

Access to Excellence Results of the CENG College-Based Domain Discussions and the College –Wide Meeting

Preliminaries:

The College of Engineering embraced the charge of the system-wide “Access to Excellence” planning process and has participated in this CSU based endeavor. During January and February, each of the six *Ad Hoc* domain groups met among themselves and subsequently met with college constituencies to develop a response in the format provided to the groups. (These responses are appended below.) Each group was cognizant that their charge was to winnow the responses to a proposition, an action based on that proposition and a few ideas that would enable the implementation of the suggested action.

Each *Ad Hoc* domain group was comprised of six to seven members, and was chaired by a designee who had the responsibility of building the group, and developing responses in line with the charge to the groups. Each group had representation from faculty, staff, students, administration and a member external to the university. All six groups, and other members of the college community came together for a final vetting of the responses on February 13, 2007. This six-hour, college-wide meeting led to the refinement of the college-based domain responses.

Groups

Domain	Chair	e-mail
1- Assuring Access	Stacey Breitenbach	sbreiten@calpoly.edu
2- Connecting to P-12 and CC	David Cantu	dcantu@calpoly.edu
3- Fulfilling Commitments to Stakeholders	Dan Walsh	dwalsh@calpoly.edu
4- Ensuring Success in Student Learning	Fred DePiero	fdepiero@calpoly.edu
5- Faculty and Staff Excellence to Promote SL	Ed Sullivan	esulliva@calpoly.edu
6- Now&Future: Campus and System Identity	Z. Sheikh & L. Vanasupa	zsheikho@calpoly.edu

A priori, the groups recognized that there was considerable overlap among domains, and crafted their responses based on that recognition. The final results of each groups deliberations, their feedback from constituents, and the final vetting to the larger college community are reported in the appended forms.

COLLEGE of ENGINEERING**Contact Name & Phone #:** Stacey Breitenbach (D1), David Cantu (D2)**e-mail:** sbreiten@calpoly.edu, dcantu@calpoly.edu

DOMAIN #1: ASSURING ACCESS

Proposition:

Not enough P-12 students are adequately prepared for admission to STEM disciplines at the university level. The State of California is economically at-risk because of an insufficient high-technology workforce. Since Cal Poly is a highly selective institution this lack of underrepresented and underserved is more severe than at other institutions.

Action:

A. Establish an outreach position within the college of engineering.

Recommendation: Establish an outreach position at each academic college that reports to their college dean. The office of the Vice-President of Admissions, Recruitment, and Financial Aid would be responsible for coordinating the seven Outreach positions. The CENG outreach position responsibilities would include: design; devise and implement an comprehensive outreach plan; coordinate, maintain and assess outreach activities within the College; coordinate across the University; coordinate across P-14 activities. Leverage existing outreach activities within the College (SWE, SHPE, other CENG clubs, CENG departments, Upward Bound, Cal SOAP, etc.) Marketing engineering careers to parents/students and develop communication pieces in multiple languages highlighting engineering careers. Establish an annual on-campus bi-lingual parent conference for community members to tour and learn about engineering careers, admissions, financial aid.

B. Influence middle school and high school teacher

preparation by instituting on-campus intensive summer workshops in engineering concepts tied to the curriculum being taught in the public schools and matching the California standards for science and math. Developing low cost hands-on supplemental science and math curricula.

Recommendation: Pursue external funding to support this activity and recruit interested faculty members. In addition, outreach activities must be part of the recognized RPT process (it must be valued) and release time as an option.

