“Over the course of the next decade, let us renew our beloved Cornell. Let us ensure that its faculty, its staff, its programs, and its students together constitute a university worthy of our students’ love.

And let us renew our revolutionary Cornell. Let us insure that the intellectual breadth and depth of our university is brought to bear on the fundamental challenges of our time.”

October 29, 2004, State of the University Address
Jeffrey S. Lehman
President
Cornell University

Purpose

Engineering touches all aspects of civilization. Great works of humankind, from the construction of the pyramids to the creation of the internet, are marvels of engineering. Engineering is an evolving discipline that reinvents itself to explore and create solutions to new problems. Fields such as molecular biotechnology and nanoscale science that did not exist in the recent past are now expected to produce dramatic breakthroughs. Progress in engineering is driven by the application of varied fields of human understanding and subject to episodes of rapid enlightenment brought about by advances in technology. Thus, while strategic planning is important for any organization, it is critical for an engineering college where its role is two-fold: leadership in creating revolutionary technological advances through scientific discovery; and education of students who will have a significant positive impact on society.

The process of strategic planning in an academic environment is unique, in part because the inputs and especially the outputs of the academic endeavor and the value that they add are often not readily quantifiable. How do we gauge the value added to society if a Cornell graduate becomes a teacher who inspires generations of students? We have endeavored to include intangibles in the process, tempering the value that scientists and engineers traditionally assign to metrics and balancing it with a healthy respect for elusive but very real qualities such as collegiality, integrity, and leadership.
Cornell University’s College of Engineering will create a better future for all through its leadership in research and excellence in engineering education. It will accomplish this by fostering a challenging, enlightened, and collaborative academic environment that demands excellence, encourages innovative education, and supports ground-breaking discovery. Its esteemed faculty will be world renowned for their creative scholarship and innovative teaching. The college’s graduates will be recognized and valued for their commitment to excellence, enthusiasm for learning, ethical behavior and integrity, and exceptional leadership.

The college’s graduates will be recognized and valued for their commitment to excellence, enthusiasm for learning, ethical behavior and integrity, and exceptional leadership.
A Mission of Distinction

Cornell University’s College of Engineering is a rigorous and dynamic intellectual community that plays an important role in the interdisciplinary life of a uniquely broad and renowned research-intensive university. In this context, the college’s mission is to:

■ Provide students with a broad and exceptional education that prepares them to excel in their professions and to become creative leaders and mentors in an increasingly complex world;

■ Lead responsively and creatively in the discovery of new knowledge and transforming inventions and technologies; and

■ Create a better future for all people through the application of innovative ideas and resources and the solution of important and complex global problems.

Supporting Values

The college’s core values underscore and support its vision and mission to be a world leader in engineering education and innovative research through its commitment to:

■ Treat all individuals with dignity and respect, judge impartially, critique fairly, and encourage without reservation;

■ Value differences and recognize that multiple perspectives enhance creativity;

■ Embrace innovation, demonstrate a willingness to take risks, and persist in the face of challenges to achieve the seemingly impossible;

■ Excel at what really matters, and aspire to greatness; and

■ Be worthy of the trust and respect that the college has earned.
In order to achieve its mission and bring its vision to life, the College of Engineering has established the following goals:

**GOAL 1:** To be considered one of the top five engineering colleges in undergraduate and graduate studies;

**GOAL 2:** To be recognized as the premier research university in advanced materials, information sciences, and nanoscience, and a leader in bioengineering, complex systems, and energy and the environment;

**GOAL 3:** To recruit, retain, and enable a diverse community of exceptional faculty, students, and staff;

**GOAL 4:** To educate future leaders who are the most sought-after engineering graduates in the world; and

**GOAL 5:** To establish and maintain facilities and infrastructure that are second to none in supporting the achievement of the college’s vision, mission, and values.
A Unique University and College

Cornell University is a richly woven tapestry composed of a diverse and vibrant learning community that is distinguished by its quality and breadth of programs and its excellence in achievement. As one of the founding colleges, the College of Engineering is integral to the fabric of university life. It offers strong interdisciplinary programs with Cornell’s world-class physical sciences, life sciences, and mathematics, and creatively leads partnerships with all of Cornell’s colleges and schools, particularly the Colleges of Arts and Sciences, Agriculture and Life Sciences, Veterinary Medicine, the Johnson Graduate School of Management, the Faculty of Computing and Information Science, and the Weill Cornell Medical College. Through these collaborations, the College of Engineering offers an unusual blend of engineering and science that is characterized by non-traditional innovative departments, majors, graduate degrees, and research opportunities. In addition, the unique Cornell Graduate Field structure transcends traditional department boundaries, fostering meaningful interaction and supporting a rich interdisciplinary environment for faculty research and graduate education.

