

# 2016



Evergreen Valley College

Division Of Math, Science and Engineering

## **[ ENGINEERING PROGRAM REVIEW ]**

***FINAL REPORT***

***(BASED ON PR-CRITERIA 2014-2015)***

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Current Year: 2015-16

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December 1, 2015

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6. Describe how your program is articulated with the High School Districts, CCOC (if applicable), and/or other four year institutions. (Include articulation agreements, common course numbering etc.).....
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## ***I. EVC Mission***

With equity, opportunity and social justice as our guiding principles, Evergreen Valley College's mission is to empower and prepare students from diverse backgrounds to succeed academically and to be civically responsible global citizens.

## ***II. Executive Summary***

The associate degree programs in engineering have been in existence for over 35 years at Evergreen Valley College (EVC). The program offers lower division curriculum for engineering education. The comprehensive two-year program offers associate in science and arts degrees. The engineering program enables the students to pursue the following paths:

1. Seek a technical job in industry as technicians or engineering assistants.
2. Transfer to four-year universities, such as University of California system, California State Universities, or independent private schools, and pursue bachelor's degrees in engineering.

Guided by the College's Commitments to Action focusing on Student Centeredness, Community Engagement, and Organizational Transformation, the engineering program has established partnerships with local high schools, organizations, and industry. The program has been continuously updated with the state-of-the-art equipment and laboratories. All efforts have been made to maintain currency of the curriculum, which will broaden student's access and success whether they transfer or seek an employment after graduation. EVC's engineering program is the most comprehensive engineering program among the Bay Area community colleges and receives students from all the surrounding colleges due to availability of modern, comprehensive labs, and curriculum.

The target students for this program are both high school graduate as well as retraining of professionals. The program provides a low cost and accessible alternative to university training. Engineering education at the universities are impacted and quite often students have to move away from the area to enroll at universities. The engineering program at EVC provides an opportunity to the local students to pursue their education without having to move away from the area and once they complete their lower division courses they are ready to transfer to any institution including San Jose State University.



### ***III. SUMMARY OF THE DEPARTMENT/PROGRAM***

The Engineering Department is one of the original programs in the district and it was created when the San Jose City College was established. Years later when the Evergreen Valley College was opened up in 1975 the engineering program was moved to EVC. The program offers associate degrees in Arts and Science. In addition to the courses within the degree programs, a few other engineering courses are also offered to increase students transfer opportunities in Civil engineering and Surveying. The engineering curriculum satisfies the lower division requirement of bachelor's degree in engineering. Students receive a bachelor degree in any field of engineering with two additional years of education upon transfer to four-year schools.

The engineering program at EVC, as well as other colleges, emphasizes hands-on learning. In fact, the ABET (Accreditation Board for Engineering and Technology) requires hands-on design skills from engineering graduates. All courses are designed to meet the ABET's requirement which is also required by the transfer institutions. In compliance with this requirement, the engineering program continually updates the curriculum as well as the laboratory experiments through acquisition of equipment and support services. Students are given up-to-date information in curriculum and technology to help them succeed in their career as well as education when they transfer to universities.

Critical thinking skills is a major part of an engineering education and required by ABET. Students gain and practice this skill through problem solving, designs, laboratory experimentation, and report writing. Environmental and social awareness is another attribute of an ethical engineer which is instilled in the students throughout the course of their program. Students are given opportunities to analyze critical issues using supporting evidence and to formulate their own thoughts regarding the social and environmental impact of engineering designs.

The engineering program enjoys student enrollment from local high schools and other neighboring colleges due to its comprehensive offerings.

The engineering program offers and emphasizes hands-on experiences to all enrolled students through design, fabrication, and experimentation. The laboratory facilities include

- Properties of Materials lab
- Electrical/Electronic Lab
- Computer/Computational lab

- CADD lab
- Prototype shop
- 3D-printing facility

The courses within the program are updated continually to reflect changes in industry as well as the requirements of the transfer institutions. Student learning outcomes (SLOs) for all courses have been established and assessed. The students have met all the minimum requirements of the SLOs. Through the assessment result some changes have been made to the coverage of the subject matters in order to improve the success of the students. For example in Engineering 010 “Engineering Process and Tools” more time is allocated to the design process and documentation, in Engineering 050 “Introduction to Computing” additional laboratory examples and practices was included to master the concepts of loops and use of if-else structure in programming, in Engineering 066 “Properties of Materials” included extended experiment in hard-working and fatigue to help in understanding of changes in crystal structure. All course level SLOs were successfully assessed.

The engineering program defines its effectiveness in the following ways

- **Increased student retention & success** – Retaining student is the program’s main goal; success is realized through retention. To increase retention many hands-on activities have been incorporated into each course. Many new technologies have been added to attract students’ attention and curiosity. Success is enhanced by introducing students to the latest information and also providing timely and appropriate guidance.
- **Involvement of students** – The best way of assessing effectiveness is to observe student involvement and also listen to the students’ comments. Many changes are made as a result of students’ comments which includes help on homework, help on lab experiments, making material available through the course management system (currently MOODLE), and many others.

The changes made through the above evaluations help the engineering program to a) Stay current, b) Increase enrollment (minimum of 15% increase over the last few years), c) Produce qualified graduates.

According to the published data, the course success rate for the EVC's engineering program over the last 5 year was 69.16% (~70%) on the average. The corresponding course success rate for the State over the last 5 years was 74.05% (~74%) on the average. The small difference may be attributed to the following factors:

- Geographic location of EVC – metropolitan city with local industry providing opportunity for employment thus reducing student focus and attention
- Demographics – minority students population and lack of prior preparation at high school level
- Small sample averaging for EVC versus the large sample size for the State.
- And many other factors

The data published for the course success rate in engineering technology for EVC over the same 5 year period was 72.59% (~73%) and the 5 year average for the engineering technology for the State was 77.41% (~77%). These numbers are in close agreement which is expected since the rigor and level of preparation for the engineering technology courses are much less than that of the general engineering.

