College of Engineering and Computing

Blueprint for Academic Excellence

May, 2012

Vision Statement

The College of engineering & Computing will be, and recognized as being, pre-eminent in its teaching, research, and service to the State of South Carolina and the south east, and a leader in the nation.

Mission

The mission of the College of Engineering and Computing is to attract the best undergraduate and graduate students, and by attracting the best faculty will provide the State of South Carolina and the nation with an effective resource for industry, government and academia in economic and workforce development. This will be achieved by strong research in all engineering disciplines thus maintaining the attractiveness and viability of our degree programs (undergraduate and graduate), furthering the capability of both supporting State and national industry and providing the means to attract industry (manufacturing and knowledge generation) to South Carolina.

Goals

1. Continue vigorous recruitment of top quality faculty to further enhance the viability and visibility of its top-rank capability, and provide a better critical mass of department size.
2. Increase enrollments in both undergraduate and graduate degree programs, while at least maintaining quality of students.
3. Continue to capitalize on our recent NRC rankings and transform those into widespread recognition of the quality and prestige of the College and University.
4. Continue to work with the economic development agencies in Columbia, the Midlands, and the State of South Carolina to increase the numbers of companies, both manufacturing and knowledge-based, to move to the State.

Executive Summary

Top Strengths and Accomplishments

(Individual department input to be found later)

1. Excellent NRC Rankings
2. Reasonably successful ABET accreditation visit – all programs 'likely' to receive next review in 6 years time. Biomedical Engineering looking to be fully accredited from 2012.
3. Regular faculty retreats are now in place to address strategic issues affecting the College – undergraduate education and research have already taken place and are allowing planning to take place to consider upgrading/changing undergraduate degrees, and development of new masters degrees to exploit our strengths and provide added support to industry in the state and the country…particularly in energy, materials and aerospace.
4. The creation and approvals process for new masters degrees in Aerospace Engineering and for Engineering Management complete, System Design (underway).
5. Modification of the *Engineering Science* undergraduate degree to *System Design & Engineering* is underway to address limited enrollments.
6. Appointment of Dr. Dan Cacuci to Nuclear SmartState Chair. Funding confirmed for second SmartState Nuclear Chair, and a new Aerospace/McNair Chair in materials.
7. Upgraded E-Week program to attract more students to engineering and computing, greater visibility to the community. Starting a monthly newsletter to children of lower school grade. We have begun another schools outreach program with the Edison Lecture Series. We have been awarded recognition as the new *Project Lead The Way* site for biomedical engineering.
8. Appointment of Lori Ann Summers as new Senior Director of Development to the College. Also hired a junior development officer, Jeff Verver.
9. A vigorous campaign to introduce companies and research organizations to visit the college for research presentations covering their particular interests. We have had great success with all such visits leading to increased collaboration – 3 companies have indicated a decision to open up small operations in Columbia as a direct result of these visits. We are increasing our collaboration with all economic development agencies in the state.
10. The college is increasingly engaging in cross campus collaboration with both teaching and research. We have developed links with the Darla Moore School of Business with both the creation of the Engineering Management masters degree, and with the joint hire of a senior faculty member with responsibility for entrepreneurship (Dirk Brown).
11. Entrepreneurship – the college is working directly with the new administration of the USC Incubator and has established weekly office hours for the *entrepreneur in residence*. The incubator personal have met with both department chairs and the faculty body, and participate in retreats.

Weaknesses and Plans for Addressing Weaknesses

(Individual department input to be found in the Appendix)

1. Lack of a sufficient critical mass in faculty numbers in many departments. Some departments need to get above 20 – an optimum would be closer to 25. NRC rankings are good, but we need the critical mass to also attack the US News rankings.
2. Insufficient TA/Grader support: With low faculty numbers and increasing undergraduate student numbers the provision of adequate support by way of TAs and Graders is essential to reduce the overall load on research faculty. Some departments already have the requirement for all graduate students to give 5 hours per week in TA/Grader work. Funds are sought for further graduate student support. The College has expanded on the use of peer tutoring, i.e. undergraduates who have already taken key/core classes will help those that are taking that course.
3. Insufficient space for research and teaching: As the college expands with recent faculty hiring and increased student numbers it becomes self-evident that space has become extremely limited…and is now critical! The College has a new space committee to identify wasted space in Swearingen and 300 Main and is in the process of extracting such space for reallocation. The SCANA/Catawba building is in a bad state, but is also badly utilized. In the absence of new/additional space being allocated to the College, this building could usefully be refurbished to provide much needed lab space particularly with Biomedical Engineering in mind. Nevertheless, even with the space plans in place, the availability of space for the College of Engineering and Computing is woefully inadequate and planning for a new building must be initiated. The delays in Horizon are a significant problem and may hamper future recruitment and retention.
4. Staff support is varied across the college. A study has been performed and a re-organization has been proposed and already underway.
5. Marketing has a key role to play in developing and exploiting the capabilities of the College. Although inroads have been made by expanding what the College already does, much more can be done provided adequate resources are made available, chiefly manpower. Dean's startup funds are being made available and the position has been posted at the time of writing.
6. College-wide research vision is progressing and creating opportunities and focus. Knowledge of the University's research vision would help immensely!

Goals Preamble

The College of Engineering and Computing provides a strong engineering education and research basis from which to expand. The NRC rankings have confirmed the quality of research work performed by our faculty.

The College has demonstrated its capability to respond be adaptive to new developments as illustrated by the creation of programs in Nuclear Engineering and in Biomedical Engineering –

more recently the developments in Aerospace/Systems and in Energy are cases in point. It is to be expected that these new programs will be popular.

Inevitably the successes obtained so far will create pressures that will provide significant challenges – the need for space.

Short Term Goal Continue the process to evaluate the resources we already have in place and how best to utilize them. We have completed the first phase of a space survey, and also for staff needs. The implications are still being considered.

Short Term Goal Continue the process of faculty retreats (in addition to meeting with faculty (and staff separately) in each department each semester. Continuous improvement in all aspects of our operation.

Short Term Goal Hasten the recruiting of SmartState Chairs – Nuclear (candidate in hand), BioMed (2 candidates in hand), Materials (2 candidates in hand), and Hydrogen.

Short Term Goal Further exploit our strengths in certain topic areas, e.g. energy, materials, biomed, aerospace/safety-critical systems and market our capabilities. Organization of key workshops/conferences that we host, publicize our output and encourage more industry to collaborate and set up infrastructure in Columbia/Midlands/South Carolina.

5 Year Goal Moving towards a greater emphasis on distance learning at all levels. This has the effect of making the College, and the University, more accessible to potential undergraduate and graduate students – conversion of two-year degrees to four-year degrees for mature students, part-time masters and Ph.D. degrees, plus creation of 'executive' masters degrees. Several companies in the state have shown a lot of interest in helping to 'upgrade' their two year degree employees to four year degree to better position them for promotions. Many/most of the USC component institutions have requested the facility of USC Columbia 'streaming' their Engineering and Computing classes to better prepare their two year students to seamlessly transfer to Columbia to finish their 4 year degrees. Discussions well underway with the University and with suppliers on the best way to implement. Meetings have been held with several USC Campuses (Upstate, Aiken, Beaufort) to use lecture capture material to assist with their engineering training in the first two years (to better prepare students to transfer to USC Columbia).

5 Year Goal Space is critical! Space *was* critical and is now worse. The need to make Horizon Building available to faculty that have been here for some time is essential and may become a significant retention issue. Although shorter-term plans include for better utilization of existing space, the needs are much more acute than can be reconciled in such a minor way. There is scope for upgrading SCANA/Catawba building, but this will have to include for wet labs for biomedical engineering hires including a SmartState Chair.

5 Year Goal The quality of space for the College of Engineering and Computing leaves a lot to be desired. The College is on the fringes of the campus in a very 'industrial' part of town. The

facilities available do not match those of other parts of campus, i.e. relaxation areas, food/drink provision etc. The College is to work with Carolina Catering to provide a better facility, perhaps within the Swearingen Building.

Rankings

Civil & Environmental Engineering

Top Ten Public Universities in Civil and Environmental Engineering

1. University of Illinois
2. University of California at Berkeley
3. Purdue University
4. Georgia Institute of Technology
5. University of Michigan
6. University of Texas at Austin
7. Virginia Technical University
8. University of Minnesota
9. North Carolina State University
10. University of Washington

Five Peer Civil and Environmental Engineering Departments

1. University of Florida
2. University of Alabama
3. Iowa State University
4. Auburn University
5. University of Kentucky

Chemical Engineering

Top 10 Chemical Engineering Departments at US Public Universities

1. University of California-Berkeley
2. University of Texas-Austin
3. University of Wisconsin-Madison
4. University of Minnesota
5. University of Santa Barbara
6. University of Michigan
7. University of Delaware
8. Georgia Institute of Technology
9. Purdue University
10. University of Illinois at Urbana Champaign

Five Peer Chemical Engineering Departments at US Public Universities

1. University of Colorado
2. North Carolina State University
3. University of Washington
4. Ohio State University

5. University of Florida

Computer Science and Engineering

Top Ten Public Universities in Computing

1. University of California at Berkeley
2. University of Illinois
3. University of Texas at Austin
4. University of Washington
5. University of Michigan
6. University of Wisconsin
7. Georgia Institute of Technology
8. UCLA
9. University of California at San Diego
10. Indiana University

Five Peer Computing Departments

1. University of Iowa
2. University of Tennessee
3. University of Connecticut
4. University of Kansas
5. Washington State University

Electrical Engineering

Top Ten Public Schools in EE

1. University of California at Berkeley
2. Georgia Institute of Technology
3. University of Illinois at Urbana-Champaign
4. University of Michigan at Ann Arbor
5. Purdue University at West Lafayette
6. University of Texas at Austin
7. University of California at Los Angeles
8. Virginia Tech
9. University of California at San Diego
10. University of Washington

Five Peers in Electrical Engineering

1. North Carolina State University at Raleigh
2. University of Florida

3. University of Colorado at Boulder
4. Iowa State University
5. Auburn University

Mechanical Engineering

Top Ten Public Universities in Mechanical Engineering

1. University of California Berkeley
2. University of Michigan
3. Georgia Institute of Technology
4. University of Illinois, Urbana Champaign
5. Purdue University
6. University of Texas Austin
7. University of Florida
8. Texas A&M University
9. University of Maryland
10. Virginia Tech

Top Five Peers in Mechanical Engineering

1. University of Kentucky
2. University of Connecticut
3. Central Florida
4. University of Alabama Huntsville
5. University of Tennessee

Nuclear Engineering

Top Ten Public Universities in Nuclear Engineering

1. University of Illinois, Urbana Champaign
2. University of Michigan
3. University of California Berkeley
4. University of Wisconsin – Madison
5. Pennsylvania State University
6. University of Virginia
7. Florida
8. NC State University
9. Purdue University
10. Texas A&M University

Top Peers in Nuclear Engineering

1. NC State University

2. Georgia Institute of Technology
3. University of Tennessee

Unit Statistical Profile

1. Number of entering freshman for classes Fall 2008, Fall 2009, Fall 2010 and Fall 2011 classes and their average SAT and ACT Scores.

Classes	Number	Average SAT	Avg ACT
Fall 2008	356	1219	26.0
Fall 2009	392	1240	27.6
Fall 2010	431	1219	27.0
Fall 2011	486	1228	27.1

2. Freshmen retention rate for classes entering Fall 2008, Fall 2009, and Fall 2010.

Fall 2008 ____82.3%_____, Fall 2009 _____ 86.3%_____, Fall 2010 _____84.0%____

3. Sophomore retention rate for classes entering Fall 2007, Fall 2008, and Fall 2009

Fall 2007 ___88.9_____, Fall 2008 ___88.5_____, Fall 2009 ____90.5____

4. Number of majors enrolled in Fall 2008, Fall 2009, Fall 2010 and Fall 2011 by level: undergraduate, certificate, first professional, masters, or doctoral (headcount).

By Headcount

Majors	Fall 2008	Fall 2009	Fall 2010	Fall 2011
Undergraduate	1454	1584	1698	1,849
Certificate	1	0	0	0
First Prof.	0	0	0	0
Masters	120	104	195	192
Doctoral	216	269	328	343

5. Number of entering first professional and graduate students Fall 2008, Fall 2009, Fall 2010, and Fall 2011 and their average GRE, MCAT, LSAT scores, etc. Data below came from U.S. News and World Reports Surveys for Fall 08, Fall09, Fall10, and Fall 2011. We do not have first professional students in our college. The data is for the combined Masters and Doctoral GRE scores of new entrants into the two programs.