The strong fundamental and theoretical basis of the Cornell engineering program is complemented by extensive experiential learning opportunities. Undergraduate and graduate students participate in complex design projects and leading-edge research. Societal outreach is encouraged and flourishes as part of the culture of the college. Students and alumni have a strong presence and national influence through their formation and leadership in such organizations as Engineers for a Sustainable World. Students and faculty members with interests and capabilities that extend beyond the traditional engineering focus are attracted by the scope and excellence of the college’s programs, the richness of Cornell’s research-intensive environment, and the allure of an idyllic campus setting. The Cornell community reflects many different cultures and cherishes academic freedom. It places a high value on wide-ranging perspectives and opinions, resulting in an open discourse that fuels academic creativity. These activities are generously supported through both funding from and participation of alumni, industrial partners, and philanthropic foundations.

Its rich university setting, programmatic breadth, extraordinary population, interdisciplinary strength, experiential learning environment, and vibrant community all contribute to an exceptional academic atmosphere that gives Cornell’s College of Engineering much to celebrate and build upon.
The College of Engineering is a community of students, educators, researchers, staff members, and alumni, working together and interacting with professional colleagues and leaders of industry and government from around the world. This convergence of human effort provides the foundation and supportive structure necessary to build and nurture a socially responsible, collaborative academic community that will transform the future.

The primary opportunity for growth in the engineering workforce rests on the ability to attract outstanding women, underrepresented minorities, and international students. Cornell has a particular responsibility to educate these students as future world leaders. Together, faculty and students from a wide variety of backgrounds will add new and vital perspectives to an environment traditionally rich with representatives from many nations and cultures.

Through innovative teaching and effective advising, college faculty will engage students in a life-long learning process that is inspired by cutting-edge discovery. Faculty members will lead and excel in world-class research in collaboration with graduate students, post-doctoral associates, research staff, and, increasingly, undergraduates.

Interdisciplinary research at Cornell has a long tradition encouraged by Cornell’s Graduate Field structure and fostered by the success of major research centers.

The College of Engineering is fortunate to have an exceptional staff that supports both faculty and students in achieving teaching and research excellence. This plan acknowledges the significant role staff members play in implementing the college’s objectives and specifically commits to provide opportunities for staff to grow and excel in their careers.

Facilities have a strong influence on the college’s ability to provide exceptional education and research opportunities. The provision of community space that allows for interaction and collaboration between students, faculty, and staff will be an essential element for achieving the goals of the plan.

Cornell’s enduring reputation as a leading educational institution has long been enhanced by its engineering graduates, who have gone on to distinguished careers as leaders in industry, education, government, and the community—at home and abroad. Alumni participation in the Cornell experience provides an advantage for the college and students alike.

Through the engagement and support of all constituents and stakeholders, the Cornell University College of Engineering will lead in creating a better future for all.
Innovation and Leadership in Research

The College of Engineering has identified six strategic areas of significant research focus for the next decade. While a large number of additional ongoing research initiatives will continue to be of importance and supported by the College of Engineering, these six areas of inquiry uniquely span the breadth of the college. They build on the college’s current research excellence, and they are expected to grow in importance.

**Emerging research areas:**
- Systems biology and biomedical engineering;
- Nanomaterials, nanoscience, and nanodevices; and
- Energy, environment, and sustainable development.

**Enabling research areas:**
- Information, computation, and communication;
- Advanced materials; and
- Complex systems and networks.

The college’s ongoing research and future activity in these six emerging and enabling areas is closely aligned with the national research agenda as well as Cornell’s priorities. The six areas are expected to strongly influence the college’s curriculum, facilities, and faculty hiring.
Emerging Research

Systems Biology and Biomedical Engineering

Cornell has a unique opportunity for international leadership in biomedical engineering, integrating the analytical, experimental, and computational tools used in engineering with biological concepts that can be applied to solve human health problems. Cornell’s particular leadership strengths include nanobiotechnology, optical imaging, biomaterials, bioprocess development, genomics and proteomics, metabolic engineering, biomechanics, and drug delivery.

Life sciences research has advanced to a point where the quantitative and predictive methods of engineering can be used to obtain a greater understanding of biological systems and will ultimately allow scientists to design and control them. In particular, the area of systems biology integrates many of the analytical and design-driven approaches familiar to engineers and necessary to facilitate basic biological discovery and enable engineering design. As examples, genome sequencing projects and closely related studies provide a wealth of reductionist data on biological systems. Because of the complexity of living systems, the ability to design and control cells cannot be achieved by investigating the various subcellular components alone. An integrative approach that systematically organizes the data into quantitative frameworks that describe complex biological phenomena provides an opportunity to design more effective drugs and improve pharmaceutical production.

