College of Engineering and Computing

Blueprint for Academic Excellence

May, 2013

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 Statement

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.

Section I: Executive Summary (limit to one page)

Describe how your unit contributes to meeting the Academic Dashboard targets.

Describe how your unit contributes to the Key Performance Parameters.

Section II: Meeting the University's Academic Dashboard Targets (limit to two pages)

Strategies used to address each of the Academic Dashboard measures and targets and providing an assessment of their effectiveness.

Progress made toward meeting Academic Dashboard targets this year, 2012-2013

Strategies planned to meet Academic Dashboard targets in 2013-2014

Section III: Unit's Goals and their Contribution to the University's Key Performance Parameters (limit to three pages for all goals)

Strategies planned to meet Academic Dashboard targets in 2013-2014

2013-2014 Academic Year Goals:

Goal 1 to Goal 5

Five Year Goals:

Appendix IV: Appendices

Appendix A: Resources Needed (Limit to one page)

Appendix B: Benchmarking Information (one page)

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

Appendix C: Unit's Top Strengths and Important Accomplishments (one page)

Department of Civil and Environmental Engineering strengths and accomplishments

The top strengths of the department are the group of assistant professors and recent associate professors that are changing the culture and expectations of all the faculty members in the department. We have also had a significant number of NSF CAREER

awards in the department. We have developed a strategic area in rail transportation which is gaining the respect of both industry and federal research programs.
We are making some progress in changing the culture of the department.

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: 20 of 23 faculty members have had active funding within the last year; current funding level is $120K / tenure-track faculty member
- Ten members of the faculty are NSF Career Award winners!

- Research and education strengths are in bioinformatics, security, distributed computing, computer networks, computer vision, 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
- The Department houses an NSA- and CNSS-Certified National Center of Academic Excellence in Information Assurance Education

Department of Electrical Engineering strengths and accomplishments

- World-class research programs in
  - Microelectronics and Photonics, focusing on wide bandgap materials, that have produced spinoff companies such as SET, BGT (now CREE), and Nitek
  - Power electronics, including naval and smart grid applications, as evidenced founding and continuing membership in the *Electric Ship R&D Consortium* by the *NSF Industry/University Cooperative Research Center for GRid-connected Advanced Power Electronic Systems*.
  - Simulation and early-stage system design tools, as evidenced by leadership in the VTB software development, S3D ship design tools, and spinout startup company SysEDA
  - Nationally-reconized educational and research programs in electromagnetics, including areas such as signal integrity in high-speed digital systems and antenna design, with newly-added faculty strength in this area.
- Outstanding faculty research productivity, as evidenced by NRC ranking for the PhD program, including visibility, tecognition, publications, PhDs, post docs, and grants.

- A very hands-on-oriented undergraduate curriculum that includes significant laboratory experiences in every year. Lab experiences are designed to integrate learning across the curriculum and to aid in knowledge and student retention. One professional staff person supports these laboratories.

- A new department chair with new priorities and initiatives. One focus is improving departmental, college, and university processes to increase efficiency, remove redundancy, and eliminate paper from the work flow..

- Excellent *intranet*-based continuous improvement process for the undergraduate program, that organizes and facilitates collection and documentation of accreditation-related data. This process resulted in re-accreditation with no issues or concerns cited.

- Recent addition of three new faculty members, starting Fall 2012, adds critical mass to the colleges' smallest department.

- Increasing diversity of research sponsorship and more faculty persons serving as PIs.

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
i. Hired Director for McNair center

Nuclear Engineering

The Nuclear Engineering program has recognized strengths in nuclear fuels and materials and in modeling and simulation. (based on papers published and awards/recognition received)

Significant accomplishments:

- Establishing two multi-million dollar SmartState Centers of Economic Excellence related to Nuclear Power at USC (http://smartstatesc.org/).
- Hiring endowed chair Dr. Dan Gabriel Cacuci for the first nuclear related COEE. Recognized scientist in the field and winner of the Compton Award and Seaborg Medal.
- Fuel cycle research with graduate students at USC twice recognized nationally with the 2010 and 2011 Department of Energy, Innovations in Fuel Cycle Research Award (http://www.fuelcycleinnovations.org/).
- In 2011, Travis Knight received the Fred C. Davison Distinguished Scientist Award given by Citizens for Nuclear Technology Awareness.
- More than 60 graduates from the program; half of them full-time (half part-time [APOGEE].
- Placement of two PHD graduates in academia (tenure track positions).
- One graduate student, Kallie Metzger, awarded a prestigious Department of Energy Fellowship (NEUP) one of only 23 nationally (2012).
- Significant collaborations with ORNL, INL, SRNL, NCSU, Univ. of Tenn., Westinghouse, General Atomics, other industry

Appendix D: Unit's Weaknesses and Plans for Addressing the Weakness (one page)