Based on the data presented above, the standard for successful completion of engineering course at EVC is set at 67% which is about 90% of the success rate of the corresponding State average. This standard is chosen to reflect the variability of the nature of the student population, i.e. demographics, economic, and location. The EVC's student population is very diverse with first generation students and often are non-English speaking. These are all factors in being successful in an engineering discipline.

The current success rate of ~70% over the past 5 year seems to be adequate though it is always desired to have a greater success for any program. It should be kept in mind that many students wish to pursue engineering but once they get into classes some are faced with the lack of preparation issues and decide to change their focus.

In the next three years the department would like to achieve the following

- Add an evening section of Engr. 010
- Add an online section of Engr. 069
- Offer the newly created non-credit courses to students from the adult education system in San Jose in order to increase enrollment
- Continue upgrading the laboratory equipment and facilities

## ***PART A: Overview of Program***

### **1. Please state at least three recent accomplishments for your program which show how it contributes to the College's success.**

The engineering program has many accomplishments due to the dynamic nature of the program and the fact that the program must maintain currency with industry and meet the requirements of the transfer institutions. All accomplishments directly contribute to the college's success and are in line with its mission. They also satisfy the college's commitment to actions (CTAs) as well as the departments CTAs, discussed later. The following is a list of these accomplishments:

1. Modified the degree program, i.e. Associate in Science and Associate in Art Degrees to reduce unit counts. The old degree had too many units and required courses that other engineering schools did not require from their graduates. This increases our students' opportunity to obtain their degrees without spending additional time here at EVC.
2. Created and modified student learning outcomes (SLOs) for all courses in the program. Have also assessed these outcomes.
3. Created program learning outcomes (PLOs) and mapped to the course level outcomes (SLOs) as well as institutional learning outcomes (ILOs).
4. Revamped the introduction to engineering class (Engr. 010) called Engineering Processes and Tools, in order to align it with its equivalent course at San Jose State University. Majority of our students transfer to SJSU so this change provides seamless transition and transfer to our students.
5. Written 300-page laboratory manual for Properties of Materials course (Engr. 066). This manual has been provided to the students free of charge which has saved them around \$40.
6. Written 225-page laboratory manual for Circuit Analysis course (Engr. 071). This manual has been provided to the students free of charge which has saved them around \$38.
7. Written 220-page text plus laboratory in Principles of GPS in Land Surveying. This manual is intended for Engr. 60, 61, and SG 147 courses.
8. Revamped the Technology and Society (Engr. 001) course to satisfy area D general education requirement. It was also offered as an online course.

9. Acquired many new equipment and supplies to support the program. New laboratory experiments have been designed and created in Engr. 10, Engr. 066 and Engr. 071.
10. Acquired donated equipment from IBM, local surveying company, and individuals.
11. Acquired high precision tables (\$20K each) from a local high tech firm. These tables are extensively used in the laboratories.
12. Modified the Introduction to Computing course (Engr. 050) to include port access via programming using C++. This increased transferability of the course to various schools.
13. Created a statistical calculator software to be used by mobile devices as well as desktop computers. This software is used by our engineering 010 as well as math students in statistics class.
14. Presented a talk at the Online Education Conference 2011 on the creation of Iphone Apps for education.
15. Organized an engineering workshop funded by the National Science Foundation grant.
16. Reviewed NSF engineering proposals. This has helped in keeping track of the latest innovations in engineering and engineering education.
17. Have given presentations to local middle and high school students about our engineering program twice a year.
18. Have visited Apollo high school and publicized the engineering program.
19. Participate at the orientation and recruiting day every year and publicize the engineering program.
20. Attended Engineer's Week event every year.
21. Organized and offered Engineering Excellence Scholarship at \$250 per students, two per year for three years.
22. Recruited and mentored adjunct faculty for the program.
23. Have made yearly presentations to the local high school counselors at EVC campus Counselors Day.
24. Have hosted yearly workshop/demonstration in engineering facility to the ENLACE students, SANGAS chapter.
25. Have provided research opportunity to engineering students in summer of 2014 and 2015. The summer of 2015 research was funded by NASA's Space grant. Eight students from EVC participated in design activities over the summer.
26. Have initiated and conducted an interdisciplinary project between engineering and biology departments. Engineering students conduct experiment on femur to determine hardness and other properties of this bone. Dr. Toyoshima from the biology department and her students are involved in this venture. This project has become a regular addition to the program since 2010.

27. Presented a poster session on Bone Compression Experiments as a Tool for Introducing Students to Biomechanics at the Human Anatomy and Physiology Society Annual Conference, Las Vegas 2013.
28. Has been part of a grant to offer accelerated math sequence of classes for students interested in STEM education. This program will start fall 2016.
29. Have been part of a grant to offer non-credit courses for adult student who are interested in pursuing engineering and surveying occupation. Created four new non-credit engineering and four new non-credit surveying courses as part of this grant. At the moment school is waiting for the approval of these course by the state in order to offer at least two in spring 2016.

**2. State the goals and focus of this department/program and explain how the program contributes to the mission, strategic initiatives, comprehensive academic offerings, and priorities of the College and District.**

The overarching goal of the department is to provide quality engineering and technical education to the community. To this end it is committed to ensure access and support required to achieve success. The department's goal is achieved when students successfully transfer to four-year universities and/or obtain an employment utilizing their training. The following college CTAs are all directly addressed through the department's activities:

**A. Student Centered**

1. Improve Access - this is addressed through course development, laboratory enhancement, and articulation
2. Curriculum & Program Development – this is performed continually to stay current with the latest changes in the universities and industry.
3. Services – this is achieved through tutoring, counseling, and guidance provided to the students

## **B. Organizational Transformation**

1. Build Community – the department has an active role in the college’s committee’s and operation.
2. Employee Development – the department continually provides faculty development opportunities and mentor’s its adjunct faculty. The full time department faculty, Abdie Tabrizi, has served in of the college’s staff development committee for over 18 years and provide training opportunities to all the college employees.
3. Transparent Infrastructure – the department through its activities contributes to the college’s infrastructure in transparent manner. The program offering, services, and activities are well publicized.