Systems biology and biomedical engineering provide avenues for students and faculty within the college to work in partnership with students and faculty from across the university, particularly with the Weill Medical College and the College of Veterinary Medicine. Biomedical engineering will be Cornell’s primary focus of collaboration between the Ithaca campus and the medical college in New York City.
Engineering at very small length scales has the potential to produce important technologies that utilize materials with new and fundamentally different properties. Advances in engineering have made it possible to fabricate structures at the molecular level using techniques derived from the microelectronics industry (top-down processes) or to grow them using new molecular fabrication techniques (bottom-up processes). It is possible to create microscopic structures with the desired dynamical response for use as sensors and optical switches and devices the size of biological cells with the ability to operate autonomously. One can imagine electronic devices the size of molecules that interact directly with biological systems. Such developments are expected to revolutionize many areas of society, economic development, and our personal lives.

Nanoscience research engages a broad range of expertise from different disciplines across the College of Engineering. Cornell’s strength in nanoscience stems from pioneering efforts initiated in 1977 with the establishment on campus of the National Submicron Facility (now the Cornell NanoScale Science and Technology Facility). The university’s premier leadership in nanoscale science and engineering has grown and is highlighted by several on-campus national centers and ongoing research activities including nanoscale systems, nanobiotechnology, microchemical-electrical-mechanical-bio systems, microfluidics, nanoelectronics, and nanoactuation.
An issue of critical importance that confronts the world today is the production and use of energy. Oil and natural gas provide more than 60 percent of the energy used in the United States, with 50 percent of electricity generated by coal. Over the next 50 years, the earth’s population is expected to increase to approximately 10 billion people, with concurrent energy demand predicted to rise dramatically. This extraordinary population growth will adversely affect the environment and will likely require an enormous change in the way people live. A dominant aspect of global sustainable development is the need for renewable energy that preserves the environment.

Alternative energy solutions, such as hydrogen fuel cells and energy derived from renewable resources such as wind, solar, and biomass, are possible and, with appropriate research and development, may be economically viable energy options. Hydrogen-based fuel cells could provide low weight and high power sources and substantially reduce environmental emissions. Fuel cells could power simple electronic devices such as laptop computers for days without refueling and lead to a redesign of the automobile. Other areas of technology, such as the development of low power efficient lights, could contribute to new designs utilizing light-emitting panels and revolutionize product function and energy consumption.

Cornell is well positioned to make fundamental contributions to the discovery, development, and implementation of these alternative energy sources and to the sustainability of the environment. Progress in this area is particularly dependent on multidisciplinary collaboration (for example, in combustion catalysis, biomaterials, and bioremediation) and will benefit from Cornell’s interdisciplinary strengths.

Energy, Environment, and Sustainable Development
The impact of digital technology has been pervasive and transformational. The revolution began with the invention of the transistor in 1947 and the integrated circuit in 1958 and has continued with engineering breakthroughs in the development of the internet, cell phone, web browser, and innumerable applications of computation, communication, and digital technologies. The college is a leader in important areas of information science and engineering research that will continue to accelerate the digital revolution.

Discoveries in materials, electronics, and optics will provide dramatic enhancements in speed, computation, storage, and power consumption. Research at Cornell in nanoscience may result in a replacement of the silicon field-effect transistor that has been the primary component of digital technology for fifty years. Work on micro-electromechanical systems (MEMS), low-power transmitters, wireless communications, and computing will make it possible to deploy large-scale sensor and actuator networks that will revolutionize areas as disparate as traffic management, patient monitoring, and personal productivity.

Research at Cornell in the dependability and performance of large-scale computation systems will make possible the modeling, simulation, and visualization of exceedingly complex systems and will play a growing role in all areas of research. Computation will incorporate grids of globally distributed networks of computers, databases, and instruments. This is particularly driven by collaborations among geographically dispersed research groups with access to large distributed data sets.

The effective use of high performance computation networks to simulate phenomena requires advances in numerical and mathematical modeling, algorithms, databases, data mining, visualization, computer architecture, and ultrahigh bandwidth communication. Discoveries in computation, communication, and algorithms will have major impact across wide-ranging subject matter; for example, warehousing and analysis of massive amounts of data will find application in marketing, speech recognition, machine learning, investment banking, and genomics.
At Cornell, new materials are being developed with properties and structures custom tailored at the atomic level for specific applications. Advances in the characterization of materials are enabling an understanding of fundamental structure-property relationships. Anticipated areas of Cornell innovation include computationally designed materials; enhanced functionality through convergence and integration of biological, organic, electronic, and structural materials; self-assembly creation of new materials; and tailoring of interfaces to produce nanocomposites. As an example, the development of organic semiconductors at Cornell has the potential to allow the realization of smart credit cards, displays flexible enough to be worn as clothing or used as wall paper, and the creation of cost-competitive solar cells. Future progress in digital and analog technologies is dependent on the advances made in materials. Materials research will continue to be a major driver of this and many other technologies, including those in the life sciences.