Department of Civil and Environmental Engineering weaknesses/issues

- We need to increase the success rate on large “center” proposals. Working with the VP of research’s proposal support team should help this endeavor. Also, as our group of assistant professors become tenured, they should be able to accept the risk of leading larger group proposals.
- CEE needs to increase the undergraduate enrollment. The department now has a standing outreach committee which is more active in the recruitment process and is working with the Deans office in achieving this goal.
- Space for graduate students, new faculty, visiting faculty, flexible small research labs, and hydraulics laboratory cannot provide space for expanding our research activities from new faculty hires. (THIS IS AN AREA WHERE OUTSIDE RESOURCES ARE NEEDED).
- We still need to improve the scholarly culture and moral in the department. The department still operates as 20 independent research groups, most of insufficient strength to dominate an area. We need to improve our ability to know our colleagues better build synergistic relationships that will strengthen the department without weakening each individuals’ strengths. (Resources needed include support for outside speakers, return of some of the research incentive funds (E funds) to faculty, and funds for bringing in outside speakers).
- We also need to improve our efficacy in using faculty time. We have increased our staffing (one temporary administrative and plan to add a second research support person in the next month). Workflow for common tasked need to be moved to a modern (ie web based) system. We have been waiting for improved university systems (One Carolina??) and WEB content manager since I joined the department three years ago.
- The move of department business managers to the Deans office may have improved the budget management of the college, but it has decreased the information needed to make resource allocation decisions at the department chairs level.

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

- **Difficulty.** The Department has a space problem: too few laboratories for instruction and research, classrooms too small, and too few offices
- **Weakness.** The Department has not received or even applied for any large long-term collaborative grants, such as for an NSF center
- **Weakness.** There is insufficient leadership in research from the senior faculty, who are too few in number.

The Department of Electrical Engineering Weaknesses/Issues

- A critical shortage of administrative support personnel make it nearly impossible to manage the department. With only two administrative staff, and one out for health issues, there is inadequate strength to accomplish the necessary jobs.

- Critical lack of support for financial analysis and planning. Although the university provides many tools for retrospective analysis of how funds have been spent, there seem not to be any forward-looking planning tools. Futhermore, we no longer have any staff support for this function. We are literally running blind in this area. We have no plans to address because we have zero insight into possible resources that can resolve this situation.

- Large research grants have historically been secured by a very few faculty members who are in the critical path for nearly everything in the department. This places the department at serious risk for losses related to retirements, external job-seeking, or inadequate depth to handle the necessary leadership activities. A persistent push to expand the diversity of funding across the faculty has yielded some improvements and will continue.

- The shortage of faculty in key areas persists. This is especially noticeable in the Power and Energy area where there were previously 5 faculty persons, extremely strong research funding and high PhD student productivity, but now there are only 4 faculty (only 3 really research-active). At the same time, both funding and competition in this area have grown nationwide so that now the pre-eminence of USC in this area is under heavy siege and it is clearly at risk. One new hire in this area has been made to start in Fall 2013 which will help this area.

- Insufficient numbers of graduate students are from the US, which impedes research in certain areas (defense and nuclear related). We have increased advertising of the Accelerated Masters program to attract more of our own students into graduate school, and several programs have offered Research Experience for Undergraduates and mentored Magellan Scholar programs. These and other efforts will continue to recruit from the US student population.

- A significant compression of salaries at the Assistant-Associate interface puts us at risk for losing Associate Professors to more lucrative positions elsewhere.

- Lack of funds to support the undergraduate lab program. Although our lab program has been a noteworthy strength of the EE curriculum, it has been funded from return of indirect funds to the department. Even though this is not the “right” method to fund the labs, there has been no other. The CEC Fee, which should support undergrad lab programs, is all kept at college level. Moratoriums on fee increases prevent us from imposing a new fee.

- Loss of returned indirect costs to the department, the research groups, and the PIs threatens productive research programs and retention of personnel. Certain research infrastructure is properly supported by indirect cost returns, but with those funds stopped, we have lost the ability to support that infrastructure. This ranges from maintenance and calibration of shared research equipment to replacement at end-of-life. Also, most of our new faculty hires expected to receive indirect funds to build their research programs. Finding now that they are not receiving them has been a major setback and will inevitably lead some faculty to seek more rewarding positions elsewhere. Finally, indirect costs support some long-standing staff positions related to business operations of the research units. Without indirect support these positions will have to be eliminated and consequently research will be shut down.

Department of Mechanical Engineering Weaknesses/Issues

WEAKNESSES:

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.

Nuclear Engineering Weaknesses/Issues:

Too few faculty. Hire additional faculty as noted below. See related plans for improving graduate education and addressing related weaknesses.

Appendix E: Unit Statistical Profile

2013 Unit Statistical Profile
College of Engineering and Computing

1. Number of entering freshman for classes Fall 2009, Fall 2010, Fall 2011 and Fall 2012 classes and their average SAT and ACT Scores. [1]

Classes	Number	Average SAT	Average ACT
Fall 2009	392	1237	28
Fall 2010	431	1217	27
Fall 2011	485	1226	27
Fall 2012	494	1226	28

2. Freshmen retention rate for classes entering Fall 2009, Fall 2010, and Fall 2011.[2]

Freshman Retention	Fall 2009	Fall 2010	Fall 2011
in College	69.2%	69.4%	65.6%
at USC	86.3%	84.0%	79.9%

3. Sophomore retention rate for classes entering Fall 2008, Fall 2009, and Fall 2010. [2]

Sophomore Retention	Fall 2008	Fall 2009	Fall 2010
in College	73.0%	75.1%	68.8%
at USC	88.6%	90.5%	86.6%

4. Number of majors enrolled in Fall 2009, Fall 2010, Fall 2011 and Fall 2012 by level: undergraduate, certificate, first professional, masters, or doctoral (headcount).[1]