Semester	Number graduate students	Mean Verbal GRE	Mean Quantitative GRE	Mean Analytical Writing GRE
Fall 2008	112	469	727	3.90
Fall 2009	104	449	735	3.3
Fall 2010	120	435	738	3.3
Fall 2011	112	497	746	3.55

6. Number of graduates in Fall 2010, Spring 2011, and Summer 2011 by level (undergraduate, certificate, first professional, masters, doctoral)

Degrees Awarded	Fall 2010	Spring 2011	Summer 2011
Undergraduate	88	182	13
Certificate	0	1	0
First Prof.	0	0	0
Masters	36	40	14
Doctoral	10	12	15

7. Four-, Five- and Six-Year Graduation rates for three most recent applicable classes (undergraduate only).

Class	Four Year	Five Year	Six Year
2003	19.2 \ 16.7 \ 36.0	30.6 \ 28.7 \ 59.3	32.2 \ 30.2 \ 62.5
2004	23.6 \ 11.7 \ 35.3	33.3 \ 21.4 \ 54.7	35.6 \ 23.0 \ 58.6
2005	25.6 \ 10.9 \ 36.5	36.8 \ 19.1 \ 55.8	41.1 \ 20.4 \ 61.5

Same school\Different school\ Total

8. Total credit hours and grade distribution generated by your unit (regardless of major) for Fall 2010, Spring 2011 and Summer 2011.

Student Credit Hrs	Fall 2010	Spring 2011	Summer 2011
Undergraduate	14,552	14,075	751
Masters	1,035	935	219
First Prof.	0	0	0
Doctoral	1,889	1,804	408
Total	**17,476**	**16,814**	**1,378**

CEC Grade Distribution										
Undergraduate	A	B+	B	C+	C	D+	D	F	W	WF
Fall 2010	36.1	14.1	19.1	7.7	10.1	1	3.8	3.9	4	0.3
Spring 2011	37.6	13.3	17.5	7.1	10.1	1.6	3.6	4.4	5	0.3
Summer 201135.5	35.5	15.2	17.8	7.1	10.2	1	4.6	4.6	2.5	1.5

9. Percent of credit hours by undergraduate major taught by faculty with a highest terminal degree.

BMEN	ECHE	ECIV	ELCT	EMCH	CSCE
77.03%	100%	98.99%	94.81%	89.66%	88.22%

10. Percent of credit hours by undergraduate major taught by full-time faculty

BMEN	ECHE	ECIV	ELCT	EMCH	CSCE
100%	84.39%	86.68%	85.38%	88.94%	92.89%

11. Number of faculty by title (tenure-track by rank, research or clinical by rank), as of Fall 2009, Fall 2010, and Fall 2011 (by department where applicable). Includes Provost Amiridis and Senior Vice Provost Christine Curtis.

TTF	Fall 2009	Fall 2010	Fall 2011
Professor	33	35	35
Assoc. Prof	34	38	40
Asst. Prof.	27	29	30
Total	**94**	**102**	**105**

Research Fac	Fall 2009	Fall 2010	Fall 2011
Professor	5	5	4
Assoc. Prof	2	5	4
Asst. Prof.	8	9	9
Total	**15**	**19**	**17**

12. Current number and change in the number of tenure-track and tenured faculty from underrepresented minority groups from FY 2010.

UG Major	Fall 2010	Fall 2011
CHE	1 female (Moss), 1 Hispanic (FGM)	1 female (Moss), 1 Hispanic (FGM)
CEE	2 female (Berge, Gassman) 2 Hispanic (Caicedo, Flora)	2 female (Berge, Gassman) 2 Hispanic (Caicedo, Flora)
CSE	4 female (Eastman, Farkas, Tong, Xu) 1 Hispanic (Vidal)	4 female (Eastman, Farkas, Tong, Xu) 1 Hispanic (Vidal)
EE	0	0
ME	2 female (Baxter, L Yu)	2 female (Baxter, L Yu) 1 Black (Kidane)
Total all	13	14

CHE Dr. Bihter Padak was hired Fall 2011 as Research Asst Professor, and then 1/1/2012 as tenure-track Assistant Professor

CEE Dr. Enrica Viparelli was hired 1/1/2012 as tenure-track Asst Professor

Student Retention

1. Retention Methods and Activities We have not quantitatively assessed retention mechanisms and their effectiveness on USC CEC freshmen and sophomores. The retention mechanisms we have adopted all come from nationally-recognized best practices. Retention methods are as follows:

- Forming and supporting the Engineering & Computing Community (ECC) in Bates West;
- Providing and funding Supplemental Instruction for ENCP 202;
- Creating "101/ Introduction to X Engineering or Computing"-type courses in each program for first-semester freshmen;
- Insuring that every student has a full-time, tenure-track faculty advisor.

Of these methods, the "101" courses provide guaranteed contact, and may be the weakest link in our retention efforts as they do not seem to increase our retention above national averages for comparable institutions. Students in the ECC visit plant sites across the state, as well as research and facilities sites on campus to learn about application of engineering & computing in practice. ECC students also help arrange tutoring in writing and math for CEC students. The 2012 survey of CEC students indicated, in general, that students in ECC made better connections and felt more a part of the college than non-ECC students.

2. Advising Incoming freshmen are advised by staff in the Office of Student Services in the summer before matriculation. Thereafter, students are assigned a full-time TT advisor. General effectiveness of all our advising functions is determined primarily by exit interviews with graduating seniors.

The CEC Office of Career Services regularly offers opportunities inside and outside the classroom for individual advising on career topics, with an emphasis on obtaining co-op positions and other aspects of gaining employment. Other advising covers career exploration and industry trends and expectations. The Career Center evaluates its student impact by surveying students regarding services provided and by tracking the number of student contacts made and presentations given each year.

With the advent of the Carolina Core, it has become even more evident that CEC and its programs need a standard set of advising materials that go beyond just the formal curriculum sheets. Also, training and support for advisors will be needed to make sure that students take the proper courses for the Carolina Core. Periodic (3- to 6-year) accreditation visits also give external evaluation of the quality of advising, but the ABET visit primarily determines whether advisement mechanisms are keeping students on the proper curriculum. ABET does not consider retention and graduation rates.

However, regular student advising within the College needs to be dramatically improved.

3. Student Support Students seem to respond most strongly to learning that comes from beyond the classroom experiences, such as co-operative education and internships. Students respond strongly to other students as well. Therefore efforts to engage industry, particularly recent graduates in industry, would probably have a salutary effect. More interactions with the departmental advisory boards would be helpful, as would increasing the number of undergraduate Capstone projects supported by industry.

Other activities in the college that support student success and retention include the various student organizations, student ambassadors that assist the Outreach & Retention group, the living-learning community in Bates, the student services office, and special initiatives such as groups like Engineers without Borders, Baja Team, Robotics Team, and First Lego League.

Student Graduation and Placement

1. Time to degree We have compared the number of credit hours in our degree programs with comparable public institutions, and find that the number of required hours is reasonable; indeed our credit hour requirements are toward the low end.

2. Intern and Job Placement Several years ago, Dean Amiridis led the construction of a satellite office of the USC Career Center in the Swearingen Building. The career center has two full-time staff (Assistant Director and Program Manager) and several part-time assistants. The staff visit classes, host informal drop-ins, provide support for interviewing and writing resumes, and work to recruit companies to the Science, Engineering and Technology (SET) job fair, held once each semester. Assistant Director Helen Fields collects data on the number of companies attending the job fairs, and on the number of CEC students who participate in co-ops, internships, community interns, and who attend the SET fairs. In general, the number of companies has increased noticeably in the past few years after a considerable decrease during the worst of the economic downturn. Student participation is growing (although, inexplicably, participation is still somewhat low when compared to the overall increase in college enrollment).

Some of the special initiatives offered by the Career Center for students within the college include:

- EmpowHer Conference –1/2 day conference for women in STEM disciplines; generally speaking, presenters for this event come from a variety of areas such as industry experts, career center professionals, faculty/researchers and student leaders;
- Diversity Forum –1/2 day conference for under-represented and minority students who are in STEM disciplines; generally speaking, presenters for this event come from a variety of areas such as industry experts, career center professionals, faculty researchers and student leaders;
- September Success and January Jumpstart Series –these are month long initiatives in September and January that provide multiple opportunities for students to learn from industry experts and/or career center professionals on issues such as resume writing, mock interviewing, researching employers, job fair preparation, networking, etc. in order to get the students ready for the fall and spring job fairs

3. Tracking graduates The primary mechanism for tracking B.S. graduate placement is via exit interviews. The CEC Career Center also collects graduation surveys and provides data to supplement and validate graduate placement information. One challenge is that at the time of the survey, many students will not provide information or post-graduation plans to the Career Center, so it is difficult to track 100% of the students. M.S. and Ph.D. placement is done by consulting with the students' research advisors. Data are collected and reported in the annual report of each department, and presented to each department's Advisory Board.

Distributed Learning

1. Involvement The College does not offer undergraduate courses via distance education technology. Graduate courses are offered through the APOGEE program.

2. Expanding Availability CEC is very interested in offering both UG courses and graduate courses via Distributed Learning. CEC has obtained budget estimates for implementing lecture capture capabilities in several classrooms. We have several MOUs and articulation agreements in place with regional campuses, and are developing additional agreements. These will provide opportunities for expanding our courses to other students independent of time and place. CEC has received CHE approval for two interdisciplinary Masters programs, primarily to offer off-campus in "executive" format.

3. Insuring quality Not applicable at this time.

4. Challenges Not applicable at this time. The two major challenges to implementing Distributed Learning are lack of a comprehensive university vision or policy (on selection of a standard

vendor, for example,) and of course cost. CEC could possibly outfit a few classrooms right now, but lacking university policy or vision we are reluctant to take this step independently.

USC Connect and Community Engagement

1. Encouraging USCConnect We will encourage use of USCConnect in the following ways: a) Prior to Fall 2012 advising weeks (typically in October) we will conduct a training meeting of staff from CEC Career Services, Student Services, and Undergraduate Directors from each program to provide background information on USCConnect , and to adopt existing advising and awareness materials to be used by CEC students and faculty during advising each fall and spring; b) We will post physical posters as well as flat-screen announcements around the college; c) We will encourage each engineering/computing student professional society to invite a speaker from USCConnect to one of their regular meetings; d) we will develop an on-line survey so that students can report about their plans and actions to participate in integrated learning within and beyond the classroom.

2. Support of classroom reflection

At the training meeting mentioned in item 1.a above, and as a follow-up, we will compile and recommend best practices for incorporating reflection into engineering and computing classes, and will disseminate these to faculty.

3. Undergraduate research, service learning, and international experiences

The college will gather more accurate data via the survey described in 1.d) above. Until then, our assessment is qualitative and anecdotal, as given below.

Essentially every CEC faculty member is assigned a unique 499 Independent Study course code, and can in principle accept students for UG research. We have not polled the faculty, but estimate that at least 50% and probably 75% do, or have, involved UG students in Independent Study or in research for pay. The college has a fairly strong history of encouraging UG research with faculty. Service learning and international experiences are much less common.

There are no formal Service Learning courses in the college. There is a new chapter of Engineers Without Borders, and the faculty advisor is Dr. Charlie Pierce of the Department of Civil and Environmental Engineering. Also, students in the ECC (and other students and staff) are very involved in supporting FIRST Lego League and Vex robotics competitions.

Regarding International Experiences, only 27 students (2.2% of CEC undergraduates) participated in study abroad during the 2011-2012 school year. For the first time in summer 2012, the college offered a Maymester course entitled “Energy and Sustainability-Europe”

(ECHE 589M), which was offered at the Fraunhofer Institute in Germany. Approximately 20 students enrolled.

The number of students involved in these activities has increased because the college enrollment has increased in the last six years. The percentage of students has remained relatively constant.

4. Additional BTC opportunities

The most significant BTC professional experience that a CEC student can have, in general, is to obtain a co-op position or internship. We make this statement because our students are very strongly oriented to finding a job in the engineering and computing workplace after graduation. Service learning and international experiences can be a life-changing experience for some students, but the number of students with these experiences is likely to remain low. We continue to work with CEC Career Services and the several departmental Advisory Boards, as well as the departments, to find co-op opportunities, recruit more companies, and encourage students to enter the workplace. To this end, CSCE offers CSCE 190, "Computing in the Modern World (1 credit)" and there is a new course ECHE 202, "Introduction to the Chemical Engineering Workplace (1 credit)". Both courses aid our freshman and sophomore students in getting ready for the workplace. The College plans to create a similar courses throughout, so that students throughout the college can get similar preparation in their disciplines.

Research

Describe the interdisciplinary research that is ongoing in your college.

a. What measures are being taken to increase interdisciplinary research?
   The nature of Engineering & Computing disciplines is inherently interdisciplinary, certainly within the college, but most definitely with several departments in Arts & Sciences (e.g. chemistry/chemical engineering, mechanical engineering/materials/nano center, biomedical engineering/medical school).

   Increasing interdisciplinary research is being actively encouraged by discussions on expanding the biomedical engineering program by initiating discussions with the Arnold School of Public Health, The School of Pharmacy, and the College of Nursing.

   System design-related interdisciplinary research is proceeding apace and the College of Engineering & Computing is in active discussions with the Department of Psychology with a view to initiating a human factors teaching and research program.

