December 8, 2008
College Planning Initiatives 2009 - 2010

College: College of Engineering and Computer Science

Planning Coordinator: Diane Schwartz, Associate Dean

1. Briefly explain how your plans relate to your college's mission/vision.

College of Engineering and Computer Science Mission Statement - *The College of Engineering and Computer Science seeks to be a recognized center for excellence for baccalaureate and masters education in computer science and in engineering. The College provides a quality education for its students. It is also a partner in the professional communities of computer science and engineering and provides an essential link between students' education and professional practice.*

CECS provides a quality education for its students by developing effective academic programs that prepare students for engineering and computer science careers. To do this we need to continually update and develop our academic programs; develop new ways of teaching our courses that meet the needs of our students; maintain our ABET program accreditations; ensure that our students get good advisement so that they can proceed to graduation in a timely manner; and provide excellent engineering and computer science laboratories for our students. Our plans to create new degree programs, offer more online/hybrid courses and continue our extensive on-going assessment programs support this part of our mission.

CECS creates partnerships with industry to help provide that essential link between students' education and professional practice. Our plans to expand Honors Co-op to provide internships for more students and our plans to strengthen our College Centers (CRS, ERC and ESCIE) require that we forge new industrial partnerships and cultivate the current partnerships. The College and Departmental industrial advisory boards will continue to provide feedback to the college on our planning initiatives.

CECS seeks to be recognized as a center for excellence for baccalaureate and masters education. CECS plans to focus on outreach and recruitment to ensure that students recognize the value of coming to CSUN for their engineering and computer science education. To support this focus on outreach and recruitment CECS is establishing a Student Ambassadors program and plans to expand its high school outreach program, ACCESS (Accelerated Coursework in Computer Science and Engineering for Student Success) to add more students, more high schools and more courses. We have recently hired a Student Outreach Coordinator to help us implement and manage our student outreach program.

2. ACADEMIC QUALITY

a) **Assessment**

Explain the progress that the college has made—and will make—in assessment: Identifying performance outcomes, setting benchmarks, assessing against them, using results, etc.

Assessment is an integral process for program improvement in CECS. Each of the undergraduate programs in our college, except for construction management technology, have implemented an on-going process to assess student learning outcomes that meets the requirements for ABET accreditation. ABET requires that we assess the programs using direct evidence of student learning. The basic assessment processes used by the departments include senior exit surveys, state exams, alumni and employer surveys, embedded questions on exams, department tests for specific outcomes, independent assessment of student work, pre-requisite tests and mapping scores on test and homework problems to student learning outcomes. Each of these programs was reviewed by ABET in 2007-2008 and each of the programs was reaccredited until 2014. In 2008-2009 ABET added a Continuous Improvement Criteria whereby "each program must show evidence of actions to improve the program". This will ensure that the programs document how they use their assessment results to improve their program.

The Construction Management Technology program is new and is preparing for an accreditation evaluation in 2008-2009 under the auspices of the American Council on Construction Engineering (ACCE)

Each of the ABET accredited programs has developed a six-year assessment cycle and, in 2009-2010, they will carry out the assessment activities according to their assessment plans submitted to ABET. Typically each year the programs select a subset of SLOs or courses to assess during the year; review the data collected from the previous year; revise or develop new assessment tools; and /or implement curricular changes resulting from the assessment. A special college-wide effort will be undertaken to evaluate the writing skills of our students using a college-wide writing rubric developed with the WRAD program.

Examples of program and curricular changes being made in 2008-2009 based on previous assessment results and ABET accreditation reviews include: (1) addition of a senior project course to the BS in Computer Science to improve student's ability to design software ; (2) participation in the campus WRAD program to improve student writing; (3) review of the math sequence for the MSE courses; (4) development of a new course proposal in Contemporary Issues in Engineering (ECE); and (5) introduction of a new Construction Engineering course (CEAM).

Plans to assess the program objectives and student learning outcomes for our graduate programs will be developed in 2009-2010 in preparation for the MS program reviews in 2010 -2011 and later. Plans to assess our GE courses in the Lifelong Learning section of GE will be developed in 2009-2010.

2. ACADEMIC QUALITY *(continued)*

b) **The Learning-Centered University**

CSUN faculty and staff have developed pedagogies and learning objectives that take into account the different ways and paces by which students learn, as well as the different media and formats that suit different disciplines and levels of instruction. Recently, we have especially encouraged the replacement of seat time—hours as a measure of learning—with indices and supplementary experiences which allow students to proceed faster, if they can. Record the major ways in which the college has implemented—and will implement—several principles of a learning-centered and/or innovative university. Indicate, too, the extent to which funds have been redeployed to these ends.