Headcount by Level	Fall 2009*	Fall 2010	Fall 2011	Fall 2012
Undergraduate	1584	1698	1,849	1971
Certificate	0	0	0	0
First Prof.	0	0	0	0

[1] 2008- 2012 Strategic Planning Stats - Columbia, USC Institutional Assessment & Compliance, http://kudzu.ipr.sc.edu/planning/
[2] http://www.ipr.sc.edu/retention/Retent-Fresh-Jr-By-School-2012.pdf

Masters	104	195	192	164
Doctoral	269	328	343	370

*APOGEE students are not included prior to 2010

5. Number of entering first professional and graduate students Fall 2009, Fall 2010, Fall 2011, and Fall 2012 and their average GRE, MCAT, LSAT scores, etc. The data is for the combined Masters and Doctoral GRE scores of new entrants into the two programs.[3]

New Graduate Students – on campus

Semester	Number New Graduate Students	Mean Verbal GRE	Mean Quantitative GRE	Mean Analytical Writing GRE
Fall 2009	80	454	748	3
Fall 2010	76	428	742	3
Fall 2011	87	493	751	3
Fall 2012*	70	269	395	3

*new scoring began August 2011

New Graduate Students – APOGEE

Semester	Number New Graduate Students	Mean Verbal GRE	Mean Quantitative GRE	Mean Analytical Writing GRE
Fall 2009	13	484	693	3
Fall 2010	21	534	750	4
Fall 2011	13	532	702	4
Fall 2012*	18	275	356	4

*new scoring began August 2011

6. Number of graduates in Fall 2011, Spring 2012, and Summer 2012 by level (undergraduate, certificate, first professional, masters, doctoral). [1]

Degrees Awarded	Fall 2011	Spring 2012	Summer 2012
Undergraduate	90	186	9
Certificate	1	0	0
First Professional	0	0	0
Masters	31	32	16

[3] Institutional Assessment & Compliance Table Generator

Doctoral	13	12	9

7. Four-, Five- and Six-Year Graduation rates for three most recent applicable classes (undergraduate only).[2]

Graduation Rates

Classes	**from College**			**from USC**		
	4-Year	**5-Year**	**6-Year**	**4-Year**	**5-Year**	**6-Year**
Fall 2004	23.6%	33.3%	35.6%	35.3%	54.7%	58.6%
Fall 2005	25.6%	36.8%	41.1%	36.5%	55.8%	61.5%
Fall 2006	27.9%	42.7%	45.3%	36.4%	58.5%	64.2%

8. Total credit hours generated by your unit regardless of major for Fall 2011, Spring 2012 and Summer 2012.[1]

Student Credit Hours	**Fall 2011**	**Spring 2012**	**Summer 2012**
Undergraduate	15,757	14,674	823
First Professional	0	0	0
Masters	1,105	896	208
Doctoral	1,939	1,851	417
Total	**18,801**	**17,421**	**1,448**

9. Percent of the total course hours in each major at the undergraduate level taught by faculty with a highest terminal degree.[4]

Program (from Undergraduate Academic Bulletin)	**NO - Credit Hours**	**YES - Credit Hours**	**Total Credit Hours**	**% Yes Credit Hours**
Biomedical Engineering, B.S.	225	670	895	74.9%
Chemical Engineering, B.S.E.	0	726	726	100.0%
Civil Engineering, B.S.E.	33	1566	1599	97.9%
Computer Engineering, B.S.E.	783	2245	3028	74.1%
Computer Information Systems, B.S.	585	1634	2219	73.6%
Computer Science, B.S.C.S.	783	1751	2534	69.1%
Electrical Engineering, B.S.E.	0	1104	1104	100.0%

[4] http://ipr.sc.edu/SACS/blueprints/354/

Engineering Science, B.S.	0	659	659	100.0%
Mechanical Engineering, B.S.E.	60	3312	3372	98.2%

10. Percent of the total course hours in each major at the undergraduate level taught by full-time faculty.[4]

Program (from Undergraduate Academic Bulletin)	FT Instructor Credit Hours		PT Instructor Credit Hours		Total Credit Hours	FT % Credit Hours
	Grad	UGrad	Grad	UGrad		
Biomedical Engineering, B.S.	0	895	0	0	895	100%
Chemical Engineering, B.S.E.	0	558	0	168	726	76.9%
Civil Engineering, B.S.E.	0	1404	0	195	1599	87.8%
Computer Engineering, B.S.E.	3	2409	0	619	3031	79.6%
Computer Information Systems, B.S.	30	1867	0	352	2249	84.3%
Computer Science, B.S.C.S.	0	1915	0	619	2534	75.6%
Electrical Engineering, B.S.E.	0	927	0	177	1104	84.0%
Engineering Science, B.S.	0	659	0	0	659	100%
Mechanical Engineering, B.S.E.	0	3207	0	165	3372	95.1%

11. Number of faculty by title (tenure-track by rank, research or clinical) by rank, as of Fall 2010, Fall 2011, and Fall 2012 (by department where applicable).[1]

Tenure and Tenure-Track Faculty

Rank	Fall 2010	Fall 2011	Fall 2012
Professor	34	35	37
Associate Professor	37	40	39
Assistant Professor	28	30	37
Total	**99**	**105**	**113**

