international feeder programs and countries
  - Implement specific recruiting initiatives focused on primary target feeder countries/institutions
    - Establish and maintain supportive relationships with relevant governmental/Embassy representatives and/or local faculty champions at selected institutions
• As appropriate and practical, arrange for recruiting visits of relevant Lehigh faculty members to selected countries/institutions
• Integrate and strengthen general Ph.D. student recruiting efforts
  o Incorporate Center/Institute collaboration in recruiting new students
  o Facilitate cross-departmental prospective student campus visits and promote opportunities to meet with/correspond with Lehigh faculty members and current students
  o Improve retention and cultivation of Ph.D. bound M.S. students; enhance student support and advising
  o Increase representation and talents of women and other underrepresented groups
  o Update and rejuvenate the web marketing of RCEAS graduate programs and research
  o Continue to recruit domestic students through the sponsorship of and participation in Career/Graduate School Fair

**Strategic Goal 2:**

*Enhance multidisciplinary research/programs via clustering and other innovative mechanisms*

**Tactical Initiatives:**

• Create collaborative clusters for resource pooling and intellectual exchange
  o Form research clusters according to synergistic areas to initiate formal discussions and professional idea exchange, e.g., develop/revise research niche and strategic foci
  o Cultivate formal collaboration between academic departments and research centers/institutes
  o Promote informal cross-department, cross-college research peer structure
• Align incentives, rewards, and resources toward multidisciplinary collaboration
• Create endowed chairs and joint appointment opportunities to cultivate multidisciplinary faculty leadership

**Strategic Goal 3:**

*Strengthen internal culture of research vitality and promote external visibility of research*

**Tactical Initiatives:**

• Promote informal cross-college intellectual exchange and offer opportunities for collaboration across disciplines
• Cultivate external intellectual exchange
  o Promote opportunities to present research and attend conferences
  o Offer college-sponsored distinguished lecture series and regularly scheduled college-wide seminars
• Improve entrepreneurial opportunities for faculty and graduate student inventors via patents, licensing, and ventures

**Strategic Goal 4:**
**Cultivate doctoral students for academic careers**

**Tactical Initiatives:**

- Provide networking opportunities via professional conference presentations
- Encourage and support early publication and teaching experiences
- Consider Post-PhD Academic Career Preparation (e.g., final-year fellowship, endowed fellowship)
III. Culture and Environment: Faculty, Staff and Students

Lehigh will achieve the goal of providing an engineering education that enables its graduates to make important and far reaching contributions to the global society by cultivating a satisfying and productive environment that attracts and then nurtures and retains the most talented faculty, staff and students.

Strategic Goal 1:

Recurr, retain and renew world-class faculty

Tactical Initiatives:

- Hire, tenure, and promote only the very best faculty; applying consistently high standards for teaching, research, and service
- Promote diversity in the faculty by increasing representation of talented women and minorities
- Develop cross-boundary academic peer groups as a basis for intellectual and social interactions
- Enhance support/recognition/involvement of high-performance faculty
- Offer appropriate career/relocation support for dual career faculty

Strategic Goal 2:

Maintain and Improve Faculty and Staff Quality/Productivity

Tactical Initiatives:

- Facilitate Junior Faculty Research/Scholarship Coordination
  - Enhance the junior faculty mentor and professional development programs
  - Promote/enhance federal agencies visitation, panel service
- Provide opportunities for creative collaboration between faculty and administration
  - Benchmark teaching loads at peer institutions
  - Involve the college-wide community in decision-making and brainstorming
  - Empower faculty and staff through project-based committee work
- Offer professional resources/education for the college community at large
- Develop model of staff/administrative management that nurtures creativity and contribution of administrative personnel

Strategic Goal 3:

Provide exceptional Faculty, Student, and Staff Support

Tactical Initiatives:

- Benchmark the level of faculty/student supports
- Enhance physical facilities/work space

IV. Space and Infrastructure
Lehigh’s rich history and tradition of excellence can be seen in the design and architecture of many of the impressive buildings on campus. Its role as an innovative leader in engineering education needs to also be reflected in the revitalization and restoration of research and educational facilities such as laboratories, lecture rooms, and gathering space. An enhanced physical environment and facilities will help to promote the exceptional productivity and creative collaboration expected of our faculty students and staff.

**Strategic Goal 1:**

*Enhance undergraduate laboratories*

Tactical Initiatives:

- Enhance undergraduate laboratory to promote interdisciplinary collaboration and exploratory based learning
- Create undergraduate laboratory-rotation program in graduate research labs
- Benchmark/evaluate additional support for undergraduate lab development and operation

**Strategic Goal 2:**

*Enhance Graduate Research Infrastructure*

Tactical Initiatives:

- Seek federal/state/local funding for research infrastructure improvement in strategic areas; effectively leverage research grants and external funding
- Enhance the efficiency and management of existing research infrastructure
  - Create common space and shared laboratory and research infrastructure
  - Create/enforce equipment and space sharing and maintenance policies

**Strategic Goal 3:**

*Enhance gathering space for faculty/student interactions*

Tactical Initiatives:

- Complete Packard Lab public space renovation
- Create medium size meeting/conferencing space for faculty meetings, student presentations, and small workshop/symposia
- Evaluate and enhance Fritz lab facility for alternative future use
- Evaluate potential improvement in all engineering buildings
V. Visibility Enhancement

All of the initiatives outlined in this strategic plan will support the goal of enhancing Lehigh’s visibility within our local community as well as in the greater international community of scholars and students.

While it is of greatest importance to concentrate on further defining those substantive changes and tactical initiatives, it is also of critical importance to promote Lehigh’s successes through an integrated marketing and communications plan.

Strategic Goal 1:

*Enhance Communication, Marketing, and Media Relations*

Tactical Initiatives:

- Develop long-term communication and marketing strategies; set multi-year goals and metrics
- Develop tactical communication priorities in a yearly basis; identify key messages and develop in-depth stories in support of priorities
- Manage vertical trade media; further develop consumer media relations

Strategic Goal 2:

*Celebrate and promote the Lehigh’s heritage of engineering excellence*

- Recognize distinguished alumni and faculty through Web presence and various communications channels