Principles

1. **Give students opportunities to learn in different ways:** The undergraduate programs in the College of Engineering and Computer Science are laboratory-based programs that use student team projects and other practical experiences to complement theoretical components of the curriculum. The curriculum is delivered in many different formats, including lectures, labs, team projects, senior design projects and student presentations. The engineering senior design students typically participate in intercollegiate competitions and/or work with industry sponsors. The Honors Co-op program and department internship programs provide students with further opportunities to "learn while doing". The Honors Coop program is self-supporting through fees collected from industry.

2. **Use of laboratory education to improve student learning:** Engineering and computer science programs have traditionally used laboratory education to improve student learning. This practice not only provides students with concrete examples of topics covered in their courses, but it also helps build student engagement in their programs. At this time laboratory engineering education in the engineering departments is severely limited by technical staff shortages. The resolution of this issue is a very high priority in our planning cycle.

3. **Engage students by offering an appealing and motivating curriculum:** We are integrating strategic themes into the mechanical engineering curriculum by introducing courses in alternative energy and robotics. The College is proposing a new bachelors degree program in computer information technology to better prepare students who want to work in information technology side of the computer industry.

4. **Offer programs and services where student can learn at their own pace and at their own time:** The College is offering an entirely on-line MS in Engineering Management program and offers a increasing selection of on-line or hybrid courses throughout the curriculum. The Mechanical Engineering Department has increased the number of Elluminate (hybrid) sections offered from 4 per year on 2006-2007 to a planned 11 per year in 2008-2009. Mechanical Engineering is developing a completely online MS in ME program. The MSEM Dept is increasing the number of students in on-line courses from 480 in 2007-2008 to an expected 600 students in 2008-2009.The self-support MS in ATRE program will be offered at a pace and time convenient for mid-career professionals. The College is increasing the Information Systems support staff to provide more faculty support for web-based and on-line courses. We are working to implement remote access to special applications on the college computers for CECS students.

5. **Supplementary experiences to help students learn:** The CECS Student Clubs, the Facilitated Academic Workshops (FAWs), peer tutoring and the ECS Living Learning Community provide opportunities for students to collaborate and help each other with course work and to engage in other enriching activities. The ECE Department plans to offer a series of computer aided design workshops to get students up to speed on important engineering software packages.

2. ACADEMIC QUALITY *(continued)*

c) Research and Creative Activity

Colleges and other units should report initiatives that will: (1) "incentivize" research, (2) require matches, in-kind support, or enhancements to facilities, (3) respond to regional needs, (4) revamp the delivery of the curriculum and/or the involvement of students as research/creative apprentices, and (5) or require reforms in RPT that, for instance, clarify the standards for early promotion and specify how alternatives to publication will be appraised. Pay special attention to opportunities, through grants and contracts, to enhance the General Fund support of units and the total compensation of faculty.

CECS will continue to provide reassign time to new probationary faculty for research and will set aside $25,000 to fund faculty and staff travel to conferences and workshops. The College will support the College Research Fellow with an additional $5000 stipend for travel, student assistants or needed equipment. The College provides grant writing support to faculty to encourage them to apply for grants and to enhance the success of the grant application. In 2007-2008 CECS faculty applied for $3.6M in grants and contracts and received $885,000. In the same year there were 1.8 publications per full-time faculty member in the College. We expect to meet or exceed these numbers in 2009-2010.

CECS will be implementing Digital Measures to help faculty document their research and grant activity. In the future it may be used for faculty to develop their Professional Information Files PIF.

CECS in collaboration with the College of Science and Mathematics, submitted a grant proposal to the W.M. Keck Foundation to acquire a Field Emission Scanning Electron Microscope (FESEM) with Energy Dispersive Spectroscopy (EDS) to provide faculty and students in the nanotechnology with the fundamental tools needed to investigate the complex phenomena that occur at the nanosize scale. Over two years, the proposed project components will immerse students in nanotechnology through research projects, interdisciplinary course development, pre-college outreach activities, and industry interactions. Two graduate students and ten undergraduate students will be involved in different projects and will be supported with stipends. The program requires cost sharing of $98,540.

The Mechanical Engineering Department is working on an NSF grant focusing on using the Conceive-Design-Implement-Operate (CDIO) framework to improve student retention and performance by revising the core design courses and working with peer minority-serving institutions (CSULA, CSU Pomona, and CSU Fresno) to implement CDIO.

Close cooperation between the CECS Energy Research Center and PPM has opened up many opportunities for faculty and student research. A fellowship has been acquired from Pratt and Whitney Rocketdyne to support a graduate student pursuing research in an area of interest to the sponsor. The ME Department will pursue continued funding for the fellowship. In collaboration with the University Corporation and PPM, the Energy Research Center is pursuing a business plan to market the Barometric Thermal Trap (BaTT) technology that was developed with ME faculty expertise.