Engineering management masters program has now been approved which is a collaboration between Engineering & Computing, the Darla Moore School of Business, the School of Law, and the College of Mass Communications and Information Studies. Previous experience has shown that this leads to improved college links and collaborative research programs, e.g. product quality and reliability.

As a result we are actively looking at both Energy Systems, and Materials Engineering programs which will promote further collaboration.

Energy-related research is expanding across the Colleges of Engineering & Computing and Arts & Sciences. The co-location of key faculty (Horizon) is certainly helping. The Energy Leadership Institute is providing a venue for increased dialogue across 6 colleges, which it is hoped will lead to further interdisciplinary research.

A research retreat has already been held to discuss further opportunities.
Blueprint

b. What measures should be taken to promote interdisciplinary research?

The College has already been working very well in creating interdisciplinary research in many areas, e.g. energy, materials, biomedical engineering, systems design.

Initiation of communication across the campus between ***all*** agencies would help immensely.

Additional Resources

The college is expanding at a prodigious rate, both in terms of students numbers, plus faculty numbers. Although efficiencies of scale can, and are, being addressed there are inevitable stresses that can be mitigated somewhat by additional resources although some are much more critical than others.

Space:

We need more space. An internal space review has been completed and we are able to squeeze some more space but this will be insufficient to resolve short-term or long-term requirements. Some labs are to be repurposed (computer labs shut – all out students can be expected to own a computer), but this will require upgrade and partitioning (may need upgrade to wet labs space either for biomed research or for undergraduate labs).

1. Specifically we can better use existing space if the Catawba building is refurbished plus provision of wet lab space. Given that the biomed u/g program is now one of the largest in the college but not yet a department, they need more facilities, plus a home.
2. Hiring of SmartState chairs without their promised space in Horizon being ready for, in some cases, several years cannot be allowed to continue. Horizon needs to be finished!
3. We need to start a plan for a new building to better accommodate the College – it would be better to move out of 300 Main as well as part of this plan.

Resources:

1. We have been addressing retention by expanding the use of peer advising – we hire several u/g's to help with this…very successful. Expanding this further with extra resources would help immensely. We are already spending ~$40K on this…a match from the Provost would be very welcome.
2. The facilities for students in Swearingen/300 Main and the immediate area is poor. We would like to place a 'real' coffee bar in Swearingen – e.g. like in the Hollings Library.

Appendix I

College of Engineering and Computing

Office of Research

IT and Data Management Office

College of Engineering and Computing

FY2011 Blueprint Data

Q1. The total number and amount of external sponsored research proposal submissions by agency for FY2011

FY2011 PROPOSAL SUBMISSIONS

Engineering & Computing

	Number	Dollars Requested
NIH	19	$3,620,502
HHS (excl. nih)	0	$0
NSF	126	$12,070,364
DOD	65	$13,242,853
DOE	69	$14,830,019
USDE	0	$0
OTHER FEDERAL	26	$2,368,319
STATE	6	$5,364,633
LOCAL	0	$0

PRIVATE	56	$3,600,988

Q2. Summary of external sponsored research awards by agency for FY2011

Awards by Source/Agency

Engineering & Computing

	FY2011 Funding
NIH	$769,847
HHS (excl. nih)	$0
NSF	$7,262,089
DOD	$11,653,622
DOE	$6,632,266
USDE	$0
OTHER FEDERAL	$2,228,454
STATE	$6,272,927
LOCAL	$0
PHI (Non-Profit)	$474,669
COMMERCIAL	$5,009,501
OTHER	$30,055
Total Funding	***$40,333,430***

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Q3. Total extramural funding and Federal extramural funding in FY2011

Summary of Awards

Engineering & Computing

Total Funding	Total Federal
$40,333,430	$28,546,278

Q4. Amount of sponsored research funding per faculty member in FY2011

(by rank, type, type of funding)

PI_HM_DEPT_DESC	TITLE_DESC	PI_NA	TOTAL	COMM	FEDERAL	LOCAL	OTHER	PHI (NON-PROFIT	STATE
Chemical Engineering	PROVOST	Amiridis, Michael	3,594,838	430,185	1,053,079				2,111,574
Chemical Engineering	ASST PROFESSOR	Blanchette, James	77,423		47,583				29,840
Chemical Engineering	PROFESSOR	Gadala-Maria, Francis	2,000					2,000	
Chemical Engineering		Gonzalez, Francisco	26,030		26,030				
Chemical Engineering	ASST PROFESSOR	Hattrick-Simpers, Jason	218,666	218,666					
Chemical Engineering	ASST PROFESSOR	Heyden, Andreas	103,499		103,499				
Chemical Engineering	ASSOC. PROFESSOR	Jabbari, Esmaiel	229,648	149,648	80,000				
Chemical Engineering	PROFESSOR	Lauterbach, Jochen	1,229,444		1,229,444				
Chemical Engineering	PROFESSOR	Matthews, Michael	1,261,942	500,000	261,942				500,000
Chemical Engineering		Monnier, John	162,815	122,765	40,050				
Chemical Engineering	ASSOC. PROFESSOR	Moss, Melissa	89,500		89,500				
Chemical Engineering	PROFESSOR	Ploehn, Harry	86,531		86,531				
Chemical Engineering	PROFESSOR	Popov, Branko	1,400,000		1,400,000				
Chemical Engineering	PROFESSOR	Ritter, James	858,969	249,666	554,690		25,000		29,613
Chemical Engineering	ASST PROFESSOR	Stanford, Thomas	5,000		5,000				
Chemical Engineering	PROFESSOR	Van Zee, John	1,703,237	1,278,750	424,487				
Chemical Engineering	DEPT CHAIR	Weidner, John	431,597	265,008	166,589				
Chemical Engineering	PROFESSOR	White, Ralph	455,000		455,000				
Chemical Engineering	PROFESSOR	Williams, Christopher	175,266	175,266	0				
Chemical Engineering	ASSOC. PROFESSOR	Zhou, Xiao-Dong	408,000		408,000				

Civil & Environmental Engineering	ASST PROFESSOR	Berge, Nicole	411,107		411,107				
Civil & Environmental Engineering	ASSOC. PROFESSOR	Caicedo, Juan	477,523		444,781			32,742	0
Civil & Environmental Engineering	PROFESSOR	Chaudhry, M.	649,495		563,410				86,085
Civil & Environmental Engineering	ASSOC. PROFESSOR	Gassman, Sarah	40,000		40,000				
Civil & Environmental Engineering	ASST PROFESSOR	Goodall, Jonathan	519,971		519,971				
Civil & Environmental Engineering	ASST PROFESSOR	Huynh, Nathan	43,525					43,525	
Civil & Environmental Engineering	PROFESSOR	Imran, Jasim	513,032	253,066	259,966				
Civil & Environmental Engineering	ASST PROFESSOR	Matta, Fabio	93,279	43,279	50,000				
Civil & Environmental Engineering	DEPT CHAIR	Mullen, Robert	65,755					65,755	
Civil & Environmental Engineering	ASSOC. PROFESSOR	Pierce, Charles	10,429	10,429					
Civil & Environmental Engineering	ASST PROFESSOR	Saleh, Navid	246,407		246,407				
PI_HM_DEPT_DESC	**TITLE_DESC**	**PI_NA**	**TOTAL**	**COMM**	**FEDERAL**	**LOCAL**	**OTHER**	**PHI (NON-PROFIT**	**STATE**
Civil & Environmental Engineering	ASSOC. PROFESSOR	Yoon, Yeomin	390,001	300,000	90,001				
Civil & Environmental Engineering	ASSOC. PROFESSOR	Ziehl, Paul	395,477		395,477				
Computer Science & Engineering	PROFESSOR	Buell, Duncan	77,772		61,414				16,358
Computer Science & Engineering	ASSOC. PROFESSOR	Huang, Chin-Tser	16,000		16,000				
Computer Science & Engineering	PROFESSOR	Huhns, Michael	5,055				5,055		
Computer Science & Engineering	ASSOC. PROFESSOR	Nelakuditi, Srihari	217,000		217,000				
Computer Science & Engineering	ASSOC. PROFESSOR	Tang, Jijun	5,625		5,625				
Computer Science & Engineering	ASSOC. PROFESSOR	Valafar, Homayoun	118,954		118,954				
Computer Science & Engineering	ASSOC. PROFESSOR	Vidal, Jose	16,000		16,000				
Computer Science & Engineering	ASSOC. PROFESSOR	Wang, Song	363,101		353,101			10,000	
Computer Science & Engineering	ASST PROFESSOR	Xu, Wenyuan	36,467	20,467	16,000				
Electrical Engineering	ASSOC. PROFESSOR	Ali, Mohammod	68,280		68,280				

Electrical Engineering	ASSOC. PROFESSOR	Brice, Charles	54,905	54,905					
Electrical Engineering	ASST PROFESSOR	Chandrashekhar, MVS	18,999					18,999	
Electrical Engineering	PROFESSOR	Dougal, Roger	2,712,441	50,535	2,661,906				
Electrical Engineering	ASSOC. PROFESSOR	Ginn, Herbert	249,985	60,307	189,678				
Electrical Engineering	PROFESSOR	Khan, Asif	1,148,666	173,000	975,666				
Electrical Engineering	ASSOC. PROFESSOR	Koley, Goutam	304,948		304,948				
Electrical Engineering	ASSOC. PROFESSOR	Mandal, Krishna	244,590		244,590				
Electrical Engineering	ASSOC. PROFESSOR	Santi, Enrico	38,886	38,886					
Electrical Engineering	ASSOC. PROFESSOR	Shin, Yong-June	179,767	19,367	160,400				
Electrical Engineering	PROFESSOR	Simin, Grigory	33,000		33,000				
Electrical Engineering	DEPT CHAIR	Sudarshan, Tangali	313,885	150,000	163,885				
Electrical Engineering		Zhao, Feng	176,934	176,934					
Engineering & Computing, College of		Boccanfuso, Anthony	314,883		314,883				
Mechanical Engineering	ASSOC. PROFESSOR	Baxter, Sarah	342,000		342,000				
Mechanical Engineering	PROFESSOR	Bayoumi, Abdel	2,256,950		2,254,800				2,150
Mechanical Engineering	PROFESSOR	Chao, Yuh	5,900		5,900				
Mechanical Engineering	ASSOC. PROFESSOR	Chen, Fanglin	1,731,972		1,705,531				26,441
Mechanical Engineering	PROFESSOR	Deng, Xiaomin	165,720		165,720				
Mechanical Engineering	PROFESSOR	Giurgiutiu, Victor	445,121		445,121				
Mechanical Engineering		He, Xiaoming	621,629		621,629				
PI_HM_DEPT_DESC	**TITLE_DESC**	**PI_NA**	**TOTAL**	**COMM**	**FEDERAL**	**LOCAL**	**OTHER**	**PHI (NON-PROFIT**	**STATE**
Mechanical Engineering	ASSOC. PROFESSOR	Huang, Kevin	115,913	100,913	15,000				
Mechanical Engineering	ASST PROFESSOR	Huang, Xinyu	179,131	14,621	164,510				
Mechanical Engineering	ASST PROFESSOR	Kaoumi, Djamel	83,742		83,742				

Mechanical Engineering	DEPT CHAIR	Khan, Jamil	1,711,288		218,713			75,000	1,417,575
Mechanical Engineering		Kheradvar, Arash	77,000					77,000	
Mechanical Engineering	ASSOC. PROFESSOR	Knight, Travis	2,205,500		205,500				2,000,000
Mechanical Engineering	ASST PROFESSOR	Li, Chen	94,999		94,999				
Mechanical Engineering	PROFESSOR	Li, Xiaodong	179,840	100,000	79,840				
Mechanical Engineering	PROFESSOR	Reifsnider, Kenneth	4,797,201		4,797,201				
Mechanical Engineering	PROFESSOR	Reynolds, Anthony	658,128	202,486	429,201				26,441
Mechanical Engineering	ASST PROFESSOR	Shazly, Tarek	10,000		10,000				
Mechanical Engineering	PROFESSOR	Sutton, Michael	279,000		250,000				29,000
Mechanical Engineering	ASST PROFESSOR	Wang, Guiren	687,492		687,492				
Mechanical Engineering	ASST PROFESSOR	Xue, Xingjian	404,211		404,211				
SC Alliance for Minority Participation (SCAMP)	CLASSIFIED	Perkins, Michael	189,144		189,144				

Q5. Total sponsored research expenditures per tenured/tenure-track faculty for FY2011