Historically, Cornell University has had leadership in materials research. Cornell was awarded one of the first three materials research centers, funded in 1960 by the Department of Defense, which has continued with consistent national funding and is now the Cornell Center for Materials Research (CCMR). In addition, three other major research centers, the Cornell NanoScale Science and Technology Facility (CNF), the Cornell Nanobiotechnology Center (NBTC), and the Cornell Center for Nanoscale Systems (CNS) all conduct research on advanced materials. Advanced materials characterization capabilities at Cornell such as ultra-high-resolution transmission electron microscopy, scanning-probes (such as atomic force microscopy), and the Cornell synchrotron X-ray facility (CHESS) provide unique opportunities for the study of the structure and dynamics of multiple materials systems.
Society relies on engineered complex systems to deliver critical services, including information, financial systems, water, power, and transportation. These complex systems include intelligent machine systems that integrate actuation, sensing, digital communication, and control into physical devices to create automated systems. Engineered complex systems also include integrated circuits, internet networks, transportation and manufacturing networks, infrastructure for healthcare and homeland security, and services such as supply chains and investment analysis. The design, analysis, management, and control of these complex systems are critically important and exceedingly difficult.

Complex systems also exist naturally in physical environments such as the solar system and in biological systems through the interactions of molecules, cells, neurons, tissue, and organ systems. Understanding, modeling, and simulating these natural complex systems provides insight that can inform the design and control of artificial complex systems.

The foundation of this enabling research area is the recognition that integrative rather than reductionist approaches are essential to capture system behavior. Many complex systems, both engineered and natural, exhibit properties that are more than the sum of the properties of their parts. The College of Engineering has a broad-based foundation in the study and analysis of such complex systems, including expertise in applied mathematics, information systems, systems biology, electric power systems, transportation, manufacturing, and financial systems.

*Complex Systems and Networks*
Strategic Objectives

Faculty

The objective most important to this plan is the recruitment, retention, and support of the world’s very best faculty. The faculty is recognized as the primary resource on which the future of the College of Engineering relies. If the faculty achieves preeminence in scholarship and world-class excellence in teaching, then the vision, mission, and goals of this plan will also be achieved. While the College of Engineering is committed to enabling faculty success, the responsibility for achieving internationally unparalleled leadership in research and teaching rests with the faculty. The success of the college in enhancing its academic and research climate, promoting diversity, and ensuring integrity is also dependent on the example set by faculty and on participation from all of the college’s constituents and stakeholders.

The faculty of the College of Engineering is committed to scholarship and education. This strategic plan focuses on enhancing their impact, reputation, and productivity, and also on increasing their number. The educational effectiveness and research preeminence of the faculty are directly affected by the undergraduate student-to-faculty ratio. In the ten-year period from 2002 to 2012, the college will increase the number of tenure-track faculty members by at least 30, thus reducing the student-to-faculty ratio and increasing the quality, impact, and visibility of faculty teaching and research. Approximately half of that growth is expected to occur at the intersection of life sciences and engineering, particularly biomedical engineering. The other half will be seen in core areas of excellence, with a focus on the six emerging and enabling areas identified in this plan.

Faculty Objectives

Objective A: Recruit and retain a superb faculty.

- Expand opportunities for recruiting a diverse faculty and increase underrepresented minority faculty members from 4 percent to at least 7 percent and women faculty members from 11 percent to at least 20 percent;
- Provide significant faculty start-ups that include graduate student support, summer salary, travel, equipment, and laboratory space;
- Create six term-chairs for strategic junior faculty members and 40 additional endowed professorships for preeminent senior faculty members; and
- Sustain national leadership in engineering faculty salaries at all ranks.
Objective B: Enhance educational effectiveness.

- Improve the undergraduate student-to-faculty ratio from 14:1 to 12:1 by increasing the number of faculty members in the College of Engineering by 30;
- Create a Teaching Institute that enhances teaching excellence through seminars, workshops, and consulting opportunities;
- Create ten endowed instructional enhancement positions (lecturers, skilled laboratory instructional staff, and classroom technical support staff); and
- Increase significantly the number of teaching assistant (TA) positions.

Objective C: Encourage and enable faculty excellence in all areas.

- Establish a goal of graduating each year on average one Ph.D. student, two M.Eng. students, and three B.S. students per faculty member in the College of Engineering;
- Increase the average research funding per faculty member by at least 10 percent per year, with a goal of doubling the funding within ten years;
- Enhance collaboration in research and education with all other Cornell colleges;
- Create engineering community centers to promote research collaborations among members of different departments, thus increasing the likelihood of serendipitous encounters between researchers working in different fields; and
- Increase the percentage of faculty members in the national academies and in other positions of national leadership and encourage nomination of faculty members for major awards.