The College will continue to pursue funding for College Centers, including the Energy Research Center, the Ernie Schaeffer Center for Innovation and Entrepreneurship and the Center for Research and Services. The Center would be able to provide administrative support for grants, design clinics, Honors Coop and would be a strong conduit between the college and industry. The College will review the charter of the Center for Research and Services to determine what services the Center should provide and what support it can give to incentivize research. A funding source for the administration of the Center needs to be identified.

The College Personnel Committee has requested that each department develop standards for early promotion.

2. ACADEMIC QUALITY *(continued)*

d) **On-Going Programs**

What changes do you anticipate? In particular, how will academic change entail more than growth? Will it entail experiential learning, reduce seat time, reinforce GE, and/or respond to regional needs or accreditation reviews? Will it reflect an entrepreneurial direction to enhance General Fund and total compensation? **How will you reduce costs to students? How are you engaging in partnerships with the community?**

New programs to respond to regional needs: CECS is planning to offer new graduate and undergraduate programs to attract new students with a curriculum that will enable students to compete for jobs in a changing industry and to offer programs that respond to regional needs. The following programs are all ready in the college or campus or CO review cycle: BS in Engineering Management, MS in Assistive Technology and Rehabilitation Engineering(ATRE) which is a self-support program through Tseng College, BS in Computer Information Technology and a Minor in Engineering Management . The Computer Science Department, in collaboration with the Department of Accounting and Information Systems, is exploring the possibility of an MS in Information Technology to be offered in a self-support mode through the Tseng College of Extended Learning. ME and ECE are preparing the documents for a 2 + 2 engineering program with Shanghai Normal University.

CECS departments are beginning to develop new programs in Quality Management (BS and MS) and an MS in Computer Engineering and a new Minor in Mechanical Engineering.

Partnerships with the Community: Two masters programs in assistive technology (MS ATRE and MS in ATHS) are being developed jointly between the Colleges of ECS, HHD and CSM, the Tseng College, the Center on Disabilities and industry and practitioners from the assistive technology community. These self-support programs will be implanted in Spring 2010. The Energy Research Center and the Ernie Schaeffer Center on Innovation and Entrepreneurship are deeply involved with the external community for advice, direction and funding and general research opportunities. The ACCESS program with eleven local high schools is another example of a strong partnership with the community. Our Honors Coop program is an academic internship program with close partnerships with industrial companies that hire our students and that pay for the cost of the program.

Reducing Costs for Students: CECS is reducing costs for students by increasing online courses and 3 hour block scheduling to save students commute time and fuel costs; increasing number of scholarships; decreasing time to graduation by better advisement to reduce "extra courses" or change of majors and looking for opportunities to partner with professional societies to get reduced textbook prices. As we work towards reducing costs for students by offering more online courses and more 3-hour block courses, we also need to carefully determine which courses are most suitable to be offered in on online or 3 hour-block format. We do not want to reduce costs for students at the expense of providing them a quality education.

Overcoming Impediments to Offering More Online or Hybrid Courses: We need to work with the University to determine ways to provide more technical support to faculty offering online or hybrid courses. More support is needed for timely maintenance of the infrastructure (e.g. SMART classrooms) that is being used to deliver the hybrid and online courses.

3. STUDENT ENGAGEMENT

Describe how your unit will contribute to the CSUN effort to engage, retain, stimulate, and graduate its students. Specifically, concentrate on plans to improve first to second year retention, reach out to K-12 pupils and teachers, make advising more consistent in practice and policy, and improve the support structures for students in courses with high failure rates. Finally, if pertinent, describe plans to mentor and channel undergraduates into post-baccalaureate study.

The College of Engineering and Computer Science has a strong on-going commitment to student recruitment and to the retention of our students once they matriculate at CSUN. As an example of its commitment to student recruitment, CECS implemented a High School Outreach Program (ACCESS). . The ACCESS program is designed to give high school students a college experience and to encourage students to consider a major in a technical (STEM) field. In fall 2007 72 students from local high schools took the engineering orientation course, MSE 101/101L, as a hybrid on-line course. In Fall 2008 we have 120 students from eleven different high schools in the ACCESS program. We plan to expand the program to include offering ECE 101/L and a beginning computer science course to the local high schools. We have hired a full-time Student Outreach Coordinator to help manage and implement our outreach efforts to high schools and community colleges. The College recently established the Joseph and Nancy Owens Endowment for Student Outreach in CECS. CECS received a $60,000 grant from the CSU Engineering Academy in 2007-2008 to support engineering and computer science outreach programs to K-12. An additional $65,000 was received in 2008-2009.