Dept	PI	Total Expenditures	Status
		(Direct/Indirect)	
Chemical Engineering			
	Amiridis, Michael	62,341	Tenured
	Blanchette, James	62,944	Tenure Track
	Davis, Thomas	55,497	
	Gadala-Maria, Francis	22,553	Tenured
	Hattrick-Simpers, Jason	91,640	Tenure Track
	Heyden, Andreas	172,628	Tenure Track
	Jabbari, Esmaiel	474,297	Tenure Track
	Lauterbach, Jochen	1,172,824	Tenure Track
	Matthews, Michael	45,176	Tenured
	Monnier, John	239,524	
	Moss, Melissa	196,853	Tenured
	Ploehn, Harry	91,848	Tenured
	Popov, Branko	1,137,767	Tenured
	Ritter, James	822,413	Tenured
	Shimpalee, Sirivatch	7,094	
	Stanford, Thomas	5,553	Tenured
	St-Pierre, Jean	-1,644	
	Van Zee, John	739,863	Tenured
	Weidner, John	409,802	Tenured
	White, Ralph	403,882	Tenured

	Williams, Christopher	393,930	Tenured
	Zhou, Xiao-Dong	252,504	Tenure Track
Civil & Environmental Engineering			
	Baus, Ronald	496	
	Berge, Nicole	8,914	Tenure Track
	Caicedo, Juan	187,586	Tenured
	Chaudhry, M.	413,334	Tenured
	Gassman, Sarah	38,463	Tenured
	Goodall, Jonathan	128,845	Tenure Track
	Huynh, Nathan	38,605	Tenure Track
	Imran, Jasim	117,944	Tenured
	Matta, Fabio	56,157	Tenure Track
	Mullen, Robert	43,390	Tenured
	Pierce, Charles	82,851	Tenured
	Ray, Richard	382	
	Rizos, Dimitris	72,892	Tenured
	Saleh, Navid	69,371	Tenure Track
	Yoon, Yeomin	95,494	Tenure Track
	Ziehl, Paul	521,900	Tenured
Dept	**PI**	**Total Expenditures**	**Status**
		(Direct/Indirect)	
Computer Science & Engineering			
	Bakos, Jason	94,521	Tenured
	Bowles, John	5,761	Tenured
	Buell, Duncan	47,763	Tenured
	Eastman, Caroline	101,020	Tenured
	Farkas, Csilla	5,969	Tenured

	Fenner, Stephen	38,889	Tenured
	Hu, Jianjun	152,200	Tenure Track
	Huang, Chin-Tser	83,407	Tenured
	Huhns, Michael	5,055	Tenured
	Nelakuditi, Srihari	91,310	Tenured
	O'Kane, Jason	119,247	Tenure Track
	Rose, John	129,113	Tenured
	Tang, Jijun	215,317	Tenured
	Valafar, Homayoun	321,677	Tenured
	Vidal, Jose	95,387	Tenured
	Wang, Song	186,741	Tenured
	Xu, Wenyuan	142,051	Tenure Track
Electrical Engineering			
	Ali, Mohammod	69,151	Tenured
	Brice, Charles	33,283	Tenured
	Chandrashekhar, MVS	23,574	Tenure Track
	Dougal, Roger	3,507,080	Tenured
	Ginn, Herbert	41,575	Tenured
	Khan, Asif	1,019,966	Tenured
	Koley, Goutam	253,291	Tenured
	Mandal, Krishna	183,925	Tenure Track
	Santi, Enrico	45,653	Tenured
	Shin, Yong-June	259,366	Tenured
	Simin, Grigory	136,454	Tenured
	Sudarshan, Tangali	217,091	Tenured
	Zhao, Feng	28,978	
Engineering & Computing, College of			
	Ambler, Anthony	5,000	Tenured

	Boccanfuso, Anthony	282,553	
	Gonzalez, Francisco	26,030	
	Ploehn, Harry	357	Tenured
Mechanical Engineering			
	Baxter, Sarah	58,679	Tenured
	Bayoumi, Abdel	1,665,686	Tenured
	Chao, Yuh	4,038	Tenured
	Chen, Fanglin	670,356	Tenured
	Deng, Xiaomin	149,087	Tenured
	Giurgiutiu, Victor	278,831	Tenured
	He, Xiaoming	137,561	
	Huang, Kevin	86,136	Tenure Track
	Huang, Xinyu	209,302	Tenure Track
	Kaoumi, Djamel	55,914	Tenure Track
	Khan, Jamil	318,078	Tenured
	Kheradvar, Arash	9,801	
	Knight, Travis	273,424	Tenured
	Li, Chen	92,988	Tenure Track
	Li, Xiaodong	243,004	Tenured
	Lyons, Jed	214,325	Tenured
	Reifsnider, Kenneth	5,450,070	Tenured
	Reynolds, Anthony	544,079	Tenured
	Sutton, Michael	373,080	Tenured
	Wang, Guiren	119,607	Tenure Track
	Xue, Xingjian	156,538	Tenure Track
SC Alliance for Minority Participation (SCAMP)			
	Perkins, Michael	249,343	

Q6. Number of patents, disclosures, and licensing agreements in fiscal years 2009, 2010 and 2011.

Engineering and Computing

	Invention Disclosures	Provisional patent applications	Non-Provisional patent applications	Issued patents
FY2011	19	22	12	2
FY2010	23	28	23	2
FY2009	26	36	8	2

Source: Office of Technology Commercialization

Appendix II

College of Engineering and Computing

1.Placement of graduate students, terminal masters, and doctoral students, for the three most recent applicable classes.

Information is not available.

2. Number of undergraduate and graduate credit hours in Fall 2010, Spring 2011, and Summer 2011, stated separately, taught by tenured and tenure-track faculty, by instructors, by non-tenure-track faculty (clinical and research), by temporary faculty (adjuncts), by full-time faculty, and faculty with terminal degrees.

Fall 2010	Tenured and tenure-track	Non-tenure track faculty	instructors	Adjuncts (includes grad students)	total
Grad	2,648	0	0	252	2,900
Undergrad	9,874	144	1,053	3,162	14,233

Spring 2011	Tenured and tenure-track	Non-tenure track faculty	instructors	Adjuncts (includes grad students)	total
Grad	2,616	51	0	33	2,700
Undergrad	9,013	0	1,089	2,905	13,007

Summer 2011	Tenured and tenure-track	Non-tenure track faculty	instructors	Adjuncts (includes grad students)	total
Grad	608	10	0	0	618
Undergrad	250	0	0	285	535

Appendix III

College of Engineering and Computing

Faculty Hiring/Retention and Ph.D. Programs

1. Number of faculty hired and lost for AY 2009, AY 2010, AY 2011 (by department, if applicable, and by rank). Give reason for leaving, if known.

AY 2009 Faculty Hires

Department	Assistant Professor	Associate Professor	Professor
CEE	Nathan Huynh Nicole D. Berge Navid Saleh	Yeomin Yoon	
CSE	Max Alekseyev		
EE	Feng Zhao		
ME	Xingjian Xue		

AY 2009 Faculty Losses

Antonello Monti, EE Professor and Ferdinanda Ponci, Assistant Professor both resigned 1/1/2010 to accept positions in a German Institution

AY 2010 Faculty Hires

Department	Assistant Professor	Associate Professor	Professor
CHE	0	1 (XD Zhou)	
CEE	1 Matta		1 (Chair Mullen)
CSE			
EE	1 Chandrashekhar	1 Mandal	

ME	3 (Kaoumi/Chen LI, X Huang	1 (K Huang)	

AY 2010 Faculty Losses

Ronald Baus, CEE, Professor, retired 6/30/2010 (TERI end date)

Vincent Van Brunt, CHE, Professor, retired 9/30/09 (TERI end date)

AY 2011 Faculty Hires

Department	Assistant Professor	Associate Professor	Professor
CHE	Jason Hattrick-Simpers Ehsan Jabbarzadeh		A. Jochen Lauterbach, Clean Coal CoEE Director
CEE	Chunyang Liu Jeong-Hoon Song		
CSE	Yan Tong		
EE		Herbert Ginn	
ME	Tarek Shazly Lingyu (Lucy) Yu		

AY 2011 Faculty Losses

Arash Kheradvar, ME, Asst Prof., accepted position at UC Irvine, 9/30/2010

Larry Stephens, CSE, Professor, retired 12/31/2010

Xiaoming He, ME, Asst Prof, accepted position at Ohio State, 6/1/2011

2. Number of post-doctoral scholars (Ph.D., non faculty hire) in FY2009, 2010, 2011

Department	FY09 PhD, non-fac hires	FY10 PhD, non-fac hires	FY11 PhD, non-fac hires
CHE	21	11	15
CEE	2	3	2
CSE	0	7	5
EE	3	5	3
ME	18	17	18

3. Anticipated losses of faculty by year for the next five years. Please supply reasons for departure if known; e.g., TERI period end, conventional retirement, resignation.

Department	Faculty	TERI end date
CHE	Stanford, Thomas G.	5/31/2012
EE	Sudarshan, Tangali	5/31/14
CSE	Eastman, Caroline	6/30/2016
CHE	Gadala-Maria, Francis	12/14/2016

CEE expects to have one retirement and to lose one faculty member to another university.

CHE - Professor Tom Stanford will retire in May, 2012 due to TERI. Two other professors are at retirement age and may retire in the next 5 years. No other departures are anticipated, but the major concern is that many of our highly productive faculty will be recruited away because of the lack of resources (e.g., space, pay raises, quality graduate students).

CSE has one faculty member currently in TERI (Eastman, Caroline), one successful faculty member attracted by an opportunity elsewhere, and two faculty members at retirement age. CSE hired one new assistant professor for fall 2012 and currently has two vacancies at the senior-level, which we expect to fill this Spring.

EE has one full professor (Sudarshan, Tangali) who will retire 5/31/14 due to TERI.

ME is not anticipating any losses due to TERI in the next five years. We may lose one or two faculty members due to retirement, although no one has formally informed the college of their impending retirement.

As for hiring for the next five years ME anticipates hiring one Nuclear Smart State Center Chair, two junior Nuclear engineering faculty, one replacement hire for Jeff Morehouse, two faculty to contribute to the new Aerospace Engineering MS/ME program. Additionally the department would like to hire 3 more faculty members in the core areas of mechanical engineering (one each in controls, design, and fluids/thermo)

4.Outline your college's actions to improve graduate education, to improve its NRC and other rankings.

The College has embarked upon a large program to re-address its graduate programs in terms of content but also new degrees that better address our strengths. In addition to new masters degrees in Aerospace Engineering (to cater for an increasing aerospace presence in the State), we have approval for a masters degree in Engineering Management – a degree in Systems Design is already entered into the approvals process. We also aim to increase the numbers of US citizens entering graduate education by improving the marketing of the accelerated masters degree, but also by the offering of degrees in an executive format (part-time, one weekend per month) – this has been shown elsewhere to increase the numbers doing part-time Ph.D.'s which greatly improves links with industry.

CEE lists the following actions:

- Added a technical writing course to increase the students' push for publication
- Increase the number of fellows of ASCE etc. in the Department

CSE lists the following actions:

- Recruit better graduate students
- Submit more interdisciplinary and multi-organizational proposals
- Reduce class sizes to improve quality of instruction
- Host international conferences and workshops

The goals for individual faculty members are to sustain ~4 Ph.D. students, 2 M.S. students, ~$200K per year in research funding, and ~2 publications per Ph.D. student per year

EE lists the following actions:

- Require PhD students to publish at least 3 papers in recognized journals before they graduate.
- Diversify funding sources for research.
- Increase total size of EE faculty to 20 in the next three years with focus on hiring faculty in the areas of (a) Biomedical sensors, imaging, implantable devices, etc., (b) RF and wireless, and (c) Power and Energy. Strategic hiring in the above areas is essential to attain a critical mass of faculty to significantly impact our standing internationally in at least two significant areas of research. Priority should be given to hiring faculty with a track record at Associate Professor level to achieve intended impact in a short period of time.

ME lists the following actions:

The department emphasizes graduate education by offering graduate courses in the areas where the faculty have research strengths, so that students working in these areas have the opportunity to take necessary courses. The tenure & promotion criteria emphasize doctoral degree production, external funding, and publications in archival journals. Recruiting high quality graduate students is done through advertising and personal visits. All of these are done to improve graduate education and help with the NRC rankings.

The CHE plan to improve graduate education, to improve its NRC and other rankings.

is stated below.

We need to improve the quality of our PhD program, and therefore our ability to recruit top candidates and make them more productive. We propose to do this by focusing in the short term on winning a major pre-doctoral training grant in one of our core areas. The effort and reforms needed to do this will elevate the entire department. We need to win recruiting battles for top students, and we can do this by providing cutting edge education and professional development to every student. We also want to improve the breadth of education by providing a more interdisciplinary research environment. Finally, we want to improve our financial competitiveness by providing incentives to top U.S. students.

It is noted that the goals, initiatives, and action plans stated below are complementary, as they should be. For instance, under Goal 1 the initiatives to increase the number, quality and productivity of PhD students also support Goal 2, to establish a large, federally-funded pre-doctoral training grant. In addition to refocusing the (limited) departmental resources, co-funding for these initiatives will be sought from the Office of the Dean and the Office of the Vice President for Research and Graduate Education. Funding can also be sought from corporate sponsors and through other development efforts. The University is set to embark on a new capital campaign in the next year or two. A well-conceived plan, backed by the faculty, its academic partners, and the upper administration will facilitate development efforts.