Non-Tenure Track Faculty

Rank	Fall 2010	Fall 2011	Fall 2012
Research Professor	2	2	0
Research Associate Professor	5	4	3
Research Assistant Professor	8	10	7
Instructor	2	3	3

Adjunct Faculty	14	10	14
Total	**31**	**29**	**27**

1. Current number and change in the number of tenure-track and tenured faculty from underrepresented minority groups from FY 2011.[1, 5]

ETHNICITY	**Fall 2011**	**Fall 2012**	**Change**
American Indian/Alaska Native	0	0	0
Black or African American	0	0	0
Two or More Races	0	0	0
Hispanic	2	2	0
Unknown	4	3	-1
Asian	14	13	-1
N/R Alien	37	43	6
White	48	52	4
TOTAL	**105**	**113**	**8**

GENDER	**Fall 2011**	**Fall 2012**	**Change**
Female	12	14	2
Male	93	99	6
TOTAL	**105**	**113**	**8**

[5] College of Engineering and Computing Departmental websites

Statistical Research Data

College of Engineering and Computing

Office of Research
IT and Data Management Office
College of Engineering and Computing
FY2012 Blueprint Data

Q1. The total number and amount of external sponsored research proposal submissions by funding source for FY2012.

DESCRIPTION	PI Home Department	Number	Amount 1st Yr
Federal - (FED)			
	Chemical Engineering	*61*	*$ 8,313,297*
	Civil & Environmental Engineering	*40*	*$ 6,002,147*
	Computer Science & Engineering	*32*	*$ 3,969,191*
	Electrical Engineering	*47*	*$ 7,740,078*
	Mechanical Engineering	*109*	*$16,673,046*
State - (STA)			
	Computer Science & Engineering	*1*	*$ 17,475*
	Electrical Engineering	*1*	*$ 50,000*
	Mechanical Engineering	*2*	*$ 80,000*
Private, Foundations, Non-Profit - (PHI)			
	Chemical Engineering	*9*	*$ 659,807*
	Civil & Environmental Engineering	*3*	*$ 179,818*
	Computer Science & Engineering	*3*	*$ 133,863*
	Electrical Engineering	*1*	*$ 100,000*
	Mechanical Engineering	*4*	*$ 284,774*
Commercial - (COM)			
	Chemical Engineering	*10*	*$ 983,562*
	Civil & Environmental Engineering	*3*	*$ 137,550*
	Computer Science & Engineering	*2*	*$ 257,138*
	Electrical Engineering	*3*	*$ 101,301*
	Mechanical Engineering	*10*	*$ 426,930*
Other - (OTH)			
	Chemical Engineering	*4*	*$ 1,380,000*
	Civil & Environmental Engineering	*1*	*$ 4,020*
	Electrical Engineering	*2*	*$ 109,126*
	Mechanical Engineering	*2*	*$ 60,000*