Objective D: Make dual career solutions a strategic priority.

- Work with Cornell’s administration to establish a well-funded, university-level program that provides significant career opportunities for spouses and partners;
- Develop a process for rapid discovery of on- and off-campus employment opportunities; and
- Work with other New York universities to influence state-level initiatives that encourage the creation and placement of high-technology companies in the region.
Although recognized as particularly ambitious, the ability of the college to realize its vision is dependent upon its goal to provide facilities and technical infrastructure that are second to none. A physical environment can either constrain creativity and productivity or it can inspire and enable excellence. The functional design of its buildings, organization of its collaborative work and study environments, and adequacy of space for innovative learning and research are essential for Cornell’s College of Engineering to be an international leader.

The broad educational and emerging research enterprises of the College of Engineering drive the need for a major revitalization of its facilities and technical infrastructure that is strategic to accomplishing the college’s mission. Almost all of the college’s core departments and schools urgently need a significant expansion of available space for learning and research and a major upgrade in the quality of the physical and technical infrastructure. The principal college buildings constructed in the 1950s (Carpenter, Hollister, Phillips, and Upson) are a particular challenge in both function and appearance.

Students, staff, and faculty members require adaptable laboratories, classrooms, and collaborative space where they can pursue experiential learning and accomplish world-class research in broad frontiers of exploration. State-of-the-art laboratories in Duffield Hall will ensure Cornell’s leadership in infrastructure for nanoscience and advanced materials. The new life sciences facility and a new physical sciences building will have a major impact on the success of Biomedical Engineering and sustaining the excellence of Applied and Engineering Physics.

The proposed information sciences and engineering building is expected to provide exceptional interdisciplinary space for Computer Science and Operations Research and Industrial Engineering and will allow Upson Hall and Rhodes Hall to be renovated to meet the long-term needs of Electrical and Computer Engineering, Materials Science and Engineering, Mechanical and Aerospace Engineering, and Theoretical and Applied Mechanics. The proposed learning, library, and service center (Carpenter Hall replacement) is necessary to provide a facility for student-centered collaboration and study and will release needed space for Chemical and Biomolecular Engineering and Civil and Environmental Engineering.

**Facilities Objectives**

**Objective A: Develop a long-range comprehensive master plan and timeline.**

- Develop a college master plan and project timeline that addresses the need for new and renovated world-class facilities, an expanded college footprint, flexibility and proximity requirements, future space needs, and the function and appearance of current buildings.
Objective B: Renovate existing facilities and infrastructure.

- Renovate the interior, exterior, mechanical, electrical, and information technology infrastructure of existing facilities; and
- Create vibrant community centers for academic collaboration and social interaction.

Objective C: Create a learning, library, and service center.

- Replace Carpenter Hall with a facility that provides exceptional spaces for collaboration and learning.

Objective D: Provide significant additional research, instruction, and office space for Computer Science, Electrical and Computer Engineering, Mechanical and Aerospace Engineering, and Operations Research and Industrial Engineering.

- Construct a new Computing and Information Science and Engineering facility for Computer Science and Operations Research and Industrial Engineering;
- Reallocate Rhodes Hall and Upson Hall for Electrical and Computer Engineering, Materials Science and Engineering, Mechanical and Aerospace Engineering, and Theoretical and Applied Mechanics; and
- Renovate Bard Hall, Grumman Hall, Kimball Hall, Phillips Hall, Rhodes Hall, Thurston Hall, Upson Hall, and Ward Laboratory.

Objective E: Provide additional research, instruction, and office space for Chemical and Biomolecular Engineering and Civil and Environmental Engineering.

- Move Student Services and the Engineering Diversity Programs out of Olin Hall and into new facilities. Move Engineering Admissions and the Engineering Communications Program out of Hollister Hall and into new facilities; and
- Renovate Hollister Hall and Olin Hall.
Objective F: Provide offices, laboratories, and instructional facilities for Biomedical Engineering.

- Obtain sufficient space in the Life Sciences Technology Building for the new Department of Biomedical Engineering that includes office, research, and instructional laboratory space for 15 faculty members and the associated department staff and graduate students.

Objective G: Provide an enhanced facility for Applied and Engineering Physics.

- Collaborate with the College of Arts and Sciences in creating a new physical sciences building.