Goal 1: Within five years, to increase productivity, impact, and quality metrics so that our department is in the top 20 Chemical Engineering Departments among state-supported institutions. *{Achieving and promoting this goal will improve the renown of our department, aiding in the recruitment of PhD students, research associates, and faculty. Achieving this goal will drive faculty and students to higher productivity with higher quality. Achieving this goal, and publicizing it, will ultimately lead to higher reputational ranking.}*

Productivity, quality and reputational rankings are very important in attaining all three goals. Demonstrated productivity and quality influence our ability to win major grant funding and recruit strong PhD students with a respectable fraction of U.S. citizens. In addition, rankings are important in recruiting undergraduate students, attracting companies that hire our students, and in development activities such as gifts for scholarships, fellowships, and infrastructure. A strong reputation helps us recruit new faculty and develop collaborations with other top institutions.

Finally, a strong reputation in Chemical Engineering helps the University of South Carolina increase its stature and supports its efforts to develop a national statue in energy, biomedical research, nanoscience, and environmental sustainability.

Initiative 1.a. Increase the number of PhD graduates to one per year per faculty member, with 40% being U.S. citizens.

This number will include both ECHE and BMEN dissertations directed by ECHE faculty. High PhD productivity is essential to meeting our mission of educating chemical engineers for industry and the nation. Departmental and university rankings are enhanced with high PhD productivity. Many of our grants and contracts require U.S. citizens. This initiative requires several Actions to increase the number and quality of enrolled U.S. citizens.

Action Plan 1.a.1 *Modify the PhD program of study to improve flexibility and decrease the number of required courses to more closely match top-ranked peer departments.*

This action will help students better align coursework with their research interests, improving productivity. This may decrease time to degree and will allow more time focused on research. This should be more attractive when recruiting top U.S. citizens.

Action Plan 1.a.2 *Define a regular set of graduate elective offerings, including interdisciplinary offerings with our strongest partner departments, and offer at least four graduate elective courses per year.*

A reliable set of graduate electives has been a concern of past students. A reliable set of electives aligned with our strengths will aid in increasing productivity and quality, help with recruiting, and provide a basis for pre-doctoral training grant applications, see Goal 3.

Action Plan 1.a.3 *Re-focus Swearingen/Honeywell and Cantey Fellowship funds for the purpose of attracting U.S. students to graduate school with enhanced stipends and educational allowances.*

Funds can be used for relocation expenses, stipend enhancements, a Teaching Fellows program, etc. This will make USC more competitive financially in recruiting.

Action Plan 1.a.4 *Institute a program where all students will receive enhanced Professional Development training. "Professional Development" means improving students' scholarly productivity by improving their ability to find and critically assess literature, think independently, and communicate effectively in their field. This also includes instituting a program where a select number of highly qualified students may satisfy the Professional Development requirement by serving as Teaching Fellows.*

A guaranteed Professional Development program should be attractive to U.S. citizens, and also should provide a basis for developing pre-doctoral training grants (see Goal 3: Action plan 1.a.3 and 1.a.4 are coupled).

Action Plan 1.a.5 *Benchmark stipends and benefits to PhD students at top institutions, then develop and implement a schedule to increase stipends regularly to remain competitive.*

Stipends need to be nationally competitive, and allowances made in grant budgeting for inflation, for instance.

Initiative 1.b. Increase the number of peer-reviewed journal papers to an average of 5 per year per faculty member, with a focus on journals with high impact factors.

Peer-reviewed papers in high impact journals are another very important metric for strong departments. Strong journal productivity is required to win new grants. Equally as important, publishing journal papers is an essential component of graduate education, and thus our students are best served when they complete and publish a significant body of new knowledge in widely respected and read journals.

Action Plan 1.b.1= Action Plan 1.a.4 *Institute a program where all students will receive enhanced Professional Development training.*

Not only will a Professional Development program help in recruiting, it will accelerate student research productivity, specifically in their ability to conduct and communicate research, increasing the number of papers published.

Action Plan 1.b.2 *Raise the bar on the departmental PhD requirement for papers so that each PhD graduate must have at least one accepted journal paper, and three additional papers submitted.*

The current publication "bar" (minimum) is that all PhD students must submit three journal papers prior to being granted the PhD. While this bar had a strong impact several years ago when instituted, the number of journal papers published by the faculty has remained relatively flat despite growth in the number of faculty. Raising the bar, combined with providing Professional Development training, will increase the number of journal papers.

Action Plan 1.b.3 *Examine the regulations and incentives regarding joint advising of PhD students. Seek to increase opportunities for working with a second advisor, especially those outside the Department of Chemical Engineering.*

It is believed that working with strong external collaborators will increase the number of top-quality students and the number of papers published. Tenure and promotion regulations and other policies, as well as historical and cultural matters, may actually discourage collaborations outside the department. These matters need to be investigated and, if substantiated, addressed appropriately.

Action Plan 1.b.4 *Establish a Professional Communications Center in the Department or College.*

Establishing such a Center will increase publication productivity, relieve some of the editing burden on the faculty, and will also be an attractive resource for recruiting students.

Action Plan 1.b.5 *Track Journal Impact Factors and Citations by Faculty, and make these an explicit part of annual reviews and promotion/tenure reviews.*

Tracking these metrics should encourage faculty and their students to aim for the highest impact journal possible.

Initiative 1.c. Enhance publicity and outreach efforts. USC lags other top departments in promoting the accomplishments of its students and faculty.

Action Plan 1.c.1 *Convene an external group of advisors to develop a marketing plan. Follow up by working with the Dean to prepare the various materials to be disseminated. This Action includes improvement of the departmental web site.*

Action Plan 1.c.2 *Appoint a coordinator to nominate faculty for national awards, and for fellow (or similar) positions within professional societies.*

Action Plan 1.c.3 *Establish a named research seminar series to accompany the Neva Gibbons Educational Seminar, and aggressively promote both of these nationwide.*

Goal 2: Within two years, to obtain one major, federally-funded pre-doctoral training grant (e.g. IGERT, GAANN, or NIH pre-doctoral grant). *{Achieving this goal will establish USC Chemical Engineering as a national leader in one area of research and graduate education. This will improve the renown of the department, and will aid in recruiting highly qualified U.S. citizens.}*

The department (and the college and university) need long-term, stable funding for major team-based research projects. Large project funding is essential for solving some of society's most difficult projects. Establishing a nationally-recognized pre-doctoral training program may be a prerequisite to such funding. In addition, the steps taken to win such a grant will affect the overall culture of the entire PhD program. The Department has reached a size and maturity that it should be leading at least one such pre-doctoral training program. **Note that several of the initiatives and action plans listed under Goal 1 will also enhance our goal of winning a major pre-doctoral training grant. Additional initiatives and actions for Goal 2 now follow.**

Initiative 2.a. Identify one or two target areas where Chemical Engineering can lead a major pre-doctoral training grant.

There are many strong individual programs and small groups in the department. Valiant efforts have been made in the past to win an IGERT, without success. We believe that promising areas should be identified with the help of impartial experts, and that a long-term effort must be incentivized, seeded, and followed.

Action Plan 2.a.1 *Convene a panel of advisors, both internal and external, to review departmental strengths, promising partnerships, leading to identification of realistic opportunities for a training grant.*

An outside panel of experts (IGERT winners, former program managers, leaders in the field) will provide perspective that is not available from the departmental faculty. They will help identify the highest probabilities for success, and will advise and critique the proposals for pre-doctoral training.

Action Plan 2.a.2 *Select proposal leaders and empower them to go after the center for the next four years. Obtain support for released time, travel/development funds, seed funds for innovative courses, consultants, etc.*

Efforts to date to win an IGERT have been undertaken by faculty as an overload, on top of other responsibilities. This approach has not worked to date. The effort in communicating, traveling, partnering etc. requires dedicated time.

Action Plan 2.a.3= Action Plan 1.b.3 *Identify barriers to collaboration, and overcome these so that a more collaborative culture results.*

Just as collaboration is important to increasing productivity, it is essential to establishing the research and educational programs needed to win a high-profile pre-doctoral training grant.

There are concerns however with achieving these goals. Past efforts to land an NSF Engineering Research Center, Materials Science Research Center, or other large programs have not been rewarded. Likewise, several efforts to land an IGERT have not been successful. Competition for grants is becoming increasingly stiff. The department and the college have not broken through in terms of major NIH R01 grants yet. The Biomedical Engineering component needs an established, funded senior leader or two with a national reputation. It is becoming increasingly difficult to recruit a sufficient number of strong domestic students to the program.

A major concern in the next handful of years is the increase in the number of required and elective courses we need to teach with the formation of the biomedical engineering program. This situation is accentuated by the ultimate loss of Professors Van Brunt and Stanford from teaching. It is unclear how we will go forward with the teaching of excellent design and safety courses, and provide an adequate number of electives for our graduate and undergraduate students. Although we are teaching more students, the number of B.S. chemical engineering graduates is too small to garner broad national attention from corporate recruiters. The opportunity to support the BMEN program is exciting and beneficial; however, the production of BMEN bachelor's degrees will not be recognizable in national databases or reputational rankings.

The research computing infrastructure is not nationally competitive. For teaching, classrooms are plain, unattractive, lacking in technology, and inferior to community colleges and probably many high schools. The number of support staff is small, and the planned increase in number of faculty, graduate students, and undergraduate students will tax our people even more. Splitting faculty and students between Swearingen, Horizon and Catawba will strain the staff even further. We do not have sufficient trained staff or funds to support outreach and PR efforts, including web pages, mailings, and brochures.

5.Describe your methods for placing your Ph.D. and other terminal degree students in tenure track positions at high ranking institutions.

Civil and Environmental Engineering

- Inviting more department chairs/NAE fellows to give seminars in the department.
- Increasing the number of invitations that our faculty get to give seminars at other schools
- Informing colleagues at other schools and former students of mine that have faculty jobs about our new Ph.Ds.

Chemical Engineering

- *Institute a program where all students will receive enhanced Professional Development training.*

  Not only will a Professional Development program help in recruiting, it will accelerate student research productivity, specifically in their ability to conduct and communicate research, increasing the number of papers published.

- *Institute a program where all students will receive enhanced Professional Development training. "Professional Development" means improving students' scholarly productivity by improving their ability to find and critically assess literature, think independently, and communicate effectively in their field. This also includes instituting a program where a select number of highly qualified students may satisfy the Professional Development requirement by serving as Teaching Fellows.*

  A guaranteed Professional Development program should be attractive to U.S. citizens, and also should provide a basis for developing pre-doctoral training grants *Institute a program where all students will receive enhanced Professional Development training. "Professional Development" means improving students' scholarly productivity by improving their ability to find and critically assess literature, think independently, and communicate effectively in their field. This also includes instituting a program where a select number of highly qualified students may satisfy the Professional Development requirement by serving as Teaching Fellows.*

A guaranteed Professional Development program should be attractive to U.S. citizens, and also should provide a basis for developing pre-doctoral training grants.

Computer Science and Engineering

- We encourage and help Ph.D. students to publish their papers in top conferences and journals from the early stages of their Ph.D. study. We then support them to attend top conferences. These will increase their interest in academic careers.

Electrical Engineering

- Recruit excellent graduate students.
  - Approach: Create a departmental fund to support grad students for 1-2 semesters before they are picked up by individual professors.

    - o Action Item: Grad Committee will make recommendations with specifics on the number of students to be admitted next year with a budget request to the department.
- Attract good US students to our graduate programs, although we are making some headway here.

Mechanical Engineering

There is no formal program in place for placing PhD students in tenure track positions. Doctoral students with potential for faculty positions are given opportunity to teach classes, they are encouraged to publish journal articles. The department shares partial cost for travel if the student makes conference presentations. After they graduate our PhDs are encouraged to apply for post doctoral and faculty positions. The departmental faculty members do their best in recommending the PhD students to their peers in high ranking institutions

Funding Sources:

1. “E” fund balances, by account, as of June 30, 2009, 2010, and 2011.

   See report below.