## **C. Community Engagement**

1. Increase Visibility – the department maintains a visible role in the college through participation in various committees’ activities, outreach, and running workshops to the local high schools and junior high students.
2. Develop Strategic Partnerships – department has been active in developing partnership with the Milpitas high school by articulating its Engineering 010 “Engineering Process and Tools” and Apollo high school by making presentations at their site and hosting visitation by Apollo at EVC.
3. Bring the College to the Community – every year the department makes presentation to the local high school counselors and host hands-on demonstrations in the engineering laboratories to the local schools.

The engineering department’s strategic plan for its growth and success are accomplished through its own commitment to action (CTAs). The following are the program CTAs for this year, 2015-16:



## **A. Student Centered**

### **1. Improve Access**

Provide students with more choices by offering additional sections of the introduction to engineering course, called “Engineering Processes and Tools.” To increase access the additional section(s) will be offered in the evening in order to reach working individuals as well as those students having schedule conflict. It is also hoped that this will attract students from San Jose State University since they also have identical course and their program is currently impacted.

Offer an online section of the Technology and Society course which satisfies area D of the general education requirement. This course is planned to be offered during the intersession January 2016 and possibly summer 2016.

### **2. Curriculum & Program Development**

- a. Update existing introduction to engineering labs and design new experiments in ENGR 010
- b. Incorporate PC-based electrical circuits in ENGR 071
- c. Incorporate the new fatigue tester into the lab experiments in ENGR 066
- d. Finish retrofitting the tensile/torsion software

### **3. Services**

The engineering job market has become very competitive in recent years. Our students need to gain some industry experiences in order to have a successful employment. This could be accomplished through internships either locally at school through research projects and/or at a job site. The following are being planned:

- a. Distribute the internship opportunities that are sent to the department among the students and follow through with each.

- b. Require students to seek internship opportunities as a homework assignment.
- c. Provide mentorship to those who are interested in conducting research project.
- d. Organize three teams of four students to participate in the Space Grant project through NASA.

## **B. Organizational Transformation**

### **1. Build Community**

Sense of ownership of the program is vital for both the students as well as the faculty. The following are planned

- a. Organize and participate in social and professional events.
- b. Enhance bonding among full-time and adjunct faculty members.

### **2. Employee Development**

Identify some professional development opportunities for the staff and faculty through

- a. PDD activities for the program faculty and staff
- b. Educational conferences

### 3. Transparent Infrastructure

Continue participating in various school functions and inform the faculty, staff, and administration about the program status and offerings.

## **C. Community Engagement**

### 1. Increase Visibility

Visibility to the program is planned through

- a. Presentations to local high school counselors
- b. Workshop/demonstration to local high school students
- c. Visiting local high schools

### 2. Develop Strategic Partnerships

Create partnerships with

- a. The local industry
- b. Local high schools via articulation and training of high school teachers

### 3. Bring the College to the Community

Participate in the orientation day by running hands-on activities and disseminating program information.

The program met the overall CTA of the college by implementing the program CTAs. The program has completed all the CTAs that it was committed to and made many additional accomplishments as showed earlier. The department's goal is to build the best and most comprehensive Engineering program in the South Bay Area. The plan to achieve this goal includes updating the existing

program offering and modernizing the laboratories, building new partnerships with the local high schools, San Jose State, and industry.

Unmet goal for the program is to offer an online section of our Statics (Engr. 69) class. It is hoped that we could get additional enrollment from the colleges and universities in the Bay Area. A consideration is being given to offering a spring session of this course. To continue contributing to the college's mission and priorities, the following new initiatives are planned

- Implement the new non-credit engineering courses. These courses are designed for the students who are enrolled in the adult education program in San Jose and are supported by the grant from the state of California. The intention is to provide an opportunity to these adults to learn about the engineering and surveying disciplines and hopefully pursue a career in a technical field. The following are the specific courses that have been created for this purpose. At the time of this writing school is seeking an approval of the state to offer these courses:
  - a. Introduction to Engineering (ENGR 500)
  - b. Basic Math Applications in Engineering (ENGR 502)
  - c. Technical and Contextualized Communication (ENGR 504)
  - d. Principles of Engineering (ENGR 506)
  - e. Introduction to Surveying (SG 500)
  - f. Basic Math Applications in Surveying (SG 502)
  - g. Technical and Contextualized Communication (SG 504)
  - h. Principles of Surveying (SG 506)
- Offer a 1-day training class to the local high school technology/engineering teachers during summer session. This will help the high school teachers to learn technical skills, get acquainted with the engineering program at EVC and increase the enrollment.
- Establish a partnership with SJSU to offer a section of Engineering Processes and Tools (Engr. 010) for them at EVC or have EVC's Engr. 010 cross-listed with one of their equivalent classes. It is hoped that this exposure will increase enrollment in other engineering classes.

There are a few goals associated with the engineering program at EVC which are outlined below:

a. Transfer to four-year school

The program offers associate of arts and science degrees in general engineering. This includes all the lower division courses required by the four-year schools. After completing the program students could transfer to a four-year school of their choice (UCs, CSUs, and independent colleges) to complete their bachelor's degrees.

It is not actually required that a transfer student should have completed or received their associate degrees. However, as a transfer student it is to the students' benefit to complete the courses within the program before transferring in order to minimize course conflicts with the transfer institutions.