Undergraduate Studies

The College of Engineering has a tradition of excellence in undergraduate education. Its students are well prepared to join a proud legacy of graduates who have made a profound difference in the world through leadership in their careers and community service. The college excels at recruiting and educating students who want to make a difference in society and who have a desire to learn broadly and to gain an unmatched understanding of the fundamentals of science and engineering. Its exceptional faculty is committed to continuously improving curricula, instructional delivery, and the educational environment.

The future of the engineering profession is dependent upon its ability to enlarge the talent pool, expand perspectives, and widen influence. Women, African Americans, Latino Americans, and Native Americans are significantly underrepresented in engineering education and the engineering workforce. Yet they are the fastest-growing untapped college-age population and offer tremendous potential for enriching the future of engineering.

Women and underrepresented minority students who enroll in Cornell’s College of Engineering consistently excel in their studies and in their careers. The college desires not only to graduate leaders but also to be a leader in education, particularly in the education of women and minority students.

The undergraduate program will be known for its excellence and rigor. The learning environment will be enhanced by healthy competition, reasonable workloads, and continuous review of curriculum and course content. Curricula and instructional delivery must be sufficiently flexible to accommodate breadth of inquiry, non-traditional interests, international work and study, and differences in learning styles. Cornell’s learning and living community is an important component of the undergraduate experience and is instrumental in achieving the college’s goal of graduating engineering students known for their integrity, leadership, and breadth of fundamental knowledge.

Undergraduate Studies Objectives

Objective A: Enhance the undergraduate educational environment and experience.

- Institute programs that continuously improve the quality of teaching, encourage development and use of innovative teaching strategies and technologies, and support varied learning styles;

- Periodically review the undergraduate workload, class sizes, and affiliation requirements to ensure their appropriateness;

- Identify requirements that can be reduced or eliminated in order to allow time for new programs;
Identify and reduce sources of excessive student stress and competition;

Expand post-graduate, internship, and co-op program opportunities;

Provide opportunities for all undergraduate students to experience hands-on learning by participating in a research experience or project team;

Develop plans and resources for consistently enhancing the facilities, equipment, and staff supporting undergraduate instructional laboratories;

Develop international study and work (internship and co-op) opportunities and increase student participation from 2 percent to at least 10 percent; and

Develop a strategic relationship with a targeted set of peer institutions in China, India, and Europe for student and faculty exchange and collaboration.

Objective B: Enhance the engineering undergraduate curriculum and implement procedures for assessment and change.

Conduct a comprehensive review of the curriculum to simplify requirements, accommodate emerging areas, and provide students with the flexibility to pursue breadth in their studies and extra- or co-curricular experiences (such as internships, cooperative programs, research, and international study);

Enhance the cultural, societal, ethical, environmental, and international focus of the curriculum;

Sustain a continuous improvement cycle for review of program objectives and outcomes consistent with Accreditation Board for Engineering and Technology (ABET) principles;

Ensure that all students understand the necessity for professional and ethical behavior, particularly in the context of a complex world of many nations and cultures. Utilize ethics and history to prepare students for the moral choices they will make throughout their careers; and

Develop programs and experiences that build communication and leadership skills for all students.
Objective C: Recruit the highest quality undergraduate students.

- Enhance the visibility of the College of Engineering and Cornell in targeted high schools;
- Work with college alumni in focused recruiting; and
- Effectively tell the story of Cornell’s tradition of leadership, excellence in education, and undergraduate research.

Objective D: Become a leader in the education of women and underrepresented minority engineers.

- Increase the percentage of undergraduate women students from 25 to at least 35 percent and the percentage of underrepresented minority students from 6 percent to at least 10 percent; and
- Increase the retention and graduation rates of underrepresented minority students to the same level as the overall engineering student cohort.
Graduate Studies

Attainment of the college’s goals is dependent on the excellence of its graduate programs and the accomplishments of its graduate students. Graduate students are colleagues in research and teaching as well as students in classes, laboratories, and seminars. The educational environment is enhanced and enriched by their work as teaching assistants and their accomplishments in graduate research. Successful recruitment of the very best graduate students is essential for realizing the college’s vision. A significant increase in the number of graduate fellowships and graduate research and teaching assistantships is part of the college’s strategy for achieving preeminence in both research and education. The college’s goal is to have every first-year Ph.D. student supported on a graduate fellowship.

The effectiveness and reputation of the graduate program is dependent on excellence in both research and graduate education. Students pursuing graduate degrees are particularly influenced by the vitality of the research enterprise and mentorship of faculty advisors. The college aspires to provide a research environment that is the very best in the nation, enabling research discoveries that lead the world in their importance and impact. Strategies for achieving these goals include doubling research funding, significantly enhancing the physical infrastructure to provide world-class facilities, providing a climate for graduate study and research that enables success, and recruiting the very best faculty and graduate students.