Some ideas:

- Establish an outreach ambassadors program that includes: students, faculty, staff, alumni, parents and industry. These members should be self-selected.
- Leverage existing MESA Schools Program and MESA Community College relationships.
- Ensure CENG website is sensitive to under-served groups and highlight outreach activities.
- Evaluate and clarify transfer criteria for community college transfer students, parents, community college counselors, faculty, and staff.
- Develop alternative mapping for students who wish to attend a community college prior to transferring to Cal Poly.
- Explore alternative means of communications (podcasts, pamphlets) to middle and high school students and their parents.
- Include educator's page on the CENG newsletter.
- Expand Open House to include a significant educational component to educate the general public about engineering and STEM related careers. To include: tour of departments, educational displays and demonstrations, and general sessions on multiple possibilities offered within engineering.
- Work with Admissions to identify early prospects (10th grade) to develop their interest in pursuing engineering at Cal Poly by inviting them to special events, matching them with a mentor, periodic targeted communications, etc.
- On-line mentoring for teachers "Ask an Engineer" to

answer specific questions about engineering concepts and to assist with curriculum development. We would utilize faculty and alumni in this endeavor.

- Provide a venue where some local science and math teachers would the opportunity to work on summer projects currently being sponsored by industry. Seek funding from industry to provide a stipend for the teachers.

DOMAIN #2: CONNECTING TO P-12 SCHOOLS AND COMMUNITY COLLEGES

Proposition:

Increase teacher knowledge and passion for engineering fields by leveraging partnerships with P-14 educational sector.

Action:

Develop a university wide partnership with future and current teachers to broaden the understanding of engineering concepts and its social and global relevance.

Some ideas:

- Include outreach activities as part of the recognized RPT process and allow release time to work with local schools in curricular development.
- Establish a faculty outreach award to recognize outstanding contributions to P-14 educational system.

- Partner with various colleges (College of Liberal Arts, College of Science and Mathematics, and the College of Education) to affect teacher prep curriculum to include hands-on science and math enrichment activities that include engineering concepts.
- Establish service learning course with degree applicable credit where students can teach engineering modules in a P-12 classroom setting.
- Partner with community college members of the Engineering Liaison Council in order to build capacity to increase the number potential engineering transfer students.
 - Identify feeder schools to Cal Poly and evaluate if a change in the transfer MCA would increase the applicant pool from underrepresented and underserved students.
 - Target academy schools, Upward Bound Science Centers, and engineering magnet schools with the intentions of establishing appropriate levels of involvement with engineering.
- Increase the number of designated Partner Schools and corresponding outreach efforts.
 - Stable designated contacts with P-14 partners to strengthen communications.
- Designate scholarships for partner institutions (high schools and community colleges).
 - 50% of Cal Poly scholarships should be need based.
- In order to reduce the debt burden on low income first generation college students – the financial aid package for the first two years at Cal Poly should be comprised of scholarships and grants.
- Establish a summer research experience for 10th and 11th grade students and potential community college transfer students.
 - Provide a venue where some local science and math teachers would the opportunity to work on summer projects currently being sponsored by industry. Seek funding from industry to provide a stipend for the teachers.
- Influence middle school and high school teacher preparation by instituting on-campus intensive summer

workshops in engineering concepts tied to the curriculum being taught in the public schools and matching the California standards for science and math. Developing low cost hands-on supplemental science and math curricula.

COLLEGE of : Engineering

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DOMAIN #3: FULFILLING COMMITMENTS TO MULTIPLE STAKEHOLDERS

Proposition:

The nationally-recognized College of Engineering holds a special position within the CSU, serving as a vital catalyst to improve the economic health and societal conditions of California, the nation and the world.

In our well-tested, hands-on, laboratory-intensive approach, students serve as the primary link to all stakeholders. The college provides quality graduates to enhance the workforce and help the industries, businesses, and institutions of California thrive and adapt.

Action:

Given the global challenges and the ever-increasing role of technology in our society, our partnerships with stakeholders must evolve, especially to increase the agency and visibility of faculty and staff.

Evolution requires the development of systems responsive to the needs of stakeholders. At a minimum, this growth requires an infrastructure that facilitates partnerships at all levels and with all stakeholders.

Some Ideas:

- Strengthen graduate programs and applied research
- Generate team-based projects with stakeholder-provided

challenges, resources and mentors

- Expand distance learning and on-site workshops/short courses
- Create forums for articulating stakeholder needs
- Enhance faculty/staff-moderated contact with industry—quality, quantity, and time horizon of interaction
- Develop a college infrastructure that supports partnerships with stakeholders

COLLEGE of : Engineering

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DOMAIN #4: ENSURING SUCCESS IN STUDENT LEARNING

Proposition: The needs of students, the engineering profession, and society are changing at an accelerated rate.