To ensure complete articulation as well as readiness, the engineering program continually updates its curriculum and laboratory equipment.

b. Seek employment

Students may seek employment after completing their associate degrees. This employment will be at a technician level. Students could then, at a later time, decide to pursue a four-year degree if they choose to do so. It should be noted that quite often the employers will pay for the cost of education.

c. Personal development

Some folks enroll in the courses for retraining and refreshing their knowledge. Community college system makes it easier for these individuals to receive training without going through an extensive admission process like those of the universities. The cost of these trainings are very minimal and affordable.

d. Provide and/or increase access

The role of the engineering program at EVC is to provide and/or increase access to higher education to the individuals

- that are lacking financial means. Engineering education at universities are very expensive, in addition to the unit-cost of a course, there are laboratory fees etc. These are very substantial.
- that are not academically prepared. Universities minimum GPA requirement for admission into engineering disciplines is around 3.2/4.0. This presents a challenge to those high school graduates who are ill prepared. Sometimes a low high school GPA does not necessarily represent students' aptitude in the subject area. The engineering program at EVC provides an opportunity to these individuals to improve their skills and get ready for transfer. In fact according to a research conducted by SJSU a few years back, the community college transfer students performed better in the job market after they graduated from SJSU!

**3. (data) Identify current student demographics. If there are recent changes in student Demographics, explain how the program is addressing these changes.**

Figure 1 to 14 show the student demographics in engineering. Similar to other engineering and technology programs, women are significantly underrepresented. We plan to use our successful female alumnae as role models and show case their stories on the school website. Also continue our usual presentation to local high school and junior high students. Publicize the Society of Women Engineers to connect the program's female students with them. In November of 2016 Abdie Tabrizi presented a discussion to a Women in Education class. This class was grant funded and included mothers and daughters. It should be pointed out that over the last 35 years the percentage of female students in engineering classes has not changed significantly. Currently the percentage of female students is around 10 to 15%. The EVC's engineering program includes large percentage of Asian and Hispanic students. The percentage of white and black students are rather small, about 4 to 8%.

Over the last 20 years the white student population has been decreasing steadily from high 30s to around 8%. This could partially reflect changes in the community demographics. The enrollment

On the average 12% of the enrollment is female over the years of 2010-2015. The female enrollment over this period ranged from about 7% to 21% (Figure 2).

Ethnicity data for spring 2015 is shown in Figure 9. The enrollment is 47% Asian, 34% Hispanic, 14% White, and 5% Black. The overall average enrollment over 2010FA and 2015SP are 49% Asian, 34% Hispanic, 13% White, and 4% Black. This shows that the enrollment pattern is relatively stable. However, the reduction in White and Black student enrollment is still noticeable as pointed out earlier. The presence of large Asian population does present some difficulties in terms of communication. This will be communicated to the counseling department so that students are given guidance in this respect. Students' ultimate success is of the engineering department's interest thus any intervention by the counseling department is welcomed.

Figure 13 to 16 shows student enrollment data by age. Overall during 2010FA to 2015SP 63% of the students comprised the age group of 18-24, 32% in 25-39 range, 5% in 40-over range, and almost 0% in the range of 17 – below. Then 17 and below age group enrollment was expected due to the nature of the program offering. It is also expected that the age group of 18-24 will represent the largest enrollment. It is interesting to see a large percentage of 32% of students were in the age group of 25-

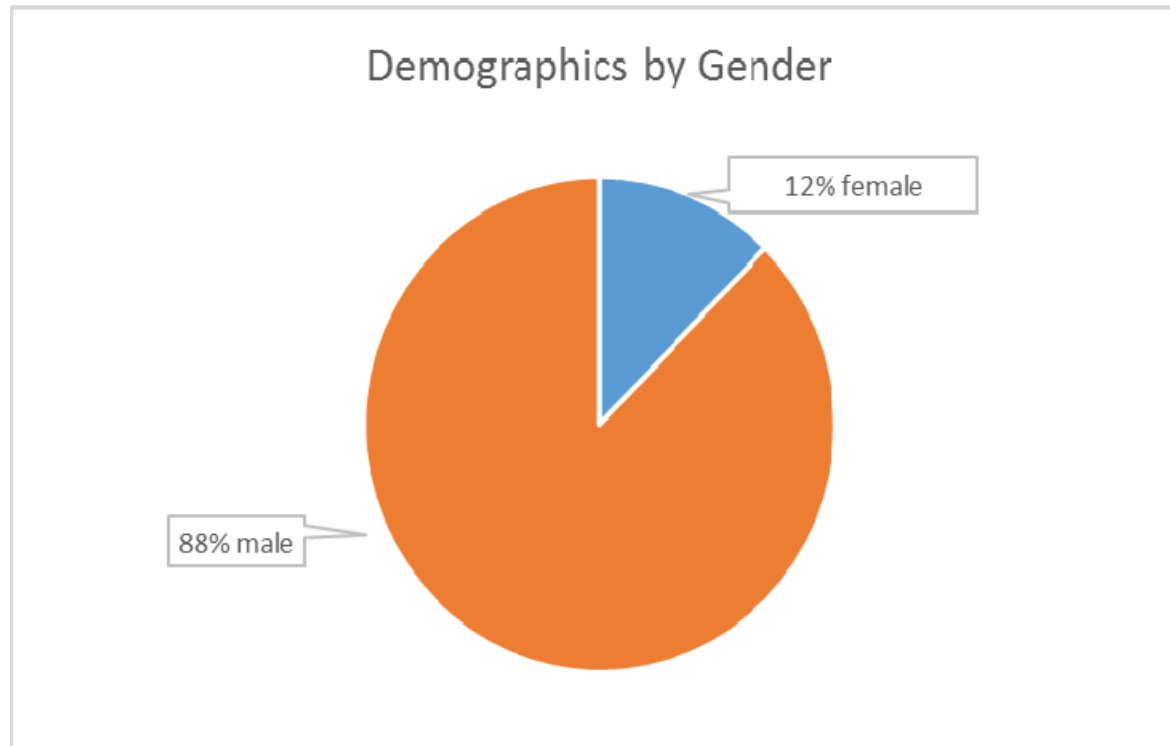
39. This implies two possibilities, i.e. either these students are changing career or realizing that the community college in general and engineering program at EVC in particular is providing an opportunity to pursue a higher education that otherwise would not be possible. This could be because of financial and/or educational preparation.

