

# 1. INTRODUCTION

The University of Illinois at Chicago (UIC) is one of Illinois' two public-assisted comprehensive research universities, and the largest public university in the city of Chicago. UIC has about 25,000 students (16,000 undergraduates, 6,800 graduate students, and 2,200 professional students) with a total budget of \$1.3 billion, and annual research expenditures exceeding \$250 million.

The UIC College of Engineering is recognized for its academic excellence with undergraduate and graduate programs in its six academic departments: Bioengineering, Chemical Engineering, Civil and Materials Engineering, Computer Science, Electrical and Computer Engineering, and Mechanical and Industrial Engineering. The College of Engineering has 114 faculty, 1,684 undergraduate and 860 graduate students. About 39 of the College's faculty are Fellows of their societies, about 20 are National Science Foundation CAREER or Presidential Young Investigator Award winners, and more than 10 are Editors-in-chief of major research journals. The research programs at the UIC College of Engineering have been growing rapidly over the years and are conducted in six departments and eight interdisciplinary centers. During 2003-04, the total research expenditures for the College was about \$21 million.

In the 21<sup>st</sup> century, engineering schools across the nation are facing numerous challenges both within and outside the academic setting. Many disciplines of engineering are undergoing rapid and pervasive changes, and many aspects of modern life are becoming increasingly dependent on emerging technologies and the scientific framework in which they evolve. The explosion of the computing and communications industry, access to tremendous amounts of information and computing resources in research, rapid advances in the fields of nano-technology and bio-technology, new national security challenges, expanded economic competition, urgent public health needs, and a growing global awareness of environmental deterioration bring new opportunities for varied careers in engineering. We expect our students to continue the expansion of fundamental knowledge and apply their knowledge to the world. The world of work has become more interdisciplinary, collaborative, and global. Hence engineering schools of the 21<sup>st</sup> century need to produce young engineers who are adaptable and flexible, as well as technically proficient.

The College of Engineering at the University of Illinois at Chicago is a strong engineering school and is poised to be one of the premier schools of engineering in Chicago, in the State of Illinois, and in the country. The College of Engineering was ranked 60th overall in US News and World Report rankings of Graduate Programs during 2004. Although we may argue that the US News rankings are not very scientific, our constituents, namely, our students, the parents of students, prospective new faculty, companies recruiting our students, and agencies funding our research all look at these rankings. Our challenge is to figure out a strategy to become more agile and responsive to the nation's needs and provide a truly remarkable student experience so that we can enhance our position of strength and reputation in the nation.

It is well known that the top engineering schools are much larger in terms of faculty size, Ph.D. production, research publications, and research funding. For example top ranked MIT has 350 research active faculty, 1400 Ph.D. students, 200 Ph.D. graduates per year, and \$241 million in research funding (\$685,000 per faculty). Second ranked Stanford has 165 faculty, 825 Ph.D. students, 229 Ph.D. graduates per year, and \$120 million in research funding (\$730,000 per faculty). Third ranked UIUC has 360 research active faculty, 1500 Ph.D. students, 186 Ph.D. graduates per year, and \$213 million in funding (\$590,000 per faculty). Fourth ranked Berkeley had 212 research active faculty, 1200 Ph.D. students, 186 Ph.D. graduates per year, and \$121 million in funding (\$571,000 per faculty). Fifth ranked Georgia Tech has 477 research active faculty, 1900 Ph.D. students, 179 Ph.D. graduates per year, and \$187 million in funding (\$392,000 per faculty).

In comparison, UIC is quite small, and has about 100 research active faculty, 422 Ph.D. students, 35 Ph.D. graduates per year, and \$21 million in funding (\$200,000 per active research faculty). However, one does not always have to be a large college to be highly ranked. For example, Caltech has 96 research active faculty, 461 Ph.D. students, 57 Ph.D. graduates per year, and \$48 million in funding (\$500,000 of funding per faculty). Princeton has 127 faculty, 482 Ph.D. students, 51 Ph.D. graduates per year, and \$56 million in funding (\$442,000 in research funding per faculty). The key approach to improve in rankings and reputation is through growing *selective areas of excellence*. We elaborate on this further in the strategic plan later in this document in Chapter 2 and Chapter 3.

Global competitiveness requires that our engineering college contribute substantially to the diverse high technology of the State of Illinois. We need to do so through participation in broad economic development projects, the University of Illinois at Chicago's Great Cities program, and through our intellectual property development and collaboration with the Office of Technology Management, among others. Another basis for our competitive ability will be our strong partnerships with industry which provide both research support and student support.