Q2. Summary of external sponsored research awards by funding source for FY2012

Dept	PI-Name	Rank	Total_PI	Com	Fed	Oth	Phi	State
Chemical Eng	Amiridis, Michael	Provost	$1,113,592	$ 167,441	$ 900,000			$46,151
Chemical Eng	Blanchette, James	Asst Prof	$ 120,060		$ 120,060			
Chemical Eng	Gadala-Maria, Francis	Professor	$ 6,000				$ 6,000	
Chemical Eng	Gonzalez, Francisco		$ 19,180		$ 19,180			
Chemical Eng	Hattrick-Simpers, Jason	Asst Prof	$ 135,000	$ 130,000			$ 5,000	
Chemical Eng	Heyden, Andreas	Asst Prof	$ 263,573		$ 263,573			
Chemical Eng	Jabbari, Esmaiel	Assoc Prof	$ 121,549		$ 120,000		$ 1,549	
Chemical Eng	Jabbarzadeh, Ehsan	Asst Prof	$ 10,000		$ 10,000			
Chemical Eng	Matthews, Michael	Professor	$ 5,117	$ 5,117				
Chemical Eng	Monnier, John		$ 124,690	$ 82,690	$ 42,000			
Chemical Eng	Moss, Meslissa	Assoc Prof	$ 41,000		$ 41,000			
Chemical Eng	Padak, Bihter	Asst Prof	$ 258,333	$ 258,333				
Chemical Eng	Ploehn, Harry	Professor	$ 162,000	$ 132,000	$ 30,000			
Chemical Eng	Popov, Branko	Professor	$1,235,212	$ 135,212	$1,100,000			
Chemical Eng	Regalbuto, John	Professor	$ 50,000		$ 50,000			
Chemical Eng	Ritter, James	Professor	$ 759,521		$ 558,750	$ 50,000		$ 150,771
Chemical Eng	Shimpalee, Sirivatch		$148,181		$ 148,181			
Chemical Eng	Van Zee, John	Professor	$2,861,250	$ 161,250	$ 200,000			$2,500,000
Chemical Eng	Weidner, John	Professor	$ 230,477	$ 128,078	$ 102,399			
Chemical Eng	White, Ralph	Professor	$ 30,000		$ 30,000			
Chemical Eng	Williams, Christopher	Professor	$ 174,937	$ 174,937				
Chemical Eng	Zhou, Xiao-Dong	Professor	$ 440,000		$ 440,000			
Civil & Env Eng	Berge, Nicole	Asst Prof	$ 132,577				$ 132,577	
Civil & Env Eng	Caicedo, Juan	Assoc Prof	$ 63,297		$ 23,210	$ 4,020	$ 36,067	
Civil & Env Eng	Chaudhry, M.	Professor	$ 492,097		$492,097			
Civil & Env Eng	Goodall, Jonathan	Asst Prof	$ 50,000		$ 50,000			
Civil & Env Eng	Matta, Fabio	Asst Prof	$ 101,000		$ 101,000			
Civil & Env Eng	Mullen, Robert	Professor	$ 42,007				$ 42,007	
Civil & Env Eng	Saleh, Navid	Asst Prof	$ 59,996		$ 59,996			
Civil & Env Eng	Song, Jeong-Hoon	Asst Prof	$ 286,125		$ 286,125			
Civil & Env Eng	Viparelli, Enrica	Asst Prof	$ 24,177		$ 24,177			
Civil & Env Eng	Yoon, Yeomin	Assoc Prof	$ 87,000	$ 87,000				
Civil & Env Eng	Ziehl, Paul	Assoc Prof	$ 467,516		$ 467,516			
Comp Sci & Eng	Bakos, Jason	Assoc Prof	$ 97,684		$ 97,684			
Comp Sci & Eng	Buell, Duncan	Professor	$ 60,500		$ 43,025			$ 17,475
Comp Sci & Eng	Huang, Chin-Tser	Assoc Prof	$ 23,873		$ 23,873			
Comp Sci & Eng	Huhns, Michael	Professor	$ 14,640	$ 7,138	$ 7,502			
Comp Sci & Eng	Nelakuditi, Srihari	Assoc Prof	$ 16,000		$ 16,000			
Comp Sci & Eng	Tang, Jijun	Assoc Prof	$ 249,588		$ 249,588			
Comp Sci & Eng	Tong, Yan	Asst Prof	$ 443,803		$ 443,803			
Comp Sci & Eng	Valafar, Homayoun	Assoc Prof	$ 134,978		$ 134,978			
Comp Sci & Eng	Wang, Song	Assoc Prof	$ 401,613		$ 396,613		$ 5,000	
Comp Sci & Eng	Xu, Wenyuan	Asst Prof	$ 286,887		$ 286,887			
Electrical Eng	Ali, Mohammod	Professor	$ 146,806		$ 146,806			
Electrical Eng	Brice, Charles	Assoc Prof	$ 37,095	$ 37,095				
Electrical Eng	Chandrashekhar, MVS	Asst Prof	$ 430,000		$ 430,000			
Electrical Eng	Dougal, Roger	Professor	$4,300,004	$ 109,076	$4,190,928			
Electrical Eng	Ginn, Herbert	Assoc Prof	$ 418,053	$ 68,053	$ 350,000			
Electrical Eng	Huray, Paul	Professor	$ 89,141	$ 89,141				
Electrical Eng	Khan, Asif	Professor	$ 130,000		$ 130,000			
Electrical Eng	Koley, Goutam	Assoc Prof	$ 207,998		$ 207,998			
Electrical Eng	Mandal, Krishna	Assoc Prof	$1,075,000		$1,075,000			
Electrical Eng	Santi, Enrico	Assoc Prof	$ 117,786	$ 117,786				
Electrical Eng	Shin, Yong-June	Assoc Prof	$ 346,566	$ 67,366	$ 279,200			
Electrical Eng	Simin, Gregory	Professor	$ 187,865		$ 97,000		$ 90,865	
Electrical Eng	Sudarshan, Tangali	Professor	$ 150,000		$ 150,000			
Electrical Eng	Zhang, Yucheng	Asst Prof	$ 4,060	$ 4,060				
College of Eng	Boccanfuso, Anthony		$ 388,159		$ 388,159			

Dept	PI-Name	Rank	Total_PI	Com	Fed	Oth	Phi	State
Mechanical Eng	Bayoumi, Abdel	Professor	$ 978,817		$ 978,817			
Mechanical Eng	Cacuci, Dan	Professor	$ 27,500		$ 27,500			
Mechanical Eng	Chao, Yuh	Professor	$ 5,029		$ 5,029			
Mechanical Eng	Chen, Fanglin	Asst Prof	$ 412,967		$ 308,264			$ 104,703
Mechanical Eng	Deng, Xiaomin	Professor	$ 181,702		$ 181,702			
Mechanical Eng	Du, Yanhai		$ 124,251		$ 124,251			
Mechanical Eng	Giurgiutiu, Victor	Professor	$ 502,738		$ 502,738			
Mechanical Eng	Huang, Kevin	Assoc Prof	$ 172,455		$ 172,455			
Mechanical Eng	Huang, Xinyu	Asst Prof	$ 56,295	$ 42,545	$ 13,750			
Mechanical Eng	Kaoumi, Djamel	Asst Prof	$ 81,784		$ 81,784			
Mechanical Eng	Khan, Jamil	Professor	$2,443,612		$ 526,187		$ 335,000	$1,582,425
Mechanical Eng	Knight, Travis	Assoc Prof	$1,732,263	$ 337,000	$ 370,263		$ 25,000	$1,000,000
Mechanical Eng	Li, Chen	Asst Prof	$ 185,366		$ 185,366			
Mechanical Eng	Li, Xiaodong	Professor	$ 265,000	$ 24,000	$ 241,000			
Mechanical Eng	Reifsnider, Kenneth	Professor	$1,875,527		$1,875,527			
Mechanical Eng	Reynolds, Anthony	Professor	$ 527,588	$ 129,135	$ 293,750			$ 104,703
Mechanical Eng	Sutton, Michael	Professor	$ 309,999	$ 200,000	$ 109,999			
Mechanical Eng	Wang, Guiren	Asst Prof	$ 106,502		$ 106,502			
Mechanical Eng	Xue, Xingjian	Asst Prof	$ 127,246		$ 127,246			
Total Engineering			**$49,208,740**	**$4,389,358**	**$35,492,587**	**$108,040**	**$998,130**	**$8,220,625**

