

PROGRAM REVIEW 2008-2011

Division: PSME
Department or Program: Engineering
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In providing responses in the following areas, please utilize the quantitative data available in the Program Review Enrollment Data Document and the Budget Document. For the purposes of the Program Review, both departments and programs will be referred to as program."

I. Description and Mission of the Program

Which area(s) does this program considerably address (check all that apply):

Basic Skills Transfer Career /Technical Other (describe)

A. Provide a brief description of the program including any services provided and the program's mission.

The program's mission is to:

- prepare students for transfer to a four-year Institution for completion of their Bachelor's degree in one of the major engineering fields (Electrical, Mechanical, Civil, Aero, Chemical, Industrial, and Computer Engineering).
- prepare the next generation of engineers and technical workers needed for a viable future U.S. economy
- improve student learning through technology-enhanced instruction.

B. Provide a summary of the program's main strengths.

The De Anza Engineering Program:

- is the Bay Area's main Community College feeder for four year engineering programs at San Jose State University, Cal Poly, Berkeley, and UC Davis
- provides under-served students an opportunity for an engineering education and a viable route to upward mobility.
- provides an enhanced learning environment through technology-augmented instruction, and prepares students for an ever increasing technology –based economy.

C. Provide a summary of the program's main areas for improvement.

The De Anza Engineering Program needs to:

- continue enrollment increase efforts with special attention to under-served populations

- expand the use of the web and other technology enhanced learning tools to improve both technical and writing/communication skills
- Provide additional hands-on projects and necessary supporting facilities to model industry level project methodology and development.
- encourage tutoring, mentoring, and other student support services that improve the success rate of students, especially those with basic-skills deficits.

D. What are your expected outcomes (such as learning outcomes, transfer, career goals, certificate and degrees) for students in your program?

II. Retention and Growth

A. How has the program responded to the institutional goal of increased access, growth and retention? (Include the number of students enrolled in the program and the retention rate over the last three years.)

- In the 05 – 06 to 07 – 08 years the engineering enrollment at De Anza declined about 13%; during the same period, engineering schools around the nation reported a 44% decline in enrollments.
- However, enrollments for the fall, winter, and spring quarters of the current ('08 – '09) academic year, neglecting any further spring enrollment, have increased 23% over the previous year. In addition, Engineering 10, an Introduction to Engineering, has shown a 28% increase from the previous year, and is an indicator of new students interested in engineering.
- This upward trend is expected to accelerate due to:
 - A general national turnaround in engineering enrollments
 - the recent national emphasis on math, science, and engineering education as a key to our economic viability.
 - SJSU's and other regional engineering schools limiting general enrollment and student transfers to only from CC's in Santa Clara County.
- There is still considerable work to be done to increase enrollments in the more advanced engineering courses. Some new strategies have been put in place to increase these enrollments; including
 - Incorporating more laboratory and hands on experience into the engineering programs, especially to bring more exciting examples (such as solar power and robotics) into the introductory engineering and circuit analysis classes
 - Work with the engineering club and WISEM (Women in Science, Math, and Engineering) to recruit new students, especially those students not traditionally inclined toward engineering careers. These groups sponsor activities such as robotics competitions, engineering projects, and mentor and speaker programs.

- Clarify academic and career engineering pathways so that students understand the necessary requirements and benefits of an engineering education and understand what is needed for them to transfer to four year engineering programs
- Considering that engineering is a highly demanding field of study, requiring extensive coursework in mathematics and physics as well as in general education, during the last three years, engineering has held the same or higher retention rates than the Division (PSME). Its success rates have been significantly lower than the Division in general, and need improvement.

	Department		Division	
	% Retained success	% Success	% Retained	% Success
07-08	87	52	84	67
06-07	89	57	82	67
05-06	89	58	82	67

Some ways that the success rate can be improved are:

- Work closely with the new Resource Center to improve and enlarge engineering tutoring programs
- Actively support the Engineering Club and WISEM which in turn support peer tutoring and mentoring efforts.
- Consider changes in curriculum, especially in the Introduction to Engineering course, to emphasize basic skills needed to succeed in higher level engineering courses

B. How has the program responded to the institutional goal of increased access, growth and retention specifically for the identified targeted populations of African Ancestry, Latino/a, and Filipino/a students? (Include the number and percentage of the program's enrollment that was made up of the targeted populations and the retention rate of the targeted populations over the last three years.)

07-08	Population	% Enrollment	Retention Rate
Black	12	4	83
Filipino	10	3	70
Hispanic	31	10	81
Other	9	3	89

06-07

Black	14	4	79
Filipino	16	4	75
Hispanic	31	10	88
Other	16	4	90

05-06

Black	20	6	90
Filipino	21	6	86
Hispanic	28	8	89
Other	12	3	85

The data are consistent with the drop in the general population. The following steps will should increase the enrollment of the targeted populations in engineering.