One of the unique aspects of UIC is that it is a comprehensive research university, yet it greatly values undergraduate education and is committed to making its education available to students of all backgrounds. One challenge is to continuously improve in research and graduate studies without compromising the quality of our undergraduate education. Another challenge is that of the relatively small size of the school. The strongest engineering schools are typically much larger in terms of the size of the faculty, the student body, and the size of their research programs. Since the size of the engineering school is not expected to double or triple in either the size of the faculty, or the student population, or space, the challenge is in developing a strategy to improve the school's reputation and rankings without significantly increasing the size of the school. A third challenge is that the UIC COE has been tremendously resource limited in terms of support of endowed chairs for faculty, faculty startup packages, matching grants for faculty research, space for instruction and research, graduate student fellowships and teaching assistantships, and laboratory and computing facilities. In view of the recent economic downturn, it has been difficult raising funding for support of many of these activities in the recent past. However, as the economy is turning around, there is an

opportunity to raise funds from wealthy alumni and profitable corporations. During the past leadership of Dean Larry Kennedy, the College made major strides in transforming itself into a major research enterprise. The College is now ready to take on the new challenge.

The strategic plan described in this document is a clearly articulated strategy of what the College of Engineering should do in the next five years.

### ***1.1. Vision for UIC College of Engineering***

UIC seeks to embody the ideal of a public university: to cultivate the highest intellectual ambitions of faculty, students and staff and, at the same time, contribute to the making of a more egalitarian society. We will be a resource and destination accessible to all who share our ambitions and have the desire to excel. We seek to be a leading research university and a great urban institution, taking advantage of the opportunities and needs presented to and by the state of Illinois and the city of Chicago. The UIC College of Engineering wishes to contribute to the overall vision of UIC by helping to educate students for careers of leadership and innovation in engineering and related fields; by expanding the base of engineering knowledge through original research, by developing technology to serve the needs of society; and by benefiting the public through service to industry, government and the engineering profession.

### ***1.2. Mission Statement for UIC College of Engineering***

The Mission of the UIC College of Engineering is to address the needs of the State and nation through excellence in education, research, and service; to educate students for careers of leadership and innovation in engineering and related fields; to expand the base of engineering knowledge through original research, developing technology to serve the needs of society; and to benefit the public through service to industry, government and the engineering profession.

### ***1.3. Objectives for the College of Engineering for 2010***

The specific objectives for the UIC COE over the next six years should be:

- To support UIC's public university mission of Teaching, Research, and Service, for Illinois, the nation, and the Great Cities Commitment to Chicago;
- To recruit, promote, mentor and retain a faculty of world-leading quality;
- To attract the best undergraduate and graduate students into the school;
- To provide a relevant, exciting, high-quality undergraduate and graduate education that produces young engineers who are adaptable and flexible, as well as technically proficient;
- To train and place our students in the top industries, government agencies, and universities;
- To become recognized as a research school through high impact research, scholarly publications, and interdisciplinary research in emerging technologies;

- To have excellent ties to industries and government agencies in the form of research support, technology transfer and student placement;
- To have long term and fruitful relations with our alumni;
- Provide a world-class infrastructure of labs and classrooms, allowing top quality research and teaching to flourish;
- Assure that excellence and diversity are reflected in the faculty, staff, and student body.

#### ***1.4. Strengths and Weaknesses of UIC and College of Engineering***

We now list the strengths of the UIC College of Engineering:

- Location in the city of Chicago, and excellent connections to other cities in the US through O'Hare and Midway airports.
- A very high quality faculty (out of 114 faculty, 39 are Fellows of their societies, 19 are NSF CAREER award winners, and 11 are Editors-in-Chief of Journals)
- Ability to attract excellent faculty; because of the urban location, there is a high quality of life, great cultural attractions, and a large array of spousal job opportunities.
- Proximity to industry in Chicago and neighboring areas; hence the ability for faculty to perform industry relevant research, and for students to be placed in these companies.
- Proximity to a large UIC Medical School, and ability of the COE faculty to do interdisciplinary research in bio-technology related areas.