Q3. Total sponsored research expenditures per tenured/tenure-track faculty for FY2012

Dept	PI	Total Expenditures	Status
		(Direct/Indirect)	
Chemical Engineering			
	Amiridis, Michael	$294,077	Tenured
	Blanchette, James	$47,687	Tenure Track
	Gadala-Maria, Francis	$8,157	Tenured
	Hattrick-Simpers, Jason	$272,982	Tenure Track
	Heyden, Andreas	$370,147	Tenure Track
	Jabbari, Esmaiel	$317,228	Tenured
	Lauterbach, Jochen	$615,096	Tenured
	Matthews, Michael	$54,852	Tenured
	Monnier, John	$225,765	
	Moss, Melissa	$128,308	Tenured
	Padak, Bihter	$164,273	Tenure Track
	Ploehn, Harry	$13,965	Tenured
	Popov, Branko	$1,006,108	Tenured

	Regalbuto, John	$37,438	Tenured
	Ritter, James	$778,495	Tenured
	Shimpalee, Sirivatch	$178,356	
	Van Zee, John	$514,354	Tenured
	Weidner, John	$344,765	Tenured
	White, Ralph	$148,161	Tenured
	Williams, Christopher	$252,356	Tenured
	Zhou, Xiao-Dong	$312,762	Tenure Track
Civil & Environmental Engineering			
Dept	**PI**	**Total Expenditures**	**Status**
	Berge, Nicole	$92,980	Tenure Track
	Caicedo, Juan	$275,173	Tenured
	Chaudhry, M.	$507,396	Tenured
	Gassman, Sarah	$10,992	Tenured
	Goodall, Jonathan	$278,039	Tenure Track
	Huynh, Nathan	$20,460	Tenure Track
	Imran, Jasim	$130,568	Tenured
	Matta, Fabio	$71,475	Tenure Track
	Mullen, Robert	$40,752	Tenured
	Pierce, Charles	$4,090	Tenured
	Rizos, Dimitris	$3,929	Tenured
	Saleh, Navid	$88,863	Tenure Track
	Song, Jeong-Hoon	$108,397	Tenure Track
	Viparelli, Enrica	$7,645	Tenure Track
	Yoon, Yeomin	$185,667	Tenure Track
	Ziehl, Paul	$528,391	Tenured
Dept	**PI**	**Total Expenditures**	**Status**
Computer Science & Engineering			
	Bakos, Jason	$148,579	Tenured
	Buell, Duncan	$83,820	Tenured

	Eastman, Caroline	$92,970	Tenured
	Fenner, Stephen	$71,120	Tenured
	Hu, Jianjun	$136,164	Tenure Track
	Huang, Chin-Tser	$112,272	Tenured
	Huhns, Michael	$7,057	Tenured
	Nelakuditi, Srihari	$206,125	Tenured
Computer Science & Engineering			
	O'Kane, Jason	$126,726	Tenure Track
	Rose, John	$110,744	Tenured
	Tang, Jijun	$151,024	Tenured
	Tong, Yan	$12,516	Tenure Track
	Valafar, Homayoun	$349,158	Tenured
	Vidal, Jose	$29,166	Tenured
	Wang, Song	$239,659	Tenured
	Xu, Wenyuan	$146,881	Tenure Track
Dept	**PI**	**Total Expenditures**	**Status**
Electrical Engineering			
	Ali, Mohammod	$111,987	Tenured
	Brice, Charles	$57,656	Tenured
	Dougal, Roger	$3,184,506	Tenured
	Ginn, Herbert	$276,767	Tenured
	Huray, Paul	$48,759	Tenured
	Khan, Asif	$306,260	Tenured
	Koley, Goutam	$243,113	Tenured
	Mandal, Krishna	$283,781	Tenure Track
	Santi, Enrico	$103,047	Tenured
	Shin, Yong-June	$416,929	Tenured
	Simin, Grigory	$123,692	Tenured
	Sudarshan, Tangali	$93,387	Tenured
	Zhang, Yucheng	$3,588	