Action: Work with constituents to (re)define success. Leverage ABET activities to continually assess and adjust program outcomes and objectives.

Some ideas:

- Partner with campus communities (Gen Ed, Student Life) to promote shared learning objectives.
- Partner with industry to validate and identify changes that would enhance student success (entrepreneurial, leadership, communication...)
- Partner with alumni to gauge the success in their careers, and inform our curricular changes.
- Faculty need to be active participants in defining student success (e.g. outcomes).

Proposition: Understanding performance of students and

graduates is the key to ensuring success.

Action: Define measures of success and assess student abilities on a regular basis. Work to improve measures. Establish rigorous methods for measuring success.

Some ideas:

- Improve access to available data resources to better track students. Investigate student's performance in classes relative to learning styles and co-curricular activities, for example.
- Understand professional performance of graduates and student achievement through the gathering of additional data, e.g.:
 - Progress towards degree, prerequisite checks.
 - Professional society membership, club membership
 - Licensure boards, industry
 - Alumni career accomplishments, confidence in position and skills
 - Learning styles and learning communities
- Faculty better trained in outcomes assessment

Proposition:

There are challenges and obstacles to student success

Action:

Track obstacles to success faced by students and make improvements based on assessment results. Promote faculty engagement with students.

Some ideas:

Courses/Curriculum

- Structured approach to senior projects (project based, with lectures)
- When opportunities arise, seek to improve student/faculty ratio, small class size, course availability
- Improve collaboration between engineering, science

and math. Possibly rework the freshman physics sequence to include engineering design, creative problem solving, and concepts from calculus. Improve context of math and science for engineering students.

Students

- Characterize differences between instructors' and students' learning styles
- Enhance co-curricular learning opportunities
- Promote culture of learning and thinking, not 'getting the right answer' and passing courses
- STEM outreach to help with informed choices about major and courses.
- Students arrive prepared to succeed at Cal Poly – enhance engagement with community colleges and high schools.

Faculty/Teaching

- Characterize differences between instructors' and students' learning styles
- Engage faculty in a proactive advising model.
- Faculty training in scholarly teaching, with improved assessment and feedback methods.
- Reward faculty for innovation in teaching, STEM outreach, club advising.

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DOMAIN #5: FACULTY/STAFF EXCELLENCE TO PROMOTE STUDENT SUCCESS

Proposition:

The credibility and reputation of the university and college are based not only on our excellence in the classroom but our demonstrable contributions to the engineering state-of-the-art through a broad range of faculty and student-based research, development, and externally recognized intellectual accomplishments.

Action:

A vibrant program of research and scholarly activities requires substantial investment and reward to faculty achievers and reaching synergy with a properly recognized and supported graduate program. A university-wide effort is needed to increase understanding among students and the rest of the campus community of the necessity for faculty to actively contribute to the state-of-the-art in their fields, and of the time required to accomplish this. Systematically and

consistently adjust teaching loads to recognize the substantial research and service contributions of particular faculty.

Funding allocations must recognize the costs and demands on faculty of the laboratory-intensive curriculum required to support the learn-by-doing mission of our polytechnic university.

Some ideas:

Create provisions for the supervision of doctoral and postdoctoral researchers on campus by joint agreement with UC campuses. Change space allocation practice to support faculty R&D, projects, and the needs of a viable graduate program. Restructure Grants Development and Sponsored Programs, leading to decentralized services and oversight by active faculty researchers. Revise release time costing practices to improve proposal competitiveness (15 rather than 12 WTU basis, reimbursement at replacement faculty rate, reduced employee benefit burden). Enhance competitiveness and improve fairness in the application and use of overhead. The university must accept an obligation to patent worthy faculty inventions as a necessary component of professional recognition. CSU policies and procedures need to recognize that one size does not fit all.