We now list the weaknesses of the UIC College of Engineering:

- Image of UIC as a “commuter school” because of its urban location; lack of on campus housing makes it difficult to attract undergraduates; there are not enough dormitory rooms for students.
- Currently, the average age of our alumni base is 41 years. From a fund raising perspective, this is quite young. In the near term, this represents a significant challenge for our fund raising activities.
- UIC College of Engineering is dwarfed by the UIUC College of Engineering in terms of size and reputation.
- UIC College of Engineering is ranked 60<sup>th</sup> nationally, and the public (wrongly) does not have the perception of a strong engineering college from a research perspective. UIC has competition in Chicago from Northwestern University and the Illinois Institute of Technology, in the state of Illinois from UIUC, and in the midwest from the Big Ten institutions. It is hard to change perceptions.
- The campus landscape is not terribly impressive; hence students and their parents are not captivated at first glance; most of the buildings are old.

- Contradiction of access and excellence. UIC has an overall mission of providing education to students from all financial backgrounds, hence there is a perceived tension between admission standards and the mission of making engineering education accessible to the widest possible community. In the future, we must recognize that access to excellence strengthens UIC's mission.
- Legislatures in the State of Illinois have believed that the state can only afford to support one strong engineering school, i.e., UIUC; however, one needs only to look toward other states like California with multiple highly ranked colleges of engineering (Berkeley, UCLA, UC, Santa Barbara, UC, San Diego, and UC, Irvine), Michigan (with the University of Michigan and Michigan State University), and Iowa (with the University of Iowa and Iowa State University). The realities facing us today and in the future demand a huge supply of creative and well trained engineers. An accessible, highly ranked state College of Engineering in Illinois' largest metropolitan area seems an obvious answer to this need.

### **1.5. Relationship to UIC 2010 Strategic Thinking Plan**

The Chancellor and Provost of the University of Illinois at Chicago have established a UIC 2010 Strategic Thinking Program for developing a vision of where UIC plans to be in 2010.

UIC 2010 Strategic Thinking has five parts:

- **Vision.** The vision provides a view of UIC that acknowledges where we have been, registers our experiences in the moment and challenges us to shape a future with a focus but without limits.
- **Mission and Values.** This discussion provides direction toward our vision and begins to identify the standards by which we will measure "success" at UIC.
  - The very best of what UIC can become by 2010 will be imbued with the values of: *Knowledge, Access, Openness, Excellence* and *Collaboration*.
- **Environment.** This section explores the physical condition of UIC, its architectural and developmental role in the city of Chicago, the goals and themes of our physical environment and the planning that will lead UIC to excel as a great urban institution. This section deals with the following.
  - **CAMPUS AESTHETIC:** In 2010, the UIC campus will be recognized as a premier site of urban architecture.
  - **CITY AS CAMPUS, CAMPUS AS CITY:** In 2010, UIC's activities will continue to extend beyond its conventional boundaries into the surrounding community.
  - **TECHNOLOGY:** In 2010, the best communication and computer technology will support and enhance our mission.
  - **CAMPUS INTEGRATION:** In 2010, UIC will function as an integrated whole: physically, architecturally and substantively.
  - **CARE OF OUR CAMPUS:** In 2010, the care and maintenance of our working environment will be a part of UIC's culture.

- **People.** This section reports on the people of UIC encompassing students, faculty, staff and visitors, describing the demands of instruction, research and support. We identify key themes of current life at UIC and offer a set of targeted objectives for 2010. This section deals with the following.
  - STUDENTS: In 2010, recruitment, mentoring and teaching will support students who reflect the diverse and global nature of our Great Cities and seek the excellence of a major research university.
  - FACULTY: In 2010, faculty will be recruited, supported, recognized and rewarded according to clearly articulated assessments of achievement and in accordance with their contributions to the vision, mission and values of UIC.
  - ACADEMIC PROFESSIONALS AND STAFF: In 2010, UIC's academic professionals and staff will be clear partners in the mission of UIC, sustaining a culture of mutual support with students and faculty.
  - ALUMNI, DONORS AND EXTERNAL CONSTITUENCIES: In 2010, UIC's alumni, friends and supporters, along with extensive networks of government, business, community and research organizations, will be key partners in the university's development and success.
- **Institution.** This section examines the administrative, managerial and financial infrastructure necessary to support UIC and its diverse constituencies in reaching the vision and fulfilling our mission. While these structures and processes are not as visible as buildings and people, they evoked some of the most passionate calls for change. This section deals with the following.
  - GOVERNANCE: In 2010, UIC governance will support the institution's vision, mission and values.
  - PROCESSES AND INFRASTRUCTURE: In 2010, administrative processes and infrastructure operations will be reengineered to effectively and efficiently support the core functions of UIC and the operation of the university as one integrated campus. Specifically:
    - Business office support operations, particularly human resources transactions, will meet best practice standards.
    - Research support infrastructure will provide accurate and timely response to the needs of sponsored research.
    - Physical facility management and maintenance will meet best practice standards.
  - RESOURCES AND DEVELOPMENT: In 2010, a broader funding base will reduce the impact of shortfalls in any one source.