	Zhao, Feng	$17,673	Tenure Track
Dept	**PI**	**Total Expenditures**	**Status**
Engineering & Computing, College of			
	Ambler, Anthony	$2,500	Tenured
	Boccanfuso, Anthony	$323,478	
	Gonzalez, Francisco	$15,065	
Dept	**PI**	**Total Expenditures**	**Status**
Mechanical Engineering			
	Baxter, Sarah	$102,575	Tenured
	Bayoumi, Abdel	$2,044,290	Tenured
	Cacuci, Dan	$23,082	Tenured
	Chao, Yuh	$7,006	Tenured
	Chen, Fanglin	$1,115,358	Tenured
	Deng, Xiaomin	$9,686	Tenured
	Du, Yanhai	$44,659	
	Giurgiutiu, Victor	$454,334	Tenured
	He, Xiaoming	$801	Tenure Track
	Huang, Kevin	$152,967	Tenure Track
	Huang, Xinyu	$168,593	Tenure Track
	Kaoumi, Djamel	$81,947	Tenure Track
	Khan, Jamil	$258,211	Tenured
	Knight, Travis	$353,451	Tenured
	Li, Chen	$72,094	Tenure Track
	Li, Xiaodong	$145,778	Tenured
	Lyons, Jed	$44,339	Tenured
	Reifsnider, Kenneth	$2,474,098	Tenured
	Reynolds, Anthony	$554,247	Tenured

	Shazly, Tarek	$8,837	Tenure Track
	Sutton, Michael	$384,269	Tenured
Mechanical Engineering			
	Wang, Guiren	$639,782	Tenure Track
	Xue, Xingjian	$180,789	Tenure Track
SC Alliance for Minority Participation (SCAMP)			
	Perkins, Michael	$72,613	

Q4. Number of patents, disclosures, and licensing agreements in fiscal years 2010, 2011and 2012.

Engineering and Computing

	Invention Disclosures	Provisional patent applications	Non-Provisional patent applications	Issued patents
FY2012	34	24	12	8
FY2011	19	22	12	2
FY2010	23	28	23	2

Source: Office of Technology Commercialization

4.

2. Gifts and pledges received in FY 2012.

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

The top strengths of the department are the group of assistant professors and recent associate professors that are changing the culture and expectations of all the faculty members in the department. We have also had a significant number of NSF CAREER awards in the department. We have developed a strategic area in rail transportation which is gaining the respect of both industry and federal research programs.

We are making some progress in changing the culture of the department

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: 20 of 23 faculty members have had active funding within the last year; current funding level is $120K / tenure-track faculty member
- Ten members of the faculty are NSF Career Award winners!
- Research and education strengths are in bioinformatics, security, distributed computing, computer networks, computer vision, 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
- The Department houses an NSA- and CNSS-Certified National Center of Academic Excellence in Information Assurance Education

Department of Electrical Engineering strengths and accomplishments

- World-class research programs in
    - Microelectronics and Photonics, focusing on wide bandgap materials, that have produced spinoff companies such as SET, BGT (now CREE), and Nitek
    - Power electronics, including naval and smart grid applications, as evidenced founding and continuing membership in the *Electric Ship R&D Consortium* by the *NSF Industry/University Cooperative Research Center for GRid-connected Advanced Power Electronic Systems*.
    - Simulation and early-stage system design tools, as evidenced by leadership in the VTB software development, S3D ship design tools, and spinout startup company SysEDA
    - Nationally-reconized educational and research programs in electromagnetics, including areas such as signal integrity in high-speed digital systems and antenna design, with newly-added faculty strength in this area.
- Outstanding faculty research productivity, as evidenced by NRC ranking for the PhD program, including visibility, tecognition, publications, PhDs, post docs, and grants.

- A very hands-on-oriented undergraduate curriculum that includes significant laboratory experiences in every year. Lab experiences are designed to integrate learning across the curriculum and to aid in knowledge and student retention. One professional staff person supports these laboratories.

- A new department chair with new priorities and initiatives. One focus is improving departmental, college, and university processes to increase efficiency, remove redundancy, and eliminate paper from the work flow..

- Excellent *intranet*-based continuous improvement process for the undergraduate program, that organizes and facilitates collection and documentation of accreditation-related data. This process resulted in re-accreditation with no issues or concerns cited.

- Recent addition of three new faculty members, starting Fall 2012, adds critical mass to the colleges' smallest department.

- Increasing diversity of research sponsorship and more faculty persons serving as PIs.

Department of Mechanical Engineering strengths and accomplishments

The top strengths are:

vii. Quality of in-class instruction
viii. Future Fuels, specifically related to high temperature materials research for SOFC
ix. Experimental mechanics (fracture mechanics, Digital Image Correlations)
x. Structural Health Monitoring and Condition Based Maintenance
xi. Joining, specifically Friction Stir Welding and processing
xii. Nuclear Fuels Research

Important accomplishments are:

j. Impressive NRC ranking
k. Significant increase in undergraduate and PhD enrolments
l. Research funding up by 30%
m. Hired several outstanding junior faculty
n. Award of EFRC
o. Home of NSF-IUCRC in friction stir welding
p. Significant funding increase in CBM
q. Hired Nuclear Science Smart State Center Chair
r. Hired Director for McNair center

Nuclear Engineering

The Nuclear Engineering program has recognized strengths in nuclear fuels and materials and in modeling and simulation. (based on papers published and awards/recognition received)

Significant accomplishments:

- Establishing two multi-million dollar SmartState Centers of Economic Excellence related to Nuclear Power at USC (http://smartstatesc.org/).
- Hiring endowed chair Dr. Dan Gabriel Cacuci for the first nuclear related COEE. Recognized scientist in the field and winner of the Compton Award and Seaborg Medal.

