



COLLEGE OF ENGINEERING

Budget Request Fiscal Year 2009

ENGINEERING
FUNDAMENTALS

Engineering
Fundamentals
An Introduction
to Engineering

Chapter 5
International
Engineering

FY 2009 BUDGET REQUEST

SECTION I – ANNUAL BUDGET PRIORITIES

1. Progress Report on FY08 Goals:

- A. GOAL: Continue to redirect selected faculty lines to the strategic areas of nano technology, bio technology, and information engineering. Concentrate recruitment efforts to include possible candidates for Governor's chairs of excellence. Begin work to identify superior individuals to fill the College's two vacant chairs of excellence and two professorships.

PROGRESS: Fourteen new faculty members have been appointed for the 2007-2008 academic year in the strategic areas of nanotechnology, biotechnology, and information engineering as well as in other areas of high priority: Chemical & Biomolecular Engineering – 2; Civil & Environmental Engineering – 2; Electrical Engineering & Computer Science – 2 (including Head); Industrial & Information Engineering – 2; Materials Science & Engineering – 2; Mechanical, Aerospace, & Biomedical Engineering – 2; and Nuclear Engineering – 2. In addition, ten faculty searches are in various stages of the process, with a tentative estimate of seven vacancies being filled for Fall '08.

Regarding the chairs of excellence, one candidate interviewed with the MABE faculty in April 2007, for the Condra Chair of Excellence. He has expressed strong interest in joining the College, and the hiring process is in its final stage of negotiation. Also, the College continues to work with the University regarding the Governor's chairs. Two individuals in the area of Computational Sciences were interviewed during 2007.

- B. GOAL: A long-term goal is to increase numbers of graduates at all levels, which requires increasing enrollment and improvement in retention and graduation rates. Two emphasis areas for this year will be reviewing graduate programs to ensure that students do not spend excessively long times in their graduate program and reviewing practices to improve retention and graduation rates. In addition, increasing support for graduate teaching assistants in some programs will be a priority.

PROGRESS: The graduate programs are currently being reviewed to establish better ways to recruit domestic and international students. Efforts have resulted in establishing a 5-year BS/MS program, a proposal for joint doctoral programs with other universities, and direct recruitment at student conferences such as Tau Beta Pi. The College has emphasized the importance of timely completion of graduate degree requirements. A performance-based formula to determine GTA allocation among departments was developed this year and was discussed extensively with all department heads. The approved allocation formula will be implemented effective Fall '09. As a result of this review and an opportunity provided by the Provost office, the College requested additional GTA positions for three units: Materials Science and Engineering, Chemical and Biomolecular Engineering, and Engineering Fundamentals. The College recently received approval for four additional 25% GTA lines for FY 2009.

- C. GOAL: In concert with the University's campaign plan, the College will continue its efforts for establishing key gift calls and cultivation and solicitation of major gift prospects, with all activity targeted towards funding priorities for students, faculty, facilities and programs as outlined in the College's case statement. In addition, Engineering Development has operated for the past eighteen months with only one dedicated officer. During fiscal year 2008, the College plans to implement, with the help of the campus development office, additional development staff.

PROGRESS: The College has made good progress toward its \$75 million capital campaign goal with total donations through December 31, 2007, of \$34.6 million or 46% of the goal. Much of the success in maintaining momentum must be attributed directly to the College's Board of Advisors, since Engineering Development has been seriously understaffed for the past 2 ½ years, including having no development director since June 2007. Effective January 2008, Dorothy Bryson was appointed as Interim Senior Director for 12-18 months, with the searches for the director and assistant director still in progress.

- D. GOAL: Continue efforts for a smooth transition of the new Department of Electrical Engineering and Computer Science, including appointment of the new head. Other key areas for consideration include curriculum, budget and finance, space, human resources, and other logistical concerns, with time-sensitive changes to be implemented on an as-needed basis.

PROGRESS: A task force was appointed to ensure a smooth transition of the merger of the Department of Electrical and Computer Engineering and the Department of Computer Science. Key areas for consideration included curriculum, budget and finance, space, human resources, and other logistical concerns. A new business manager was hired in June 2007, and duties and responsibilities were reassigned among the support staff. The new Department of Electrical Engineering and Computer Science was formed effective July 1, 2007, and a new department head, Dr. Kevin Tomsovic, was hired effective January 1, 2008. Curriculum issues are being addressed on an on-going basis. Serious space concerns will persist for the College until the completion of the new Min Kao building.

- E. GOAL: Develop long-term strategy for research that will increase grants and contracts, increase support for graduate research assistants, and increase total revenues. This strategy will include a carefully designed and monitored plan for increasing the number of research faculty participating in departmental, college, and university wide institutes and centers such as JIAM, JICS, JINS, and JIBS.