The College of Engineering Strategic Plan for 2010 is a very detailed action oriented plan with specific goals and objectives for many of the issues that are specific to the College of Engineering.

### **1.6. Process of Developing the Strategic Plan in the College of Engineering for 2010**

The Dean of Engineering has appointed a Strategic Planning Committee consisting of the six Department Heads, the Associate and Assistant Deans, and the Executive Committee of the College of Engineering.

The members of this committee include:

- Prith Banerjee, Dean of Engineering
- Richard Magin , Head of Bioengineering
- Sohail Murad, Head of Chemical Engineering
- Farhad Ansari, Head of Civil and Materials Engineering
- Peter Nelson, Head of Computer Science
- Mitra Dutta, Head of Electrical and Computer Engineering
- William Worek, Head of Mechanical and Industrial Engineering
- Michael Stroschio, Professor, BioE
- Raffi Turian, Professor, ChE
- Mohsen Issa, Professor, CME
- Clement Yu, Professor, CS
- Ouri Wolfson, Professor, CS
- Gyungho Lee, Professor, ECE
- Daniel Graupe, Professor, ECE
- Ken Brezinsky, Professor, MIE
- Sol Shatz , Assoc. Dean, Graduate Studies and Research
- Krishna Gupta, Associate Dean for Undergraduate Studies
- George Uslenghi, Associate Dean for MENG and International Programs
- Ralph Pini, Associate Dean for Corporate Relations and Career Placement
- Richard Alpern, Associate Dean for Administration
- Mark Jones, Assistant Dean for Development and Alumni Relations

This committee has met on the second and fourth Tuesday of each month during August, September, October, November and December 2004 to develop this plan.

In order to prepare for the strategic plan of the College, the Dean has met with all the faculty of the College individually during June, July, August and September 2004. During these meetings, the faculty were asked to list three strengths and three weaknesses of the department and the university, and what the Dean's office can do to improve the College. The Dean solicited feedback on the strategic plan from the faculty during faculty meetings held on September 9, October 21, December 8, 2004, and December 15, 2004, and January 13, 2005.

The Dean also solicited feedback on various components of the plan from the Deans of other Colleges in individual meetings with the Deans during September and October, 2004, and during a Dean's Luncheon on November 16, 2004.

The Dean has also updated the Provost and various Vice Provosts on various aspects of the plan during individual meetings during October and November, 2004.

The Dean presented the strategic plan to various alumni of the College on September 28, October 19, and November 17, 2004.

In addition, the Dean presented the strategic plan to the staff of the College on December 16, 2004.

Finally, the Dean solicited feedback from the undergraduate and graduate students of the College in 12 separate meetings by departments and by ranks (undergrads and grads) during January and February 2005.

This strategic plan has therefore been vetted by all the constituents of the College of Engineering (faculty, staff, students, alumni and administrators).

**The College Executive Committee voted (8 Yes, 0 No) in support of the plan on Thursday Jan. 13, 2005 in a meeting from 10AM-12 noon.**

**The College of Engineering faculty vote voted using a secret ballot (94 Yes, 3 No, and 1 Abstain) in support of the plan on Thursday Jan. 13, 2005 in a meeting from 3-5PM.**

### ***1.7. Outline of the Strategic Plan Document***

The strategic plan is a clearly written document of where we are today, our strengths and weaknesses, specific objectives of where we want to be in 2010, and a clear roadmap of specific actions that need to be taken in order to achieve those objectives. The subsequent chapters describe various issues facing the college, namely, what we need to do in terms of faculty, research, undergraduate programs, graduate programs, professional programs, corporate and alumni relations, laboratories and space, administration and staff, and marketing.

Specifically the document is organized as follows:

- Chapter 2: Faculty
- Chapter 3: Research
- Chapter 4: Undergraduate Program
- Chapter 5: Graduate Program
- Chapter 6: Professional Masters and International Programs
- Chapter 7: Corporate and Alumni Relations
- Chapter 8: Marketing and Rankings
- Chapter 9: Space and Infrastructure
- Chapter 10: Administration and Staff
- Chapter 11: Financial Plan



### ***1.8. Annual Review of the Plan***

The strategic plan 2010 document will be a working document for the College for the next 5 years. We will review the progress and plan annually. We will make adjustments to the plan as we feel is necessary in order to adapt the plan to the changing conditions facing our college.