Figure 16 indicates about 50 – 60 % of the students in the program are full time. This presents a unique challenge in the way of offering the curriculum to meet students' needs. Traditionally majority of the program offerings have been during the day which causes problems to those who are part time students. This is especially true for those students who are working. Starting fall 2015 an additional section of the introduction to engineering class (ENGR 10) has been scheduled in the evening. The plan is also to offer an online section of statics (ENGR 60) to provide opportunities for those who are not able to attend on-campus class.

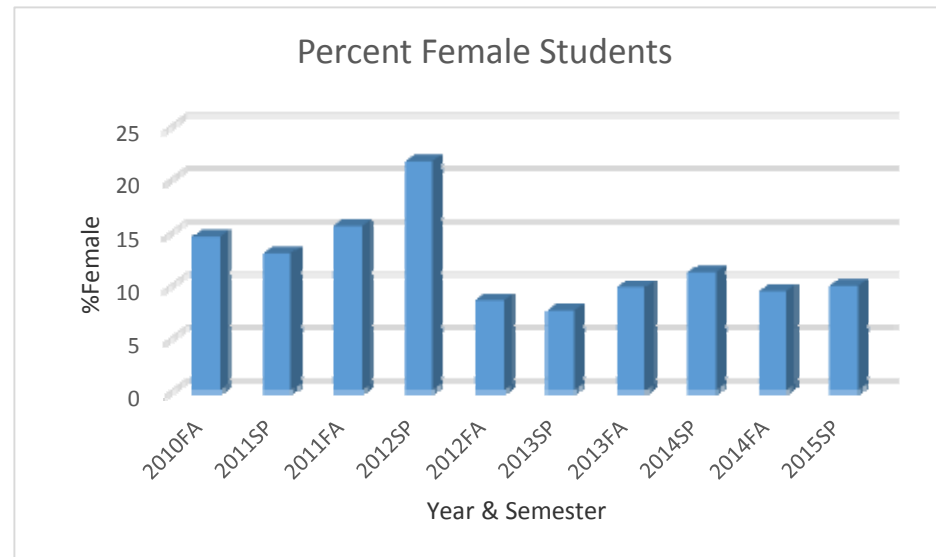
The program enrollment has shown substantial increase over the last few years as shown in Table 1, further down the report. The spring 2015 enrollment data compared to fall 2010 indicates 20% increase in FTES and 31% increase in head count. The enrollment increase in engineering could be attributed to three factors- 1. Improvement of the laboratory facilities over the last few years, 2. Local colleges are curtailing their engineering offerings, 3. Engineering is an impacted major at San Jose State University which means that the entrance requirement has been increased thus increasing EVC's enrollment.

The engineering department at EVC is planning on continuing improvements in laboratory curriculum and equipment. Improved facilities provide opportunity to provide hands-on experiences to the program students and increase number of sections offered as needed. The department is also involved in two state funded grants that could increase student access. One of these grants will have accelerated math sequence for the students in order to get into engineering and the other will provide San Jose's adult education students with an opportunity to pursue engineering and surveying. Eight non-credit courses have been created for this purpose. Furthermore many presentations at local high schools and on the campus are usually done to publicize the program.