PROGRESS: Expenditures from externally funded gifts, grants, and contracts for Knoxville-based faculty have increased from \$22M in FY03 to \$32.6M in FY07, an increase of 48% in five years. Total expenditures on a per tenure/tenure track basis have increased from \$191K/FTE in FY03 to \$276/FTE in FY07—an increase of 45% in five years. While research awards/funding involving ORNL were lower this year due to congressional continuing resolutions and budget limitations, multi-year federal awards and industrial and state-funded awards have increased. In addition, the College's centers played a key role in working with faculty and students to increase overall funding.

- F. GOAL: Finalize the College's long-term facilities management plan regarding anticipated moves that will occur during the FY08-FY11 period, related to the Min Kao Building, JIAM, and Estabrook Hall.

PROGRESS: Decisions have now been finalized which will allow the College to complete its long-term facilities management plan regarding anticipated moves in the FY08-FY11 period. A detailed spreadsheet will be completed by the end of the fiscal year that addresses the spaces to be occupied by each group. These moves include relocation of the Engineering annex to make way for the New Estabrook Building, temporary relocation of IIE faculty to Dunford Hall, retention of the Innovative Computer Laboratory in Claxton, and anticipated moves related to the planned occupancy of the new Min Kao EECS building in 2010, the New Estabrook Building in early 2011 and the JIAM building on Cherokee Campus in mid 2011. In order for these moves to occur within a reasonable time frame, assistance at the campus and systems levels is critical. (See Attachment A for the College's time table for space management.)

2. Non-Funded Expenditures and Supporting Sources of Revenue - See attached Form 1.

3. Three-Year Financial Overview - See attached Form 2.

4. Vacant Positions Report - See attached Form 3.

5. FTE Target Size

Given the current base budget, the College must continue to fill existing faculty lines. To not do so would severely slow the momentum of its overall mission of teaching, research and service. While the undergraduate graduation numbers have remained relatively constant from FY03 to FY07, enrollment has increased by 5.5% in the last two years. This is contrary to the national trend of decreased enrollments and will soon be reflected in our graduation numbers. The larger enrollments will place increased demand on filling vacant lines. Also, average entering Freshman Math ACT scores have increased from 26.3 in FY03 to 28.4 in FY07—a clear strong trend of increasing quality of entering students. The newly established engineering undergraduate honors program and the growing number of honors students require smaller sections of many courses, *e.g.*, design courses. The stability and quality of undergraduate involvement with the research mission of the College is dependent on the commitment and expertise offered by permanent faculty.

The number of PhD students graduated increased from 28 in FY03 to 54 in FY07. The number of PhD students enrolled increased from 191 in FY03 to 288 in FY07--a 51% increase. Similarly, the number of MS students graduated increased 41% from FY03 to FY07. These growths are direct results of the increase in faculty research productivity from \$191K per filled FTE in FY03 to \$276K per filled FTE in FY07, an increase of 45% in five years. In addition, the College's newer faculty have also received highly sought after National Science Foundation CAREER Awards, increasing from a total of one in FY03 to 13 total awards by FY08. While being notable achievements during a period of relatively constant faculty FTE, they also place additional load on the faculty, increasing the need to fill vacant lines.

Improvement in national ranking is dependent in part on the quality of the graduate program, which requires an ever-increasing level of research productivity. The average minimal cost for supporting a PhD student through a five-year engineering degree program to graduation is approximately \$250,000, funds provided from externally funded grants and contracts. Tenure-track faculty vacancies must be filled in order to sustain and grow the research program, since adjunct faculty cannot adequately fill the void created by the absence of regular faculty.

The College began over 15 years ago to retain all vacant faculty lines at the college level. Budgeting vacant faculty lines at the college level provides opportunities to assess academic-discipline-based changes in enrollments and funding opportunities. In addition, this steady number of faculty vacancies is needed to fund continuous startup costs for new faculty.

6. FY 2009 Goals – See attached Form 4 for budgetary requirements.

A. The recurring structural deficit of approximately \$750K continues to burden the College. The deficit mandates that, in order to remain fiscally responsible, the College must require each faculty member to recover an equivalent of \$5,000 of his/her annual salary. Otherwise, operating budgets

for academic units would be nonexistent. While most engineering colleges throughout the country do expect their faculty to produce salary savings from grants and contracts, these expectations are generally in addition to, rather than instead of, base budget funding. During FY 2007, faculty salary recoveries totaled approximately \$886K, of which only \$136K could be used for program enhancement. In addition, these recoveries resulted in an approximate 28% savings, or \$248K, for the University in benefits costs. The College seeks in FY 2009 to continue salary recovery at a similar level but requests as its # 1 budget priority additional base funding to further improve its instructional and research programs.