End-FY2011, End-FY2010, End-FY2009

Rsp	Dfund	Dfund Description	End FY2009	End FY2010	End FY 2011
40	15500E100	COLLEGE INCUBATOR CENTER	11,780.90	11,164.23	10,562.80
40	15500E150	RESEARCH INCENTIVE	1,248,618.91	602,695.02	813,682.57
40	15500E154	RESEARCH INCENTIVE - REIFSNIDER	147,443.43	145,623.43	595,444.18
40	15500E155	RESEARCH INCENTIVE - BOCCANFUSO	2,885.33	2,422.97	9,322.41
40	15500E156	RESEARCH INCENTIVE - MARTHA REIFSNIDEI	-	-	-
40	15500E200	RESEARCH INCENTIVE - WENYUAN XU	37,789.88	465.61	-
40	15500E201	RESEARCH INCENTIVE - JONATHAN L GOODA	25,321.49	17,749.63	14,420.76
40	15500E203	RESEARCH INCENTIVE ANDREAS XIAOMING I	30,549.96	43,208.54	-
40	15500E204	RESEARCH INCENTIVE GUIREN WANG	24,561.90	14,154.37	-
40	15500E205	RESEARCH INCENTIVE JAMES BLANCHETTE	34,227.34	63,873.30	16,094.77
40	15500E206	RESEARCH INCENTIVE JIANJYN HU	37,171.85	3,442.20	760.44
40	15500E207	RESEARCH INCENTIVE ANDREAS HEYDEN	11,053.18	49,480.24	(5,391.80)
40	15500E208	RESEARCH INCENTIVE- O`KANE	38,905.48	28,577.68	(84.70)
40	15500E209	RESEARCH INCENTIVE - CHEN	36,554.86	89,352.45	79,427.20
40	15500E210	RESEARCH INCENTIVE - XUE	11,355.71	14,854.53	20,035.83
40	15500E211	RESEARCH INCENTIVE - KHERADVAR	44,080.37	20,043.64	-
40	15500E212	STARTUP FUNDS - HUYNH	34,981.23	19,351.23	5,325.35
40	15500E213	STARTUP FUNDS - ZHAO	71,282.05	139,276.03	88,017.28
40	15500E214	N BERGE STARTUP	32,401.63	6,399.46	6,302.49
40	15500E215	N SALEH STARTUP	16,665.04	(6,971.91)	-
40	15500E216	Y YOON STARTUP	25,873.80	9,567.89	5,625.12
40	15500E217	K MANDAL STARTUP	-	22,435.55	52,262.07
40	15500E218	MAX ALEKSEYEV STARTUP	37,264.03	65,880.53	29,540.92
40	15500E219	D KAOUMI STARTUP	(4,225.95)	52,864.38	90,739.64
40	15500E220	CHEN LI STARTUP	-	13,316.15	50,528.56
40	15500E221	CHANDRASHEKHAR STARTUP	-	183,582.95	151,910.47
40	15500E222	DEVIN HUANG STARTUP	-	48,235.36	22,929.54
40	15500E223	XIAO-DONG ZHOU STARTUP	-	20,626.20	77,969.13
40	15500E224	XINYU HUANG STARTUP	-	(199,170.30)	7,743.48
40	15500E225	ROBERT MULLEN STARTUP	-	70,403.69	19,080.78
40	15500E226	FABIO MATTA STARTUP	-	25,439.51	4,737.42
40	15500E227	HERBERT GINN III STARTUP	-	-	12,000.00
40	15500E228	TAREK SHAZLY STARTUP		50,000.00	(24,288.67)
40	15500E229	EHSAN JABBARZADEH STARTUP	-	-	65,075.63
40	15500E230	LINGYU (LUCY) YU STARTUP	-	-	43,415.00
40	15500E231	CHUNYANG LIU STARTUP	-	-	20,601.35
40	15500E232	JEONG-HOON SONG STARTUP	-	-	24,514.08
40	15500E233	YAN TONG STARTUP	-	-	23,704.55

Rsp	Dfund	Dfund Description	End FY2009	End FY2010	End FY 2011
40	15500E235	JASON HATTRICK-SIMPERS STARTUP	-	-	-
40	15500E401	UNRESTRICTED REIMBURSEMENT-USC EDUC	14,424.55	(36,668.67)	(38,041.77)
40	15500E402	CEC FACILITIES USE AGREE-MICROELECTRIC	-	-	26,123.00
40	15500E700	ENGINEERING STUDENT COMPUTER FEE	68,739.28	3,554.32	58,178.70
40	15500E900	PROJECT LEAD THE WAY CONFERENCE	215,022.21	139,006.38	232,252.73
40	15500E901	CONTINUING EDUCATION	37,620.84	10,450.57	13,874.87
40	15510E150	RESEARCH INCENTIVE	63,983.02	92,069.32	(44,006.29)
40	15510E151	DISTINGUISHED SCIENTIST START-UP ACCOU	113,680.19	104,998.32	90,651.22
40	15510E159	CHEMICAL ENGINEERING	1,550.77	(2,041.60)	(918.09)
40	15510E160	CHEMICAL ENG SEMINAR	(1,219.59)	(2.14)	(8,020.15)
40	15510E233	RESEARCH INCENTIVE ACCOUNT DAVIS	-	23,466.09	-
40	15510E234	RESEARCH INCENTIVE ACCOUNT GADALA-M	3,845.67	4,243.44	(6,433.27)
40	15510E235	RESEARCH INCENTIVE ACCOUNT GATZKE	218.04	126.60	69.90
40	15510E236	RESEARCH INCENTIVE ACCOUNT JABBARI	61.52	(185.21)	-
40	15510E237	RESEARCH INCENTIVE ACCOUNT MATTHEW	171.85	171.85	(3,474.39)
40	15510E238	RESEARCH INCENTIVE ACCOUNT MOSS	2,871.07	(4,841.97)	(1,103.35)
40	15510E239	RESEARCH INCENTIVE ACCOUNT PLOEHN	810.45	40,408.90	(3,672.83)
40	15510E240	RESEARCH INCENTIVE ACCOUNT RITTER	(1,979.22)	(776.71)	(8.21)
40	15510E241	RESEARCH INCENTIVE ACCOUNT POPOV	2,711.24	(494.31)	(367.48)
40	15510E242	RESEARCH INCENTIVE ACCOUNT VAN ZEE	3,672.55	25,668.96	(5,137.99)
40	15510E243	RESEARCH INCENTIVE ACCOUNT WEIDNER	(9,413.69)	(545.50)	(79.93)
40	15510E244	RESEARCH INCENTIVE ACCOUNT WHITE	40,604.95	25,211.99	-
40	15510E245	RESEARCH INCENTIVE - AMIRIDIS	(11,661.54)	411.12	(21,497.07)
40	15510E247	RRESEARCH INCENTVIE - LAUTERBACH	-	-	-
40	15510E248	RRESEARCH INCENTVIE - JABBARZADEH	-	-	-
40	15510E300	DOCTORIAL EDUCATION FUND	49,365.05	20,830.02	54,874.07
40	15520E150	RESEARCH INCENTIVE	128,641.92	49,302.58	24,504.58
40	15520E212	RESEARCH INCENTIVE JUAN CAICEDO	26,087.48	9,762.77	3,914.83
40	15520E216	RESEARCH INCENTIVE M HANIF CHAUDHRY	150,844.61	149,588.61	154,980.04
40	15520E217	RESEARCH INCENTIVE JASIM IMRAN	12,702.38	14,217.61	12,936.14
40	15520E219	RESEARCH INCENTIVE DIMITRIS RIZOS	2,983.03	6,935.84	2,507.43
40	15520E220	RESEARCH INCENTIVE PAUL ZIEHL	15,550.52	21,918.58	21,528.94
40	15520E221	RESEARCH INCENTIVE RONALD BAUS	1,330.20	0.75	467.82
40	15520E222	RESEARCH INCENTIVE JOSEPH FLORA	2,874.75	2,529.96	2,166.29
40	15520E223	RESEARCH INCENTIVE SARAH GASSMAN PIEI	1,643.78	2,203.65	1,307.41
40	15520E224	RESEARCH INCENTIVE CHARLES PIERCE	191.57	115.34	290.71
40	15520E225	RESEARCH INCENTIVE RICHARD RAY	3,292.55	(95.14)	(21.86)
40	15520E226	CIVIL & ENV ENG / GOODALL IDC	1,574.22	3,991.11	2,337.89
40	15520E227	CIVIL & ENV ENG/N HUYNH IDC	-	1,266.14	7,336.59
40	15520E250	PIRE	51,272.96	48,695.36	51,636.11
40	15520E300	DOCTORIAL EDUCATION FUND	8,330.42	14,973.52	10,713.79
40	15520E400	FABIO MATTA PIRA AWARD	-	-	17,847.56
40	15530E150	RESEARCH INCENTIVE	367,670.00	376,721.76	254,613.42
40	15530E203	ELEC ENG RESEARCH INC -- DOUGAL	47,352.60	31,798.77	32,717.86
40	15530E204	ELEC ENG RESEARCH INCEN- SUDARSHAN	31,133.66	40,218.29	92,977.35
40	15530E205	RESEARCH INCENTIVE - ALI	(106.72)	558.15	1,431.01
40	15530E206	RESEARCH INCENTIVE - KHAN	2,980.54	25,436.62	530.46
40	15530E207	RESEARCH INCENTIVE - KOLEY	6,296.00	10,128.80	14,457.72
40	15530E208	RESEARCH INCENTIVE - MONTI	1,988.31	1,988.31	1,988.31

Rsp	Dfund	Dfund Description	End FY2009	End FY2010	End FY 2011
40	15530E210	RESEARCH INCENTIVE - SANTI	7,778.23	6,422.14	4,417.25
40	15530E211	RESEARCH INCENTIVE - SHIN	1,019.31	621.13	3,218.09
40	15530E212	RESEARCH INCENTIVE - SIMIN	(149.83)	2,757.25	7,095.41
40	15530E214	KRISHNA MANDAL RESEARCH INCENTIVE	-	-	1,819.50
40	15530E215	MVS CHANDRASHEKARAN RESEARCH	-	-	-
40	15530E216	HERBERT GINN RESEARCH INCENTIVE	-	-	-
40	15530E250	EE PHD STUDENT TRANSFER FUND	-	-	75,000.00
40	15530E300	DOCTORIAL EDUCATION FUND	29,773.53	42,251.53	66,539.28
40	15530E400	VIRTUAL TEST BED ANNUAL REVEIW	1,960.59	(519.94)	17.94
40	15540E150	RESEARCH INCENTIVE	168,992.06	119,853.17	273,871.69
40	15540E222	RESEARCH INCENTIVE	-	-	-
40	15540E223	RESEARCH INCENTIVE - SARAH BAXTER	1,475.24	2.55	90.76
40	15540E224	RESEARCH INCENTIVE - ABDEL BAYOUMI	15,313.57	24,928.42	34,276.42
40	15540E225	RESEARCH INCENTIVE - YUH CHAO	50,587.55	35,438.98	30,345.25
40	15540E226	RESEARCH INCENTIVE - XIAOMIN DENG	12,316.66	15,061.74	13,554.86
40	15540E227	RESEARCH INCENTIVE - VICTOR GIURGIUTIU	4,030.00	44,935.32	31,519.79
40	15540E228	RESEARCH INCENTIVE - JAMIL KHAN	16,217.37	18,440.43	16,444.40
40	15540E229	RESEARCH INCENTIVE - XIAODONG LI	4,377.50	9,130.91	7,085.91
40	15540E230	RESEARCH INCENTIVE - JED LYONS	1,149.69	1,149.69	458.40
40	15540E231	RESEARCH INCENTIVE - STEPHEN MCNEILL	5,653.28	6,448.52	6,488.52
40	15540E232	RESEARCH INCENTIVE - ANTHONY REYNOLD	54,353.82	42,180.86	10,562.56
40	15540E233	RESEARCH INCENTIVE - MICHAEL SUTTON	28,451.12	21,050.57	7,535.82
40	15540E234	RESEARCH INCENTIVE - K REIFSNIDER	-	-	5,692.52
40	15540E235	FRANK CHEN RESEARCH INCENTIVE	-	-	2,418.16
40	15540E236	TRAVIS KNIGHT RESEARCH INCENTIVE	-	-	1,575.67
40	15540E237	XINGJIAN (CHRIS) XUE RESEARCH INCENTIVE	-	-	21,819.02
40	15540E239	GUIREN WANG RESEARCH INCENTIVE	-	-	189,664.58
40	15540E240	RESEARCH INCENTIVE- XIAOMING HE	-	-	-
40	15540E300	DOCTORIAL EDUCATION FUND	42,997.13	55,790.50	57,835.45
40	15540E400	CENTER FOR ADVANCED MANUFACTURING	87,957.07	107,457.07	135,561.94
40	15540E401	ADVANCED MATERIALS INSTITUTE	150,802.93	123,500.48	124,009.53
40	15540E402	SC CARDIOVASCULAR COBRE GRANT	-	22,900.00	4,447.65
40	15540E403	TAREK SHAZLY PIRA AWARD	-	-	16,796.02
40	15580E150	RESEARCH INCENTIVE	51,474.22	32,953.92	22,995.88
40	15590E150	RESEARCH INCENTIVE	131,338.97	93,049.22	160,165.85
40	15590E300	DOCTORIAL EDUCATION FUND	61,144.04	80,411.46	66,314.78
		TOTAL	4,345,270.46	3,791,879.63	4,788,081.62

2. Gifts and pledges received in FY 2011.

UNIVERSITY OF SOUTH CAROLINA

Development Summary by Division

Columbia-Engineering and Computing - 0014

July - June 30, 2011

Cash Gifts from Prior Activity	FY 11
a. Pledge Payments Received	$7,508,413.05
b. Estate Gifts Received	$57,772.00
Subtotal (a + b)	$7,566,185.05