The Master of Engineering program at Cornell University is nationally unique in its creative scope and structure. The program serves students, industry, and the nation by providing students with the opportunity to enhance their engineering knowledge and expertise in innovative areas of market demand. The program is one component of the college’s commitment to Cornell’s land grant mission. The Master of Engineering program provides the opportunity for a fifth year of specialization and, for some students, is a bridge to the M.S./Ph.D. degree program.

Graduate Studies Objectives

Objective A: Increase the number of Ph.D. students.

- Double the number of available Ph.D. fellowships, with an emphasis on opportunities for underrepresented minority and women students. Increase the flexibility given to departments and graduate fields in administering fellowships. Provide a fellowship for every first-year Ph.D. student in the College of Engineering;

- Significantly grow the Ph.D. program, particularly in the six areas of strategic focus: advanced materials, information science, nanoscience, bioengineering, complex systems, and energy and the environment; and
Increase underrepresented minority graduate students from 4 to at least 7 percent, and women graduate students from 21 to at least 30 percent.

Objective B: Improve the infrastructure to support graduate students.

- Implement workshops for professional development;
- Improve the physical work environment for all graduate students, including Master of Engineering students, and provide quality space for graduate student collaboration and student events; and
- Enhance career services assistance available to graduate students.

Objective C: Improve the graduate student academic and community experience.

- Create media to communicate graduate student responsibilities, expectations, and opportunities in the College of Engineering;
- Support the Engineering Graduate Student Association (EGSA) with regular meetings of graduate students, faculty, and leadership of the college; and
- Design and implement an exit interview process for graduate students in order to continuously improve the academic and research experience.

Objective D: Strengthen the quality and impact of the Master of Engineering programs.

- Increase the selectivity of the Master of Engineering programs through effective recruiting of outstanding students;
- Conduct a review of each Master of Engineering program and implement strategies for enhancing each program;
- Utilize the Master of Engineering programs to further enhance the undergraduate and M.S./Ph.D. programs;
- Evaluate the impact of each program on department resources, faculty, students, and employers, and achieve an appropriate Master of Engineering program size in each field; and
- Create a vibrant and supportive environment for students enrolled in Master of Engineering programs.
Staff

Staff members work with faculty, students, alumni, representatives of industry, government, and other constituencies to fulfill the mission of the College of Engineering. They are valued as essential members of the college community and recognized for their excellent abilities and significant contributions. Their knowledge, skills, experience, and commitment make possible the operation of the college and allow faculty to concentrate on teaching and research and students to focus on learning. As the college emphasizes collaborative learning and teamwork, the staff’s partnership with the faculty is a visible model of their shared commitment to excellence.

To this end, the College of Engineering will recruit, retain, and promote highly qualified staff members and provide them with a positive and healthy work environment. In a time of rapidly changing work performance, expectations have become increasingly complex and technical. The new demands and expanded responsibilities placed on staff require updated facilities, equipment, and tools to support their work. A positive work climate is also supported by setting reasonable performance expectations and workloads, establishing rewards and fair compensation that are linked to performance, and providing frequent opportunities to develop and refresh skills.

As the college emphasizes collaborative learning and teamwork, the staff’s partnership with the faculty is a visible model of their shared commitment to excellence.

The responsibility for fostering a productive and enjoyable work environment and ultimately the success of the college is shared by all.

Staff Objectives

Objective A: Increase the job satisfaction and retention of staff members with the experience, skills, and professionalism to support the college goals.

- Increase staff size based on growth of the college’s research enterprise, creation of new programs and departments, and increase in the number of faculty members;
- Provide staff members with appropriate facilities, equipment, and software;
- Set reasonable workloads and regularly evaluate staff responsibilities during times of change;
- Implement a college evaluation process to improve work cycles, cost efficiency, consistency, and productivity;
Celebrate and reward excellence in innovation, leadership, initiative, efficiency, quality, and productivity; and

Conduct regular exit interviews and address retention issues.

Objective B: Continuously improve the work climate.

- Develop, articulate, and adopt a Statement of Workplace Values that acknowledges staff members as full partners in the college’s success;

- Implement a new and consistent college-wide employee orientation program;

- Support work-life balance through the application of flexible policies (flexplace, flextime, job sharing), stress management training, and attendance at university health-related events and programs to support a healthy workforce; and

- Sponsor events, programs, and facilities that develop a cohesive college community.

Objective C: Improve the quality and diversity of staff through continuous professional development and enhanced recruitment.