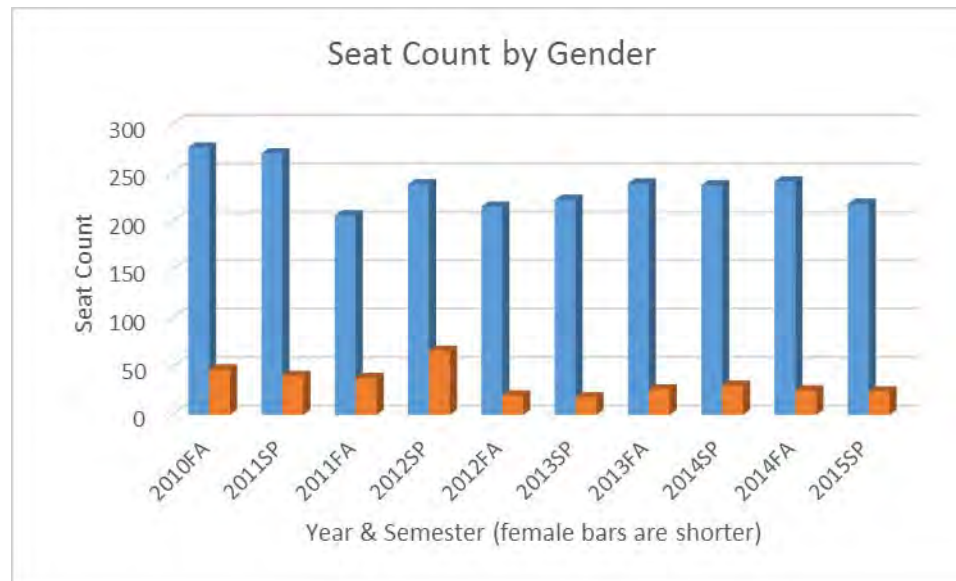




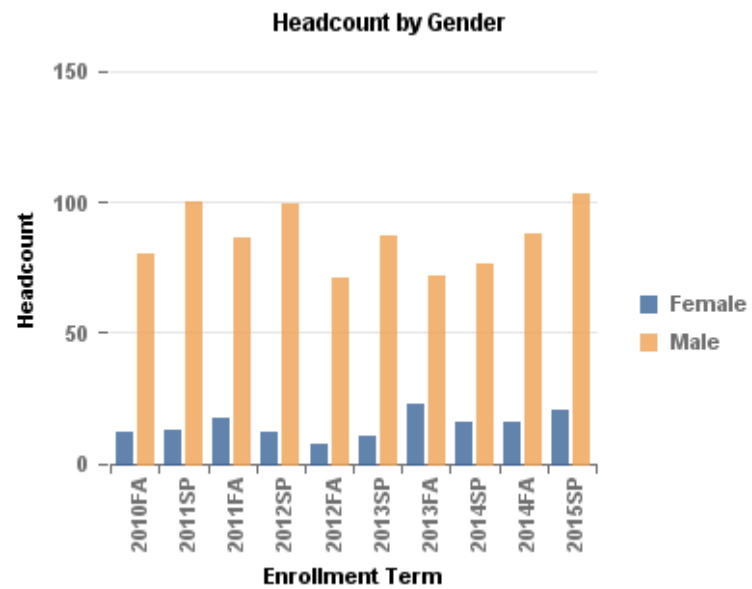
**Figure 1 Average engineering student's demographics by gender 2010FA - 2015SP**



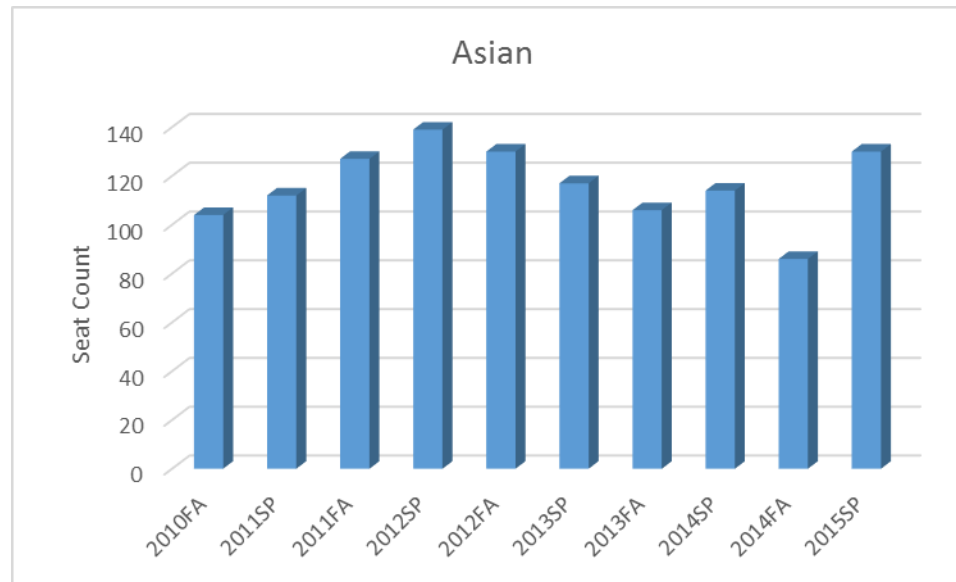
**Figure 2 Percent female engineering students**



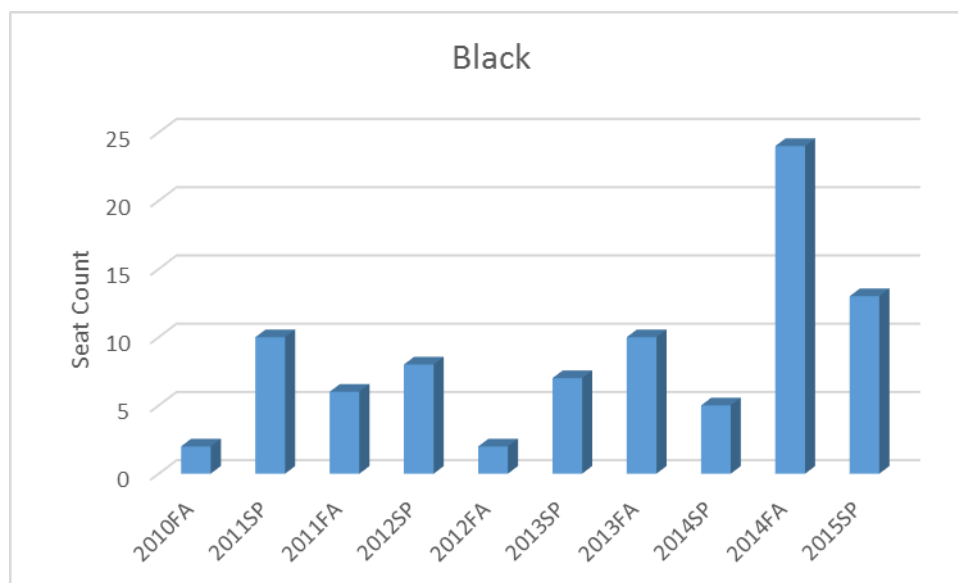
**Figure 3 Demographics of engineering students by gender**



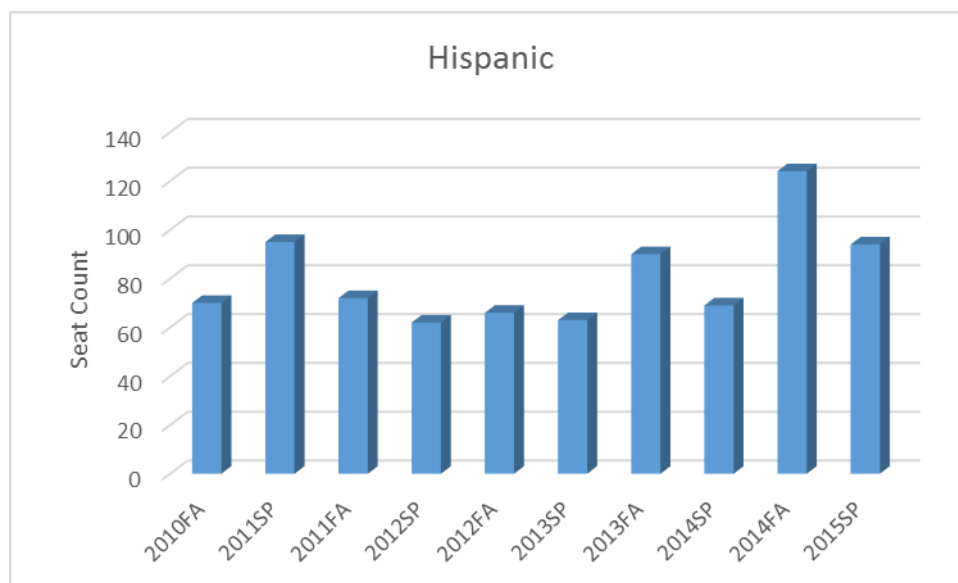
**Figure 4 Head count of engineering students by gender**