- B. The long-term goal of improving retention in the undergraduate program is achieved through high quality advising at the college and departmental levels, coordination of outreach activities, and better recruitment of incoming freshmen. These activities would especially help the College to expand recruitment and retention of better students, including those in the engineering honors program. For these reasons, the need exists to acquire permanent resources to fund the current Advising Center Director position. This position was created two years ago and partially funded for FY 2007 and 2008 by the campus on a nonrecurring basis at an annual level of \$50K. No permanent resources exist to fund this position. Also, funding for additional advising staff is a priority.
- C. The College will continue to redirect selected faculty lines to the strategic areas of nano technology, bio technology, and information engineering. A five-year goal to acquire 5 additional faculty lines per year for each of 5 years will increase the overall faculty FTE to 175.

7. Development Campaign Priorities

The College plans to strategically build on its strengths, fuel its momentum, and allow the vision to be realized with extraordinary results through the following efforts:

- A. Faculty Support: Faculty propel all efforts to create and convey knowledge. With campus administrative support, the College will recruit, retain, and continue to foster excellent faculty members--those who prepare students for creative problem-solving and who supply urgently needed ideas and innovations to benefit society.
- B. Student Support: Contributions to scholarships for undergraduates and fellowships for graduate students will shape the future of the College. These scholarships and fellowships have been yielding a swell in the number and caliber of in-state engineering students, effectively boosting the College's efforts to cultivate vital knowledge for the state and nation.
- C. Program Support: Gifts in this category will transform the College's programs and provide infusions to launch education, discovery and outreach enterprises to unprecedented levels of excellence. A transformational gift allows the College and its distinctive programs vigorously to create and convey knowledge. Such a gift ultimately allows the nation to maintain its command position in economic strength and high quality of life.
- D. Facilities Support: New facilities are a key part of the College's plan to cultivate knowledge central to a competitive edge for its students, state and nation. Yet to be fully effective, facilities must be outfitted with state-of-the-art infrastructure that advances teaching and technologies.

SECTION II – LARGER PLANNING AND BUDGET CONCERNS

1. Key Opportunities and Challenges

The College will continue to improve student access by expanding outreach activities and strengthening its current diversity programs. The challenge will be to strike an appropriate balance between the College's rising admission requirements and student quality with that of student access and diversity. The College is also contributing in a significant way to the current campus globalization programs by (a) its recent initiative to implement a campus-wide dual doctoral degree program and (b) extending its co-op program to industries that offer internship positions at international sites. These efforts will effect a larger, better, and more diverse student body and will improve global connectivity of the UT campus.

Research activity continues to increase as measured by annual research expenditures. The short-term outlook for research funding on a national level, however, suggests that funding will remain highly competitive and possibly flat, including funding to national laboratories. Efforts are ongoing to develop stronger ties with industry as well as state and federal agencies. In addition, the College continues to develop its programs related to alternative fuels and advanced energy research with its recent participation and lead in forming the Sustainable Energy Education and Research Center. Along with research in nanotechnology, information engineering and biotechnology, these programs will increase the College's role in the economic development of the state. Also, the College is participating in efforts led by the Center for Industrial Services to reach out to industrial and manufacturing companies across the state to provide assistance in development of new technologies.

Lastly, the College continues to seek opportunities for internal reallocation of available funds. Vacant faculty lines are always reviewed for redirection, and, as mentioned earlier, reallocation of GTA/GA lines are planned for Fall 2010. In spite of these efforts, the College continues to struggle as a result of its large structural funding deficit, which is reflected in the E&G budget as required faculty salary recoveries. Engineering faculty remain engaged in research, teaching, and service and are major contributors toward resolution of the budget shortfall through salary recoveries from externally funded grants and contracts. Rather than being invested into existing and new research and instructional programs, over 80% of these salary savings must be used to cover the base-funding deficit. With the additional resources requested, the College is optimistic that it will be able to continue its substantial progress regarding the effectiveness and quality of its operations. (For an itemization of FY 2008 reallocations, see Attachment B.)

(See Attachment C for metrics that reflect the College's contributions to the strategic direction of the University.)

2. Possible Revenue-Generating Initiatives

With an initial annual investment by the Chancellor's Office of \$300K for each of two consecutive years and matching funds at a 1:1 ratio from key tenured/tenure-track faculty, the College could selectively hire up to six new research faculty. At the end of two years, these research faculty would be covering 100% of their own salaries and collectively generating approximately \$2.4 million per year in research expenditures, funding an additional 24 graduate students per year, and generating approximately \$680K per year of F&A. The increases in research expenditures and number of graduate students represent a substantial return on investment.