The primary activities in CECS devoted to retention are college-wide efforts to maintain and improve an excellent advisement system (both in the SSC and in the departments); to run the Student Services Center tutorial programs which feature organized group study sessions; to continue the Facilitated Academic Workshop (FAW) program for lower division courses with high failure rates; and to offer a new college-wide orientation course (CECS 196ACT). We also have an Engineering and Computer Science Living Learning Community in the Residence Halls for which CECS provides advisement support, tutoring in lower division CECS major courses and guest speakers. The college has provided $6000 for LLC tutoring for 2008-2009.

Another example of student engagement is the strong commitment of the college and departments to student clubs. Each department has at least one active student professional club. These student groups along with the student groups from the Society of Women Engineers (SWE), the Society of Hispanic Professional Engineers (SHPE) and the National Society of Black Engineers (NSBE) support outreach, retention and professional development efforts in the college. They are an important component of the CECS major experience and of college outreach activities.

The College plans to review and track retention of its undergraduate students in 2009-2010. The questions that will be studied include What are we doing to retain students? How do the various retention activities relate to actual retention? That is, what is working and what is not working? What should we do in the future to improve our retention rates? The study will be coordinated by the Associated Deans Office in conjunction with our Student Affairs Committee, Student Services Center and individuals from the departments.

4. SHARED VALUES

Enumerate and explain your major projects. What philosophy—what thread—ties together these efforts? Indicate how they respond to assessment reports. **What efforts are underway in your college to articulate and incorporate sustainability as a core value that underlies your college's academic programs?**

College Philosophy: The College is committed to excellence in teaching and scholarship. Graduates of our programs should be of the highest quality and should be sought after by employers. Our students should have the skills needed to make innovative contributions to their field, to be leaders in their field and to be life-long learners. Our faculty and staff need to maintain professional currency; our faculty needs to have the time for scholarly and creative activity that contributes to the excellence of their teaching and to the recognition of the excellence of our programs. The College values a diverse student body and works with the local community to create a pipeline of diverse students to college and to careers in engineering and computer science. Our major projects and initiatives for the next year are :

Outreach to K-12 and Community Colleges: Expand ACCESS program; Increase visits to and from local high schools to promote programs (Use faculty, staff, students, industry); Increase number of underrepresented students in our program, including women.

Strengthen relations with industry: Expand Honors Coop and other Academic Internships; Develop Ernie Schaeffer Center for Innovation and Entrepreneurship; Strengthen the Center for Research and Services and the Energy Research Center.

New Programs (Scheduled for implementation in 2010): MS in ATRE (self-support) ; BS in CIT; Minor Engineering Management; Update and create new marketing materials for all of our programs.

Research: Increase the number of research and grant proposals submitted and/or funded

Retention Study: The College plans to review and track retention of its undergraduate students in 2009-2010.

Review College Infrastructure/Organization Needs

- Technical Support Staff Needs Review Committee - to assess and improve the level and characteristics of technical support staffing needed to maintain the laboratories. Implement recommendations.
- Long-range Equipment Replacement Committee - to develop a long-range plan to continually replace CECS laboratory equipment as it ages and before it becomes obsolete. Implement recommendations.
- Implement the CECS Business Continuity Plan

Faculty and Staff Hiring : Review needs for new faculty due to retirements, new programs and FTES growth. Each department will create a five year projection of their faculty needs. Review needs for additional technical and support staff. The College will create a five year projection of staff hiring needs.

Efforts to articulate and incorporate sustainability: CECS has established the Energy Research Center which is a multidisciplinary, university-industry research effort focused on the advancement, coordination, promotion and implementation of new and/or alternative energy sources, generation, distribution and utilization. The Mechanical Engineering Department faculty and students are directly supporting the sustainability core value through research and direct classroom instruction. The waste heat recovery system for the Direct Fuel Cell power plant was designed by CSUN's Physical Plant Management and faculty and students from Mechanical Engineering. A second phase of this fuel cell project, Phase II: Subtropical Rain Forest, was undertaken with faculty and staff from PPM and the Mechanical Engineering Department in order to utilize two main fuel cell's byproducts: carbon dioxide and water. Faculty and students are assessing the overall efficiency of this power plant including waste recovery and they are designing a system for the efficient operation of the fume hoods in the Science buildings. The Mechanical Engineering Department is offering an Alternative Energy course (ME 496 ALT) and a course in Introduction to Environmental Engineering (ME 485). Sustainability issues are addressed directly in these classes.