VISION

To be internationally recognized as the Chemical and Biological Engineering department that best exemplifies the dual commitment of outstanding research and serving students.

MISSION

Provide a high-quality education in chemical and biological engineering at the undergraduate and graduate levels that prepares graduates for a productive career in engineering and related fields, and for life as educated, effective citizens. Discover and disseminate new knowledge in science and engineering through creative activity in research and scholarship. Serve the state, nation, and world by advancing the profession of chemical engineering and improving the quality of life.

DEPARTMENTAL ROLE

The Chemical and Biological Engineering Department plays an important strategic role in many parts of the University mission and in Iowa development efforts. In particular, Iowa State University’s as well as the College of Engineering’s vision emphasizes the 2050 Challenge\(^1\) – being able to provide solutions to humanity’s challenges in the Year 2050, in a globally sustainable way. Work done in the CBE department at ISU closely aligns with the goals of the 2050 Challenge, and we are poised to play a major role in this area. An example of the key role played by the department in this area is in the leadership of the first ever National Science Foundation Engineering Research Center at ISU, focused on “Chemicals from Biorenewables”. Such ventures increase the international visibility of work done at ISU in this area, foster economic development, and provide sustainable solutions to the 2050 Challenge. The department will also continue to play an important role in the education of students to be effective practitioners in a global setting in a shrinking world.

\(^1\) In the year 2050, critical challenges that must be met will include renewable non polluting energy, abundant clean water, access to modern health care, sustainable agriculture and manufacturing, safe roads and bridges. We are looking ahead to address these problems through state-of-the-art research, and by educating the future leaders who will tackle these challenges.
PRIORITIES FOR 2008-13

Our priorities focus on becoming the best department known for outstanding research and for serving students. The Chemical and Biological Engineering Department has a superb undergraduate program in which we take great pride, and which we will continue to develop. However, chemical engineering is rapidly expanding into new areas of research and employment opportunities. For our students to become leaders in these new areas as well as traditional areas, we must expand our research and our educational offerings further into these areas. We have therefore expressed our primary goals in this section as those that will add stature and intellectual diversity to our research portfolio and our graduate program. These goals have been identified to reinforce our existing strengths and to pursue our vision.

RESEARCH

We view as extremely important that the Department’s research program be highly regarded within the chemical engineering academic community. This perception impacts decisively undergraduate as well as graduate education, since it strongly influences the attractiveness of the program to outstanding faculty candidates and students. Accordingly, maintaining the perception of quality on a year-to-year basis is an important component for the continuation of high standards of scholarship.

The position of the Department in nationally publicized rankings of graduate programs is a useful indicator of academic recognition. Moreover, as these rankings strongly influence graduate applications, they are important in themselves. In the most influential of these that published by the National Research Council, the Department’s position dropped from 21 in the 1982 report to 32 in the most recent 1995 report. Therefore, to remain competitive in recruitment of faculty and students, we aim to become one of the top 20 graduate programs in graduate rankings.

While excellence in scholarship is the essential goal of our department, we believe that a program’s perceived quality is determined in large part by the visibility of its faculty in the academic research and industrial communities. Visibility can be increased by new high-profile hires as well as by strategically enhancing the exposure of the present faculty. There is also a correlation to the number of doctoral degrees produced. Therefore funding, which determines degree productivity, can increase recognition. Here we present goals and strategies that will impact each of these factors, along with metrics that will measure our progress towards these goals.

Specific Goals, Strategies and Metrics

Faculty recruitment and retention. We will take advantage of the cluster hiring opportunities at the College and University levels to hire outstanding senior-level faculty in strategic areas, who will have an immediate impact on the departmental profile.

Strategies:

• Seek to hire new faculty members that leverage interdisciplinary and cluster hiring efforts in strategic areas supported by Iowa State University. To assist hiring effectiveness, effectively publicizing our research strengths and opportunities from
collaborations and shared facilities in these areas, and our unique dual focus on excellence in undergraduate and graduate programs.

- Make it a top priority to retain our outstanding faculty through partnerships with Central administration.
- Mentor young faculty and help them succeed

**Metrics:** Number and quality of new hires, faculty retention

Enhancing research productivity and interdisciplinary research. We will target increase in our overall research funding by 20%. Through multi-disciplinary centers, new resources and collaborations can be quickly made available to faculty candidates in compatible research areas and greatly increase the visibility of ISU CBE research in that area and positively impact perception. This provides an opportunity to attract talented young as well as senior faculty, and would also increase the doctoral degree production of the Department. They also provide significantly increased opportunities for developing industrial interactions, which would have a synergistic effect on hiring, funding and student placement. They can help leverage College and University funds, especially if they are aligned with the College and University priority areas. These thrusts do not decrease the critical importance of individual investigator funding to the success of the graduate program and its recognition. Pursuing multi-investigator funding opportunities will enhance the Department’s overall productivity in graduate research and education.