- Develop a staff diversity plan specific to the college and a process for evaluating progress toward its goals;

- Train search committees in processes and techniques that improve the quality and diversity of the applicant pool and hiring decisions; and

- Communicate Cornell’s “Human Resources Model of Staff Skills for Success” and offer staff members and faculty supervisors and managers the opportunity for training and skill enhancement required for professional development.
Alumni

The College of Engineering is enriched by the commitment and support of its 30,000 living alumni who directly interact with the college as employers of graduating students, admissions recruiters, employers of faculty members in consulting assignments, and mentors for summer and cooperative studies interns. They participate as leaders in local Cornell Clubs and as members of school advisory councils, the Cornell Engineering Alumni Association Board, the Cornell University Council, and the Cornell Board of Trustees. Just as important, alumni serve as distinguished classroom guest speakers and generously support the college with their personal resources. This wealth of alumni effort, goodwill, and enthusiasm will be invaluable as the College of Engineering moves forward with its ambitious goals.

The achievement of strategic goals will strengthen the college’s reputation internationally, while making a positive impact on peoples’ lives. A stronger College of Engineering also increases the value of all alumni degrees. Therefore, not only for personal reasons but also for the betterment of society as a whole, alumni have strongly endorsed these goals and have pledged to help the college achieve its vision. The Cornell Engineering Alumni Association (CEAA), formerly the Cornell Society of Engineers, has for 100 years served an important role as the college’s alumni organization. CEAA has committed to serve as the catalyst for the accomplishment of the following alumni objectives.

**Alumni Objectives**

**Objective A: Engage alumni in recruiting the best possible students to Cornell.**

- Work with Cornell Alumni Admissions Ambassadors and Engineering Admissions to provide an active role for alumni.

**Objective B: Promote alumni networking with engineering students and graduates.**

- Work with Engineering Cooperative Education and Career Services to identify alumni mentors for students who wish to intern or co-op; and
- Work with Engineering Cooperative Education and Career Services to identify and involve alumni interested in recruiting Cornell Engineering graduates for permanent jobs, internships, or co-op assignments.
Objective C: Involve alumni in projects that enhance the experiential goal of undergraduate curricula and Master of Engineering design projects.

- Organize alumni to work in partnership with faculty to match industry projects with course-work requirements.

Objective D: Promote Cornell Engineering alumni support for fellowships for engineering graduate students of high merit and scholarships for undergraduates; encourage alumni support for other college priorities.

- Work with the Cornell Alumni Affairs and Development division to identify individual prospects;
- Publicize giving opportunities for alumni in concert with Alumni Affairs and Development; and
- Engage a higher percentage of engineering graduates in the alumni association.

Objective E: Encourage alumni involvement in faculty research, consulting assignments, and opportunities for sabbatical experience.
Appendix: Planning Process

In 2003 the College of Engineering commenced a collaborative strategic planning process. A Strategic Planning and Advisory Council (SPAC) was formed, comprising faculty members and representatives from undergraduate student, graduate student, alumni, and staff constituency groups.

The council was responsible for coordinating the planning process, identifying college-wide priorities and metrics, developing criteria to prioritize department strategic initiatives, recommending the prioritization and funding of those initiatives, and writing the draft strategic plan.

Five advisory committees assisted the SPAC. Four of these committees had representatives on the SPAC (undergraduate student, graduate student, alumni, and staff). A Faculty Advisory Committee was formed to ensure additional faculty participation with a focus on including center directors and assistant professors. The SPAC also established task forces to focus on graduate studies, faculty, and facilities.

Guidelines for the development of academic department strategic plans were drafted as the college planning structure was formed. Non-academic units were also encouraged to develop strategic plans and adapt the guidelines as necessary to meet their unique needs.

Concurrent with the development of their strategic plans, academic departments also developed facility plans and priority funding lists. As part of its charge, the Facilities Task Force reviewed these documents. In preparation for the upcoming university capital campaign, academic units also submitted departmental priority funding lists. The academic unit strategic plans, facilities plans, and capital campaign funding priority lists were submitted to the SPAC in Spring 2003.

The drafts of the College of Engineering Strategic Plan were shared with directors and chairs and a small group of faculty members for further review prior to its release to the general engineering community. In fall 2003 the draft plan was presented to the College of Engineering faculty, staff, and students. Alumni were asked for feedback in late fall 2003. Feedback from these constituency groups was discussed by the SPAC and college deans and appropriately incorporated into the plan.

Complete drafts of the Strategic Plan were distributed to students, faculty, staff, and alumni for additional comment in the spring of 2004.

The college is fortunate to have exceptional faculty, staff, students, and alumni. Their leadership and commitment will enable the aspirations of this plan to become reality.
The College of Engineering wishes to thank all who were involved in the development of this ambitious and important planning document. Their input has been invaluable; their time, expertise, and knowledge, greatly appreciated. This plan is a testament to the cooperative and collaborative process that is a hallmark of the College of Engineering and Cornell University.

A complete list of participants is provided on the web site: www.engineering.cornell.edu/strategicplan.