New Cash/Commitments	FY 11
c. New Cash/Property/In-Kind Grants	$19,602,655.50
d. New Pledges for Future Cash	$1,551,446.24
e. New Documented Planned Gifts (Irrevocable) Cat. B	$0.00
f. New Documented Planned Gifts (Revocable) Cat. C	$40,000.00
Subtotal (c + d + e + f)	$21,194,101.74

Number of Donors in New Cash/Commitments	FY 11
Number of Donors YTD	681

Proposals	FY 11
Proposals Received from All DoD's for this Division	12
Value of Proposals	$3,405,000.00
Average Proposal	$283,750.00

Proposal Outcomes	$	#	FY 11 "Batting Average"
Funded	$1,055,788.75	7	58.00%
Still Pending	$1,055,000.00	3	25.00%
Rejected	$225,000.00	2	17.00%
Withdrawn	$0.00	0	

Super Division

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07/15/2011

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
31533 CARRYFORWARD DEFICIT											
31534 CARRYFORWARD SURPLUS	$ 854,851	$ 1,530,324	$ 2,330,510	$ 2,460,562	$ 1,684,249	$ 882,270	$ 1,574,694	$ 867,843	$ 605,656	$ 443,469	$ 420,024
BUDGETED AMOUNTS FOR ALLOCATIONS (3):											
31500/25/26 STATE APPROPRIATIONS/ GENERAL FUND	$ 13,939,345	$ 12,767,446	$ 12,995,375	$ 11,521,354	$ -						
31510 BUDGET CUT	$ -	$ -	$ (850,192)	$ (245,805)	$ -						
31900 COLUMBIA UNIT BASE BUDGET	$ -				$ 15,092,222	$ 16,128,857	$ 17,563,391	$ 18,453,468	$ 18,453,468	$ 18,453,468	$ 18,453,468
363XX ONE TIME FROM OTHER RESPONSIBILITIES	$ 1,628,130	$ 2,358,967	$ 1,660,858	$ 1,014,048	$ 2,011,675	$ 2,508,166	$ 2,604,333	$ 318,333	$ 163,333	$ 80,000	$ 80,000
368XX ONE TIME TO OTHER RESPONSIBILITIES	$ -	$ (239,637)	$ (217,942)	$ (74,361)	$ (126,719)	$ (96,327)	$ (125,000)	$ (125,000)	$ (125,000)	$ (125,000)	$ (125,000)
36400 ONE TIME INTRAFUND TRANSFER IN	$ -										
36500 ONE TIME INTRAFUND TRANSFER OUT	$ -										
373XX PERMANENT FROM OTHER RESPONSIBILITIES	$ 1,200,000	$ 895,556	$ 377,000	$ 783,000	$ 1,036,635	$ 1,434,534	$ 890,077	$ -	$ -	$ -	$ -
378XX PERMANENT TO OTHER RESPONSIBILITIES	$ -										
37400 PERMANENT INTRAFUND TRANSFER IN	$ -										
37500 PERMANENT INTRAFUND TRANSFER OUT	$ -		$ (168,368)								
TOTAL ALLOCATIONS	**$ 17,622,326**	**$ 17,312,656**	**$ 16,127,241**	**$ 15,458,798**	**$ 19,698,062**	**$ 20,857,500**	**$ 22,507,495**	**$ 19,514,644**	**$ 19,097,457**	**$ 18,851,937**	**$ 18,828,492**
REVENUES RECEIVED											
ALL 4XXXXX	$ 8,114,242	$ 8,750,720	$ 10,051,799	$ 11,552,104	$ 1,599,237	$ 1,884,325	$ 1,783,727	$ 1,780,210	$ 1,780,210	$ 1,780,210	$ 1,780,210
NET TRANSFERS											
611XX TRANSFER FROM	$ 17,364	$ 1,217,352	$ 1,535,614	$ 1,762,253	$ 140,966	$ -					
861XX TRANSFER TO	$ (8,917,092)	$ (7,639,379)	$ (7,460,908)	$ (7,660,944)	$ (79,878)	$ (250,211)					
NET TRANSFERS	$ (8,899,728)	$ (6,422,027)	$ (5,925,294)	$ (5,898,691)	$ 61,088	$ (250,211)					
TOTAL RESOURCES	**$ 16,836,840**	**$ 19,641,349**	**$ 20,253,746**	**$ 21,112,211**	**$ 21,358,387**	**$ 22,491,614**	**$ 24,291,222**	**$ 21,294,854**	**$ 20,877,667**	**$ 20,632,147**	**$ 20,608,702**
RESOURCES LESS CARRYFORWARD	*$ 15,981,989*	*$ 18,111,025*	*$ 17,923,236*	*$ 18,651,649*	*$ 19,674,138*	*$ 21,609,344*	*$ 22,716,528*	*$ 20,427,011*	*$ 20,272,011*	*$ 20,188,678*	*$ 20,188,678*
USES											
ALL 5XXXX	$ 15,343,640	$ 17,357,696	$ 17,840,376	$ 19,458,728	$ 20,525,728	$ 20,973,551	$ 23,473,379	$ 20,739,198	$ 20,484,198	$ 20,262,123	$ 20,239,598
ALL 6XXXX	$ (37,124)	$ (46,857)	$ (47,192)	$ (78,822)	$ (50,010)	$ (56,631)	$ (50,000)	$ (50,000)	$ (50,000)	$ (50,000)	$ (50,000)
TOTAL USES	**$ 15,306,516**	**$ 17,310,839**	**$ 17,793,184**	**$ 19,379,906**	**$ 20,475,718**	**$ 20,916,920**	**$ 23,423,379**	**$ 20,689,198**	**$ 20,434,198**	**$ 20,212,123**	**$ 20,189,598**
NET	**$ 1,530,324**	**$ 2,330,510**	**$ 2,460,562**	**$ 1,732,305**	**$ 882,669**	**$ 1,574,694**	**$ 867,843**	**$ 605,656**	**$ 443,469**	**$ 420,024**	**$ 419,104**
NET EXCLUDING CARRYFORWARD	*$ 675,473*	*$ 800,186*	*$ 130,052*	*$ (728,257)*	*$ (801,580)*	*$ 692,424*	*$ (706,651)*	*$ (262,187)*	*$ (162,187)*	*$ (23,445)*	*$ (920)*

Appendix 4

Departmental Summaries

Describe Your College's Top Strengths and Important Accomplishments Achieved in the Last Five Years.

Department of Civil and Environmental Engineering strengths and accomplishments

- A group of Assistant Professors (and new associate professor) that are changing the culture and expectations of the department (research, scholarly activities)
- Number of CAREER awards in the department over the past 5 years.
- The increase in the number of "center like" proposals written (and funded) at the department. Initial success is indicated by being site visited for an ERC and obtaining TIP funding in structural sensors.

Department of Chemical Engineering strengths and accomplishments

The departments' research strengths include large, well-established and recognized groups in electrochemical engineering and catalysis. The department is considered a leader, or major player, in the university's energy, biomedical, and nanotechnology initiatives. We have broad-based funding from both government and industry and have been in the top 20 in terms of research expenditures for approximately a decade. Our research productivity metrics (PhDs graduated, papers published, research expenditures) have us inside or near the top 25 (state-assisted) departments in the country on both a total and per TT faculty status. The faculty take pride in, and ownership of, the graduate program. We have an active and engaged graduate student group. Many of the faculty have national leadership positions (e.g. editorial boards, editorship, society leadership). Several of the university's Centers of Economic Excellence (CoEE) involve the department, and two are lead from here (Professor Jochen Lauterbach, CoEE in Strategic Approaches to the Generation of Electricity; Professor John Regalbuto, CoEE in Catalysts for Renewable Fuels).

Strengths of the undergraduate program begin with a strong record of individual excellence: numerous NSF Graduate Fellows and winners of other major fellowships, and placement in top graduate and medical schools. There are many excellent teachers in the department, and most take great care in advising and mentorship. We have a strong record of undergraduate research. We have an active AIChE student chapter and are ABET accredited. The Rothberg and other departmental scholarship funds are great assets. Upper-level courses such as the laboratory, separations, safety, and design have been well-spoken of by graduating seniors.

The top accomplishments in the past five years include (1) hiring talented new faculty, including two CoEE Chairs; (2) contributing to the start-up and growth of the BMEN program; (3) maintaining the university's only NSF-funded research center; (4) maintaining

and actually increasing funding in very competitive times; (5) leading several successful CoEE programs, NSF RII grants, and INBRE grants, with the associated faculty hires; (6) maintaining the NSF REU program; (7) Professor Van Brunt's winning of the university's Mungo Teaching Award, Professor Ralph White the university's Russell Research Award, Professor Jim Ritter the Education Foundation Research Award, and Professor Melissa Moss the Governor's Young Scientist Award; (8) Professors Matthews, Weidner and White being named Fellows of the ACS, ECS and AIChE, respectively, and (9) continued record of undergraduate student success with scholarships and fellowships.

Department of Computer Science and Engineering strengths and accomplishments

- Excellent and energetic faculty: 19 of 21 faculty members have had active funding within the last year; current funding level is $120K / tenure-track faculty member
- Nine members of the faculty are NSF Career Award winners!
- Research and education strengths in bioinformatics, security, distributed computing, computer networks, and artificial intelligence
- Research results are being published in the top journals and at the top conferences in each area of specialization
- Graduate student quality is increasing
- All degree programs are accredited
- NSA- and CNSS-Certified National Center of Academic Excellence in Information Assurance Education

Department of Electrical Engineering strengths and accomplishments

- World Class programs in Microelectronics and Photonics and in Simulation Environments, evidenced by Visibility, Recognition, Publications, PhDs, Post Docs, and Grants.
    - Demonstrated transition of the research program into the commercial domain: SET, BGT (now CREE), SysEDA, and Nitek. Significant impact on economic development. At USC, the EE Department has been rather unique in this respect, in spite of being a small department.
- Significant revisions to the undergraduate curriculum with more hands-on laboratory experiences starting with ELCT 101 aimed at improving retention.
- Revamping of our undergraduate laboratory program offering greater hands-on experience for students with the hiring of David Metts, EE Laboratory Manager; Project-based undergraduate labs starting with the first lab, ELCT 201.
- Streamlined EE office for efficiency and productivity.
- Excellent *intranet*-based ABET process aimed at automatic preparation of self-study report. The system now has a permanent place on our intranet to continually monitor the status and allow for planning for future improvements; historical data are stored securely. No issues or concerns regarding the EE undergraduate program were cited during the 2011 ABET site visit.
- Number of PhDs graduated/year/faculty, averaged over 5 years = 0.65

Department of Mechanical Engineering strengths and accomplishments

The top strengths are:

i. Quality of in-class instruction
ii. Future Fuels, specifically related to high temperature materials research for SOFC
iii. Experimental mechanics (fracture mechanics, Digital Image Correlations)
iv. Structural Health Monitoring and Condition Based Maintenance
v. Joining, specifically Friction Stir Welding and processing
vi. Nuclear Fuels Research

Important accomplishments are:

a. Impressive NRC ranking
b. Significant increase in undergraduate and PhD enrolments
c. Research funding up by 30%
d. Hired several outstanding junior faculty
e. Award of EFRC
f. Home of NSF-IUCRC in friction stir welding
g. Significant funding increase in CBM
h. Hired Nuclear Science Smart State Center Chair

Discuss Your College's Weaknesses and Your Plans for Addressing those Weaknesses.

Department of Civil and Environmental Engineering weaknesses/issues

Weakness

- Keeping morale up without raises
- Some area of the department need better mentoring of new and mid career faculty
- Need to increase the scholarly culture in the department
- Space for large testing facilities (hydraulic flumes)

Action items to address:

- Hire more senior geotech faculty
- Increase cross department and college group research projects
- Modify Seminar series to be more engaging of faculty

Department of Chemical Engineering weaknesses/issues

Four major weaknesses/issues are:

1. Research space
2. Number of U.S. PhD students
3. Base-line support of graduate students
4. National reputation

Research space is an issue college-wide and must be addressed in close coordination with the dean's office. Delays in finishing the labs in Horizon and Catawba have created serious issues with research productivity since considerable amount of equipment has remained unused in boxes. Once the construction on the first floor of Horizon and the renovations in

Catawba are complete this spring, some temporary relief will occur. Once the fourth floor of Horizon in complete (projections are 2-3 years), additional relief will occur. However, planning for research space beyond that is critical

The other three items on the list above are interrelated in a complex way. A strictly reputational ranking (like U.S. News and World Report, which uses no objective data) is not a goal that we can push directly. Therefore, we must push on those metrics that we can influence. Given the relation between the department's reputation and faculty productivity on the one hand, and the number, quality, and productivity of its graduate students, on the other hand, our goals are aimed at affecting this relationship. We need to improve our overall performance so that the quality and impact metrics are well within the top 20 among public departments. Lacking a sound, objective, and timely national ranking measure (NRC rankings are too infrequent), it will be up to us to identify the appropriate metrics, measure ourselves and others objectively, and then persuade sponsors, benefactors, alumni, government, and peers that we are indeed top 20.