**Strategies:**

Develop world-renowned research programs in targeted topical areas such as biorenewables, biomaterials, polymers, computational fluid dynamics, and electrochemical materials with critical mass of faculty in these areas to pursue large Center-type opportunities

- Individual faculty will step forward to assume responsibility for organizing multi-investigator center-type research proposals, and learn from recent departmental successes in establishing the first ever NSF-Engineering Research Center, a DOD MURI grant, an NSF-NIRT grant, the Keck Laboratory, and other examples. Examples are efforts already underway in the areas of Food Safety and Security, Computational and Reaction Engineering, and other initiatives.

- Other opportunities that present themselves, either based on new agency priorities or faculty initiatives, will be strongly supported by the department. Agency programs soliciting multi-investigator grant proposals include NSF-IGERT, NIH training grants, NSF ERC and STC, and others.

- Foster development of multi-investigator grant proposals with junior faculty as co-PIs. The feedback from the group will help young faculty sharpen the focus of their research area.

**Metrics:** Overall research funding/faculty, number and size of multi-investigator grants, jointly authored publications, interdisciplinary mentoring of students, growth in research
support for specific areas, invited presentations, recruitment of senior faculty, number of publications, number of awards.

**Increase visibility.** The department has added several new faculty in the past few years, but the rankings have remained constant for the past ten years because we have not done enough to publicize our successes. The department will be proactive in enhancing the visibility of the faculty, the students and the research work in the department.

**Strategies:**

- Initiate a concerted effort to nominate faculty and students for ISU as well as national and international awards, including fellowships in societies.

- Work closely with Engineering communications and marketing to do a better job of press releases related to significant research accomplishments in the Department.

- Actively encourage faculty to take on leadership roles in professional societies, editorships of journals, etc.

- Pursue distance education mechanisms and a more dynamic cyber presence.

**Metrics:** National and international awards, fellowships in professional societies, elected and appointed offices in professional societies, invited talks, chairmanships of sessions, organization of meetings and symposia, book authorships, participation of faculty on committees of professional societies.

**Development.** Our top fundraising priorities (endowed chairs, graduate fellowships, research laboratory renovation and faculty start-up funds) all strongly support increasing Departmental recognition and research productivity, and attracting and retaining talented faculty and students and enhancing research productivity.

**Strategies:**

- One or two individuals (led by the Chair) will work with the department as a whole, and with college development personnel to maximize the productivity toward the department’s fundraising goals. This would require development of a case of indisputable need, urgency and opportunity; funding categories and priorities; and a single, clearly articulated story that everyone can support and state easily to take to individuals, foundations and commercial organizations. This would build on CBE’s unique combination of strengths (excellence in scholarship and service to students), with explicit case histories.

- Develop ongoing relationships between faculty and alumni

- Seek funding for specific projects from philanthropic organizations and foundations

**Metrics:** Number and value of graduate fellowships, endowed Chairs/professorships, amount in CBE Excellence fund, and undergraduate scholarships. Support for upgrading facilities and infrastructure.
UNDERGRADUATE AND GRADUATE EDUCATION

A very important component of our vision is serving students, and this has always been an key feature of our department. For example, we are unusual among peer competitive departments in our high frequency of core course offerings, small class sizes that maximize student-faculty contact, a high level of integration with cooperative and intern programs, and extensive participation in undergraduate research. Our overall goal is to foster a large and diverse student body of high quality that will realize its full potential, and generate future leaders.

Specific Goals, Strategies and Metrics

Make ISU CBE the destination of choice. We will grow our student body at the graduate and undergraduate levels and recruit a diverse student population by making the CBE Department the clear destination of choice for students from surrounding states and the destination of choice for graduate students nationally and internationally by providing unique opportunities and an excellent learning and research environment. Size is correlated to rankings, and larger student bodies will also enable better employment opportunities for students after graduation. We will target a 20% increase in doctoral degree production.

Strategies:

- Emphasis on the student, emphasis on the curriculum
- Make transitions from community colleges to ISU CBE seamless
- Be proactive about increasing the visibility of the undergraduate and graduate programs and the unique opportunities offered in the Department.
- Work closely with the College and University to promote a diverse student body
- Take advantage of distance education mechanisms and other means to target a broader student population
- Graduate fellowships to attract quality graduate students
- Identify and effectively publicize our strengths relative to regional and national competitors (including case histories of individual students).

Metrics: enrollment figures, degree production figures, numbers of women and underrepresented minorities,

Foster an energized learning and research environment. We will provide unique and well rounded experiences to our graduates as well as opportunities involving entrepreneurship, leadership and addressing sociotechnological challenges facing us in the future as summarized in the 2050 Challenge. We will develop new example applications from non-traditional areas of chemical engineering and use them in the traditional curriculum to broaden the fundamental technical skills and employment opportunities of our graduates.

Strategies:

- Provide unique leadership opportunities through the Engineering Leadership and Policy Institute and other venues
- Effective engagement with communities beyond academia, including industry
- Use of active learning principles in our classes, undergraduate research
opportunities, supporting co-op/intern experience, opportunities for international experiences.

- Unique opportunities for graduate students through the Centers, Ames Laboratory and graduate training grants

**Metrics:** student exit interviews, alumni surveys, number of industrially sponsored senior design projects, webinars, workshops, distance education courses and other mechanisms targeted towards an industrial audience

We will periodically compare our metrics with those of our peer institutions