- Participation in engineering student recruitment initiatives sponsored by SJSU. These initiatives are aimed primarily toward the targeted populations
 - The Engineering Open House aimed at helping students transition easily from their high school courses to more advanced programs at local community colleges and San Jose State University.
 - The Regional Community College Workshops aimed at creating a seamless path from the CC's to SJSU.
- Participation in ELC (Engineering Liaison Council). This is a consortium of engineering schools from all four levels of California's system of higher learning (UC, CSU, CC, Private Institutions) aimed at coordinating course content and student preparedness for transfer between the universities and the community colleges.
- Working with the Engineering Club and WISEM to encourage enrollment of traditionally under-represented populations
- High school visitation and outreach programs.
 - To introduce students to De Anza's engineering program
 - To advise students on courses needed for success toward a science/engineering degree.

C. The Statewide Basic Skills Initiative defines "basic skills" as English, mathematics, reading, writing and ESL skills. In what ways does your program address the basic skills needs of students? For programs that do not directly address basic skills, how does the lack of basic skills impact student success rates for your program?

- Based on a questionnaire collected at the beginning of the course, approximately 60% of the students enrolled in the “Intro to Engineering” class lack basic skills needed for success.

To help ameliorate this situation, some of the following actions have been taken or are planned for the near future:

- Lab and homework assignments have been designed to cover some of the basic math skill needed for success in the course.
- Special tutors are provided at the tutoring center to assist students with their Engr10 (Intro To Engineering) class.
- The department will be working closely with the new Math, Science, and Technology Resource Center supervisor to identify individual students requiring enhanced basic skills and will provide tutoring, mentoring, and other support services to that population
- We will offer Engr 2, a similar course to Engr 10. This course is not transferable and it does not require math skills higher than arithmetic. It will give us an opportunity to develop some of the basic math and science skills necessary for students to be successful in more advanced classes, while at the same time presenting exciting hands-on project activities likely to continue students’ interest.

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III. Student Equity

- A. What progress or achievement has the program made towards decreasing the student equity gap? (Include student success rates for targeted populations compared with other students over the last three years.)

07-08	Count	%Success	%Retention
Targeted	53	32	79
Not-Targeted	259	56	89
06-07			
Targeted	64	42	83
Not-Targeted	293	60	91
05-06			
Targeted	69	39	88
Not-Targeted	292	63	89

- B. In what ways will the program continue working toward achieving these goals?

To minimize the gap between the targeted and not-targeted populations we need to:

- Offer preparatory courses in engineering/Science math.
- A course in basic Report writing and note taking techniques.
- A course in good learning and studying techniques.
- Preparation self-study computer aided courses to enhance the learning process.
- **Inclusion of more collaborative activities such as group study programs.**

- C. What challenges exist in the program in reaching such goals?

- **Lack of engineering tutors at the Tutoring Center specifically assigned to assist engineering students.**
- **Lack of instructional assistant to author self-study software for students to practice their understanding of the material presented in class.**

IV. Budget Limitations (Please be specific in your responses.)

- A. Identify any limitations placed on the program based on limited funding. What increases in resources are critical to the program and what are the consequences of continued limited funding on the program?

- **Need to purchase lab and hands-on equipment to enhance interest and reflect engineering professional environment.**

- **Need to purchase kits for hands-on experimentation.**

B. Describe the consequence to students and the college in general if the program were eliminated or significantly reduced. Please be specific.

- **According to SJSU's school of Engineering, the Engineering program at De Anza supplies 37% of their students whereas all the other regional community colleges (Cabrillo, Gavilan, San Mateo, San Francisco, Foothill, Evergreen, San Jose City, West Valley, and Mission) supplying less than 7%.**
- The pipeline to engineering will be cut off for Minority and underrepresented students by eliminating a low-cost educational opportunity.
- The enrollment in Math and Physics classes beyond the introductory and remedial courses will be greatly affected.
- Will deny minority and underrepresented students living in the Silicon Valley the opportunity for a technical career.

C. Additional Comments (optional): What additional information is important to consider when reviewing the budget of your program for possible reductions? You may include any or all of the following, or other information .

- Strategic Planning Initiatives (Community Collaborations, Cultural Competency, Outreach, and Individualized Attention for Retention): Describe any other Strategic Planning Initiatives your program has addressed.
 - De Anza's engineering program affords students from a lower socio-economic background an economical venue to an engineering degree.
 - De Anza's engineering program has participated into writing and has been awarded several grants.
- Relationships with Other Programs: Describe any partnerships or collaborations that the program is actively engaged in, which reduce costs and/ or improve service delivery.

A successful four-year partnership with UC Santa Cruz ended at the end of the Fall Quarter. This partnership offered:

- In-house (at De Anza) engineering counseling to students.
- Recruitment funding.
 - Co-ordination of course transferability.
- State and Federal Mandates: Describe any State or Federal mandates that directly impact the program.
 - A renewed national emphasis has been placed on engineering education.
- Trends (such as enrollment, certificate and degrees conferred, transfer rates, job placement, etc.): Describe any positive and/ or negative trends in the program.
 - In the last three years, the program has followed the national negative enrollment trends. However, with the new national emphasis on engineering education, I expect the trends to improve considerably.

- Comparable Programs at other Institutions: Provide any information that you have that would allow for a comparison of the program to similar programs at other institutions in the State.
- De Anza is, and has been, the premier engineering program among the community colleges in the greater bay area.
- It is the main feeder to SJSU's school of Engineering
- Most of the other community colleges in the area have a very limited offering of engineering courses and they offer them sporadically.

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