We need to improve the quality of our PhD program, and therefore our ability to recruit top candidates and make them more productive. We propose to do this by focusing in the short term on winning a major pre-doctoral training grant in one of our core areas. The effort and reforms needed to do this will elevate the entire department. We need to win recruiting battles for top students, and we can do this by providing cutting edge education and professional development to every student. We also want to improve the breadth of education by providing a more interdisciplinary research environment. Finally, we want to improve our financial competitiveness by providing incentives to top U.S. students.

It is noted that the goals, initiatives, and action plans stated below are complementary, as they should be. For instance, under Goal 1 the initiatives to increase the number, quality and productivity of PhD students also support Goal 2, to establish a large, federally-funded pre-doctoral training grant. In addition to refocusing the (limited) departmental resources, co-funding for these initiatives will be sought from the Office of the Dean and the Office of the Vice President for Research and Graduate Education. Funding can also be sought from corporate sponsors and through other development efforts. The University is set to embark on a new capital campaign in the next year or two. A well-conceived plan, backed by the faculty, its academic partners, and the upper administration will facilitate development efforts.

Goal 1: Within five years, to increase productivity, impact, and quality metrics so that our department is in the top 20 Chemical Engineering Departments among state-supported institutions. *{Achieving and promoting this goal will improve the renown of our department, aiding in the recruitment of PhD students, research associates, and faculty. Achieving this goal will drive faculty and students to higher productivity with higher quality. Achieving this goal, and publicizing it, will ultimately lead to higher reputational ranking.}*

Productivity, quality and reputational rankings are very important in attaining all three goals. Demonstrated productivity and quality influence our ability to win major grant funding and recruit strong PhD students with a respectable fraction of U.S. citizens. In addition, rankings are important in recruiting undergraduate students, attracting companies that hire our

students, and in development activities such as gifts for scholarships, fellowships, and infrastructure. A strong reputation helps us recruit new faculty and develop collaborations with other top institutions. Finally, a strong reputation in Chemical Engineering helps the University of South Carolina increase its stature and supports its efforts to develop a national statue in energy, biomedical research, nanoscience, and environmental sustainability.

Initiative 1.a. Increase the number of PhD graduates to one per year per faculty member, with 40% being U.S. citizens.

This number will include both ECHE and BMEN dissertations directed by ECHE faculty. High PhD productivity is essential to meeting our mission of educating chemical engineers for industry and the nation. Departmental and university rankings are enhanced with high PhD productivity. Many of our grants and contracts require U.S. citizens. This initiative requires several Actions to increase the number and quality of enrolled U.S. citizens.

Action Plan 1.a.1 *Modify the PhD program of study to improve flexibility and decrease the number of required courses to more closely match top-ranked peer departments.*

This action will help students better align coursework with their research interests, improving productivity. This may decrease time to degree and will allow more time focused on research. This should be more attractive when recruiting top U.S. citizens.

Action Plan 1.a.2 *Define a regular set of graduate elective offerings, including interdisciplinary offerings with our strongest partner departments, and offer at least four graduate elective courses per year.*

A reliable set of graduate electives has been a concern of past students. A reliable set of electives aligned with our strengths will aid in increasing productivity and quality, help with recruiting, and provide a basis for pre-doctoral training grant applications, see Goal 3.

Action Plan 1.a.3 *Re-focus Swearingen/Honeywell and Cantey Fellowship funds for the purpose of attracting U.S. students to graduate school with enhanced stipends and educational allowances.*

Funds can be used for relocation expenses, stipend enhancements, a Teaching Fellows program, etc. This will make USC more competitive financially in recruiting.

Action Plan 1.a.4 *Institute a program where all students will receive enhanced Professional Development training. "Professional Development" means improving students' scholarly productivity by improving their ability to find and critically assess literature, think independently, and communicate effectively in their field. This also includes instituting a program where a select number of highly qualified students may satisfy the Professional Development requirement by serving as Teaching Fellows.*

A guaranteed Professional Development program should be attractive to U.S. citizens, and also should provide a basis for developing pre-doctoral training grants (see Goal 3: Action plan 1.a.3 and 1.a.4 are coupled).

Action Plan 1.a.5 *Benchmark stipends and benefits to PhD students at top institutions, then develop and implement a schedule to increase stipends regularly to remain competitive.*

Stipends need to be nationally competitive, and allowances made in grant budgeting for inflation, for instance.

Initiative 1.b. Increase the number of peer-reviewed journal papers to an average of 5 per year per faculty member, with a focus on journals with high impact factors.

Peer-reviewed papers in high impact journals are another very important metric for strong departments. Strong journal productivity is required to win new grants. Equally as important, publishing journal papers is an essential component of graduate education, and thus our students are best served when they complete and publish a significant body of new knowledge in widely respected and read journals.

Action Plan 1.b.1= Action Plan 1.a.4 *Institute a program where all students will receive enhanced Professional Development training.*

Not only will a Professional Development program help in recruiting, it will accelerate student research productivity, specifically in their ability to conduct and communicate research, increasing the number of papers published.

Action Plan 1.b.2 *Raise the bar on the departmental PhD requirement for papers so that each PhD graduate must have at least one accepted journal paper, and three additional papers submitted.*

The current publication "bar" (minimum) is that all PhD students must submit three journal papers prior to being granted the PhD. While this bar had a strong impact several years ago when instituted, the number of journal papers published by the faculty has remained relatively flat despite growth in the number of faculty. Raising the bar, combined with providing Professional Development training, will increase the number of journal papers.

Action Plan 1.b.3 *Examine the regulations and incentives regarding joint advising of PhD students. Seek to increase opportunities for working with a second advisor, especially those outside the Department of Chemical Engineering.*

It is believed that working with strong external collaborators will increase the number of top-quality students and the number of papers published. Tenure and promotion regulations and other policies, as well as historical and cultural matters, may actually discourage collaborations outside the department. These matters need to be investigated and, if substantiated, addressed appropriately.

Action Plan 1.b.4 *Establish a Professional Communications Center in the Department or College.*

Establishing such a Center will increase publication productivity, relieve some of the editing burden on the faculty, and will also be an attractive resource for recruiting students.

Action Plan 1.b.5 *Track Journal Impact Factors and Citations by Faculty, and make these an explicit part of annual reviews and promotion/tenure reviews.*

Tracking these metrics should encourage faculty and their students to aim for the highest impact journal possible.

Initiative 1.c. Enhance publicity and outreach efforts. USC lags other top departments in promoting the accomplishments of its students and faculty.

Action Plan 1.c.1 *Convene an external group of advisors to develop a marketing plan. Follow up by working with the Dean to prepare the various materials to be disseminated. This Action includes improvement of the departmental web site.*

Action Plan 1.c.2 *Appoint a coordinator to nominate faculty for national awards, and for fellow (or similar) positions within professional societies.*

Action Plan 1.c.3 *Establish a named research seminar series to accompany the Neva Gibbons Educational Seminar, and aggressively promote both of these nationwide.*

Goal 2: Within two years, to obtain one major, federally-funded pre-doctoral training grant (e.g. IGERT, GAANN, or NIH pre-doctoral grant). *{Achieving this goal will establish USC Chemical Engineering as a national leader in one area of research and graduate education. This will improve the renown of the department, and will aid in recruiting highly qualified U.S. citizens.}*

The department (and the college and university) need long-term, stable funding for major team-based research projects. Large project funding is essential for solving some of society's most difficult projects. Establishing a nationally-recognized pre-doctoral training program may be a prerequisite to such funding. In addition, the steps taken to win such a grant will affect the overall culture of the entire PhD program. The Department has reached a size and maturity that it should be leading at least one such pre-doctoral training program. **Note that several of the initiatives and action plans listed under Goal 1 will also enhance our goal of winning a major pre-doctoral training grant. Additional initiatives and actions for Goal 2 now follow.**

Initiative 2.a. Identify one or two target areas where Chemical Engineering can lead a major pre-doctoral training grant.

There are many strong individual programs and small groups in the department. Valiant efforts have been made in the past to win an IGERT, without success. We believe that promising areas should be identified with the help of impartial experts, and that a long-term effort must be incentivized, seeded, and followed.

Action Plan 2.a.1 *Convene a panel of advisors, both internal and external, to review departmental strengths, promising partnerships, leading to identification of realistic opportunities for a training grant.*

An outside panel of experts (IGERT winners, former program managers, leaders in the field) will provide perspective that is not available from the departmental faculty. They will help identify the highest probabilities for success, and will advise and critique the proposals for pre-doctoral training.

Action Plan 2.a.2 *Select proposal leaders and empower them to go after the center for the next four years. Obtain support for released time, travel/development funds, seed funds for innovative courses, consultants, etc.*

Efforts to date to win an IGERT have been undertaken by faculty as an overload, on top of other responsibilities. This approach has not worked to date. The effort in communicating, traveling, partnering etc. requires dedicated time.

Action Plan 2.a.3= Action Plan 1.b.3 *Identify barriers to collaboration, and overcome these so that a more collaborative culture results.*

Just as collaboration is important to increasing productivity, it is essential to establishing the research and educational programs needed to win a high-profile pre-doctoral training grant.

There are concerns however with achieving these goals. Past efforts to land an NSF Engineering Research Center, Materials Science Research Center, or other large programs have not been rewarded. Likewise, several efforts to land an IGERT have not been successful. Competition for grants is becoming increasingly stiff. The department and the college have not broken through in terms of major NIH R01 grants yet. The Biomedical Engineering component needs an established, funded senior leader or two with a national reputation. It is becoming increasingly difficult to recruit a sufficient number of strong domestic students to the program.

A major concern in the next handful of years is the increase in the number of required and elective courses we need to teach with the formation of the biomedical engineering program. This situation is accentuated by the ultimate loss of Professors Van Brunt and Stanford from teaching. It is unclear how we will go forward with the teaching of excellent design and safety courses, and provide an adequate number of electives for our graduate and undergraduate students. Although we are teaching more students, the number of B.S. chemical engineering graduates is too small to garner broad national attention from corporate recruiters. The opportunity to support the BMEN program is exciting and beneficial; however, the production of BMEN bachelor's degrees will not be recognizable in national databases or reputational rankings.

The research computing infrastructure is not nationally competitive. For teaching, classrooms are plain, unattractive, lacking in technology, and inferior to community colleges and probably many high schools. The number of support staff is small, and the planned increase in number of faculty, graduate students, and undergraduate students will tax our people even more. Splitting faculty and students between Swearingen, Horizon and Catawba will strain the staff even further. We do not have sufficient trained staff or funds to support outreach and PR efforts, including web pages, mailings, and brochures.

Department of Computer Science and Engineering Weaknesses/Issues

- The Department has a space problem: too few laboratories for instruction and research, classrooms too small, and too few offices

- The Department has not received or even applied for any large long-term collaborative grants, such as for an NSF center; we plan to apply for an ERC in *Safety-Critical Systems*
- There is insufficient leadership in research from the senior faculty

The Department of Electrical Engineering Weaknesses/Issues

- Large research grants were narrowly secured by few faculty members.
    - Historically, funding numbers have looked good because of a few very large grants generated by a very few people. This situation is getting better. Currently, we have 9 of 15 faculty with decent funding. This number should grow to as close to 15 as possible.
- Lack of critical number of faculty in certain areas; Rf & Wireless and Power & Energy. We are trying to hire a full Professor in the Wireless area, and an ad has been placed to add a faculty member in the area of Grid-connected power. The plan is to hire two additional junior faculty in each of the above areas.
- Insufficient numbers of graduate students from US, which also impedes research in certain areas (defense and nuclear related). Plan to recruit excellent graduate students.
    - Approach: Create a departmental fund to support grad students for 1-2 semesters before they are picked up by individual professors
    - Action Item: Grad Committee will make recommendations with specifics on the number of students to be admitted next year with a budget request to the department.
    - Attract good US students to our graduate programs, although we are making some headway here.

Department of Mechanical Engineering Weaknesses/Issues

1. Lack of faculty in some core areas of mechanical engineering (controls, design, fluids). The weakness can be addressed by hiring at least one faculty in each of the core areas. This will be done by working with the college and the dean.
2. Lack of properly equipped labs, laboratory space and support for research computing. The department plans to address laboratory equipment by applying for equipment grant and through providing start up funds to new faculty. Space is a more acute problem, partial solution to the space problem will be achieved once the Horizon lab for the Nuclear Engineering program and the lab space for aerospace material laboratory is completed. Additionally we plan to cooperate with the college's space committee in identifying and reallocating space. Ideally a new engineering building will be the best solution, but this will require fund-raising and time.
3. Insufficient IT support for research. Ideally if we can hire one IT person fully dedicated to department's research computing, and if the IT related to undergraduate instruction is handled centrally by the college the problem may be mitigated some.