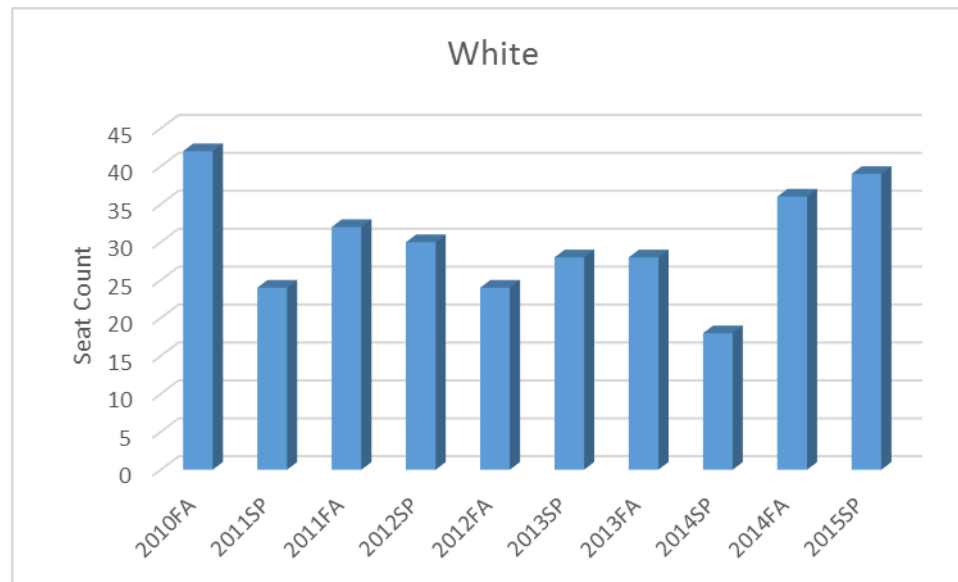
**Figure 5 Seat count of Asian engineering students**