DOMAIN #5: FACULTY/STAFF EXCELLENCE TO PROMOTE STUDENT SUCCESS

Proposition:

Recruitment and retention of top faculty and staff requires adequate support for all aspects of professional development and recognition of the need to achieve a realistic balance in individual life and career aspirations.

Action:

Realistic expectations are necessary in balancing all of the different demands on faculty to prevent burnout and enhance the student's learning experience. These demands

include research, project and extracurricular activity advising, graduate student mentoring, as well as other forms of service to the university and one's profession.

More resources and commitment at all levels are needed to address human and career needs including access to professional development opportunities for both faculty and staff, quality and affordable housing and designated child care for employees, and competitive salaries enhanced by regular merit increases.

Provide a more flexible and market-competitive salary schedule that eliminates artificial ceilings for each rank.

Provide funding for equity increases for faculty and staff.

Provide funding for competitive startup packages appropriate to the particular profession.

Improve consistency in RPT criteria, identifying clear individual expectations about the balance in teaching, scholarly activities and service, which are consistently applied among the different levels of review within the university.

Some ideas:

Additional resources and staff assistance are needed to help faculty members develop grant proposals and administer project awards.

Faculty and staff development builds upon strengthening our relationships with external professional affiliates, working in particular to support the success of California industry in the global economy.

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DOMAIN #6: NOW AND IN THE FUTURE: CAMPUS/SYSTEM IDENTITY

Proposition:

Engineers in the 21st century must value sustainability and social responsibility and be able to design and manufacture in accordance with the sustainability requirements

Action:

- Incorporate service learning as an integral part of the educational experience at cal Poly (this can be coupled with sustainability projects)
- Encourage civic engagement at local community level.
- Integrate engineering ethics and design for sustainability throughout all university curricula
- Change university retention, tenure and promotion policies and staff evaluation policies to encourage scholarly activity and collaboration across disciplines (cooperative scholarship with individuals in different disciplines) and university units

Some ideas:

- Develop a high profile sustainability program at Cal Poly and try to get national attention
- Create a office of sustainability with a director who reports to the president so that the facilities and academic side of the institution can work together on local, community-oriented sustainability projects (this would follow the example set by Arizona State University)
- Provide incentives to the faculty to bring sustainability education coupled with service learning into the classroom
- Partner with the local community to promote importance of sustainable development
- Start every project with a review of the engineering ethics. Require consideration of ethics and sustainability in any project report. The students should be able to comment of the impact their work may have on the world
- Add to EAB (External Advisory Board) people from the local non-profit organizations

Proposition:

Innovation in “hands-on” and other teaching strategies is central to the success of engineering education at Cal Poly and makes Cal Poly unique in the CSU system

Action:

- Build on the success of a number of existing curricular innovations and spread the activity across all departments
- Move towards an interdisciplinary educational experience in the college of engineering
- Develop systematic and intimate relationships with the industry to get funding and projects
- Develop a scientifically based assessment program in order to continuously improve upon the design and delivery of all courses.
- Provide incentives to the faculty for engagement in curriculum design
- Acknowledge the value of scholarship in engineering education
- Move towards agile and flexible curriculum in which the students participate in the design of their curriculum
- Change university “productivity” measures (e.g., SCUs, WTUs) to encourage cross-disciplinary, cross-college teaching innovation
- Change retention, tenure and promotion and evaluation policies that discourage cross-university collaborations

Some ideas:

- Make Cal Poly the center of excellence in project based learning in the country
- Encourage interdisciplinary projects (across the university) and competitions
- Add a design type course to all 4 years
- Get Freshmen involved with design as early as possible
- Provide financial or time-based incentives for faculty to broaden successful pilot programs to a wider portion of the university
- Loosen university restrictions on experimental courses (allow shorter time frames)
- Loosen departmental restrictions on requirements for graduation
- Remove general education policies that restrict innovation by the faculty
- Revamp general education system to promote more creativity, scholarship, and collaboration across campus departments