- Fuel cycle research with graduate students at USC twice recognized nationally with the 2010 and 2011 Department of Energy, Innovations in Fuel Cycle Research Award (http://www.fuelcycleinnovations.org/).
- In 2011, Travis Knight received the Fred C. Davison Distinguished Scientist Award given by Citizens for Nuclear Technology Awareness.
- More than 60 graduates from the program; half of them full-time (half part-time [APOGEE].
- Placement of two PHD graduates in academia (tenure track positions).
- One graduate student, Kallie Metzger, awarded a prestigious Department of Energy Fellowship (NEUP) one of only 23 nationally (2012).
- Significant collaborations with ORNL, INL, SRNL, NCSU, Univ. of Tenn., Westinghouse, General Atomics, other industry

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

Department of Civil and Environmental Engineering weaknesses/issues

- We need to increase the success rate on large "center" proposals. Working with the VP of research's proposal support team should help this endeavor. Also, as our group of assistant professors become tenured, they should be able to accept the risk of leading larger group proposals.
- CEE needs to increase the undergraduate enrollment. The department now has a standing outreach committee which is more active in the recruitment process and is working with the Deans office in achieving this goal.
- Space for graduate students, new faculty, visiting faculty, flexible small research labs, and hydraulics laboratory cannot provide space for expanding our research activities from new faculty hires. (THIS IS AN AREA WHERE OUTSIDE RESOURCES ARE NEEDED).
- We still need to improve the scholarly culture and moral in the department. The department still operates as 20 independent research groups, most of insufficient strength to dominate an area. We need to improve our ability to know our colleagues better build synergistic relationships that will strengthen the department without weakening each individuals' strengths. (Resources needed include support for outside speakers, return of some of the research incentive funds (E funds) to faculty, and funds for bringing in outside speakers).
- We also need to improve our efficacy in using faculty time. We have increased our staffing (one temporary administrative and plan to add a second research support person in the next month). Workflow for common tasked need to be moved to a modern (ie web based) system. We have been waiting for improved university systems (One Carolina??) and WEB content manager since I joined the department three years ago.
- The move of department business managers to the Deans office may have improved the budget management of the college, but it has decreased the information needed to make resource allocation decisions at the department chairs level.

Department of Chemical Engineering weaknesses/issues

Four major weaknesses/issues are:

5. Research space
6. Number of U.S. PhD students
7. Base-line support of graduate students
8. 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

- **Difficulty.** The Department has a space problem: too few laboratories for instruction and research, classrooms too small, and too few offices
- **Weakness.** The Department has not received or even applied for any large long-term collaborative grants, such as for an NSF center
- **Weakness.** There is insufficient leadership in research from the senior faculty, who are too few in number.

The Department of Electrical Engineering Weaknesses/Issues

- A critical shortage of administrative support personnel make it nearly impossible to manage the department. With only two administrative staff, and one out for health issues, there is inadequate strength to accomplish the necessary jobs.
- Critical lack of support for financial analysis and planning. Although the university provides many tools for retrospective analysis of how funds have been spent, there seem not to be any forward-looking planning tools. Futhermore, we no longer have any staff support for this function. We are literally running blind in this area. We have no plans to address because we have zero insight into possible resources that can resolve this situation.

- Large research grants have historically been secured by a very few faculty members who are in the critical path for nearly everything in the department. This places the department at serious risk for losses related to retirements, external job-seeking, or inadequate depth to handle the necessary leadership activities. A persistent push to expand the diversity of funding across the faculty has yielded some improvements and will continue.

- The shortage of faculty in key areas persists. This is especially noticeable in the Power and Energy area where there were previously 5 faculty persons, extremely strong research funding and high PhD student productivity, but now there are only 4 faculty (only 3 really research-active). At the same time, both funding and competition in this area have grown nationwide so that now the pre-eminence of USC in this area is under heavy siege and it is clearly at risk. One new hire in this area has been made to start in Fall 2013 which will help this area.

- Insufficient numbers of graduate students are from the US, which impedes research in certain areas (defense and nuclear related). We have increased advertising of the Accelerated Masters program to attract more of our own students into graduate school, and several programs have offered Research Experience for Undergraduates and mentored Magellan Scholar programs. These and other efforts will continue to recruit from the US student population.

- A significant compression of salaries at the Assistant-Associate interface puts us at risk for losing Associate Professors to more lucrative positions elsewhere.

- Lack of funds to support the undergraduate lab program. Although our lab program has been a noteworthy strength of the EE curriculum, it has been funded from return of indirect funds to the department. Even though this is not the "right" method to fund the labs, there has been no other. The CEC Fee, which should support undergrad lab programs, is all kept at college level. Moratoriums on fee increases prevent us from imposing a new fee.

- Loss of returned indirect costs to the department, the research groups, and the PIs threatens productive research programs and retention of personnel. Certain research infrastructure is properly supported by indirect cost returns, but with those funds stopped, we have lost the ability to support that infrastructure. This ranges from maintenance and calibration of shared research equipment to replacement at end-of-life. Also, most of our new faculty hires expected to receive indirect funds to build their research programs. Finding now that they are not receiving them has been a major setback and will inevitably lead some faculty to seek more rewarding positions elsewhere. Finally, indirect costs support some long-standing staff positions related to business operations of the research units. Without indirect support these positions will have to be eliminated and consequently research will be shut down.

Department of Mechanical Engineering Weaknesses/Issues

WEAKNESSES:

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.

Nuclear Engineering Weaknesses/Issues:

Too few faculty. Hire additional faculty as noted below. See related plans for improving graduate education and addressing related weaknesses.