**Figure 6** Seat count of Black engineering students

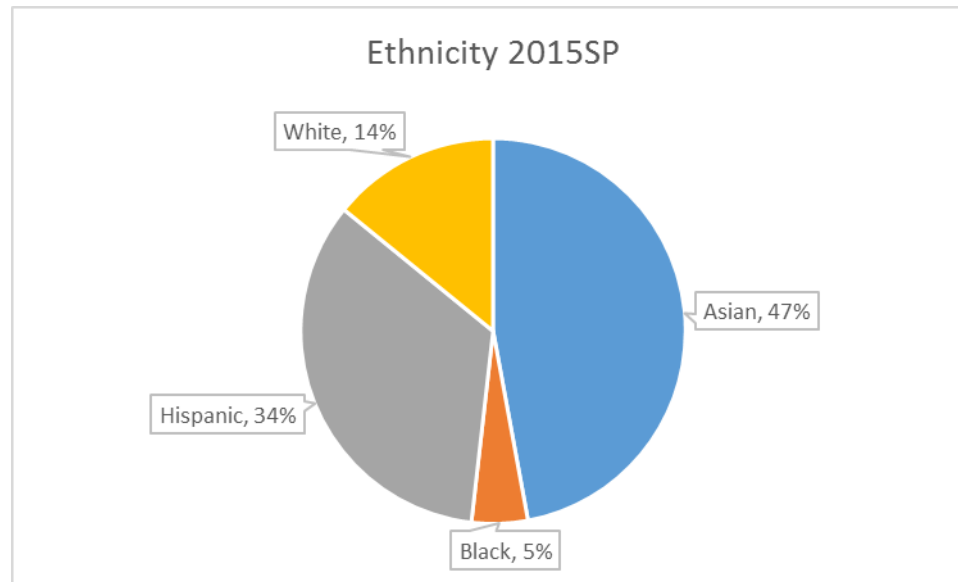


**Figure 7 Seat count of Hispanic engineering students**

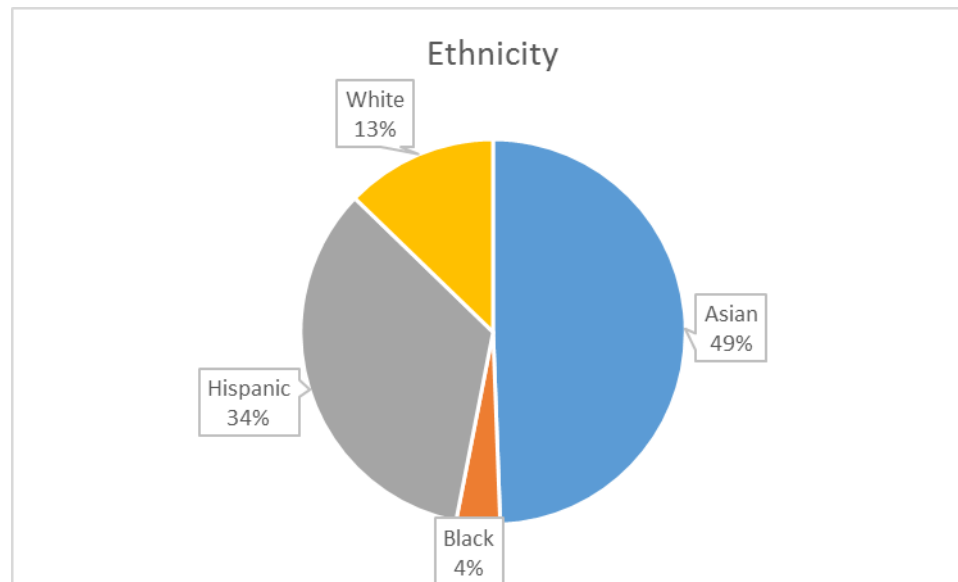


**Figure 8 Seat count of White engineering students**

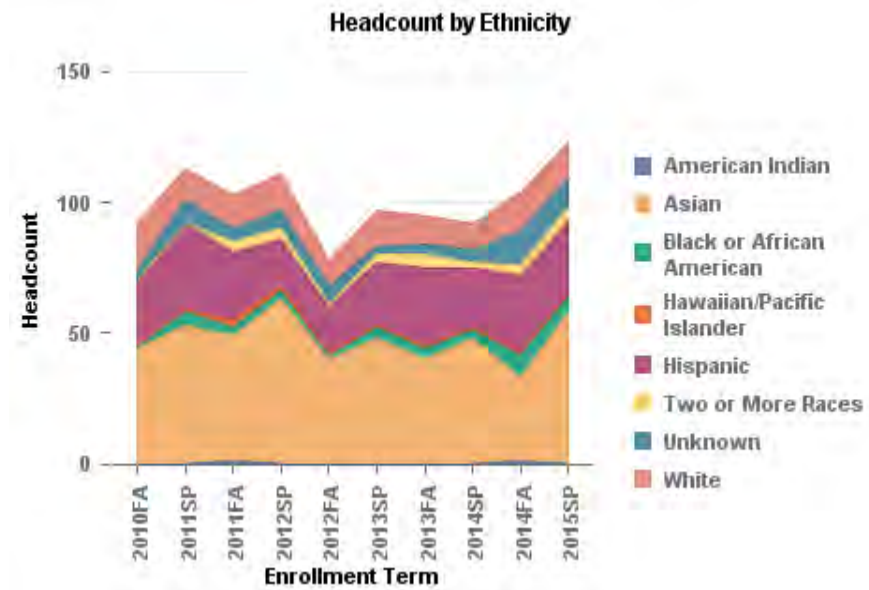




**Figure 9 Ethnicity of engineering students in spring 2015**



**Figure 10 Ethnicity of engineering students over 2010FA-2015SP**



**Figure 11 Head count of engineering students by ethnicity**

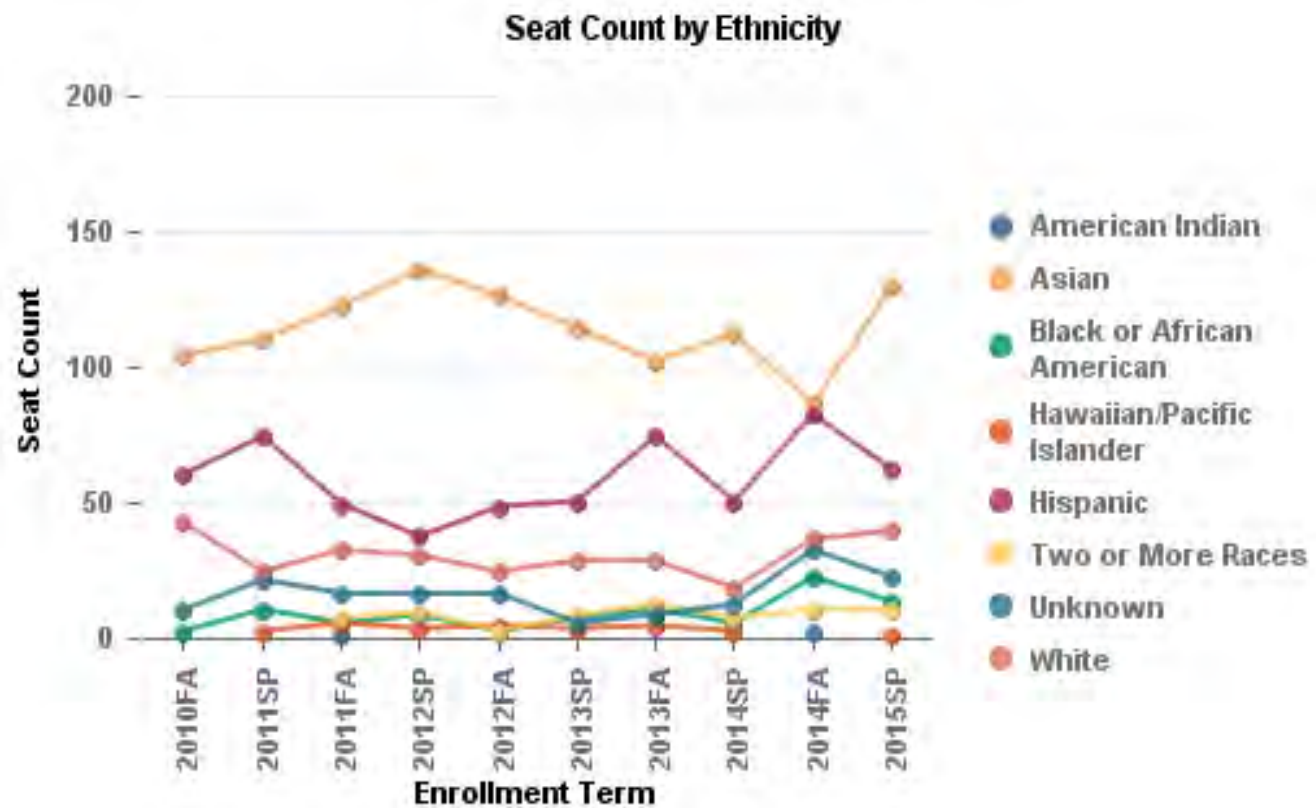
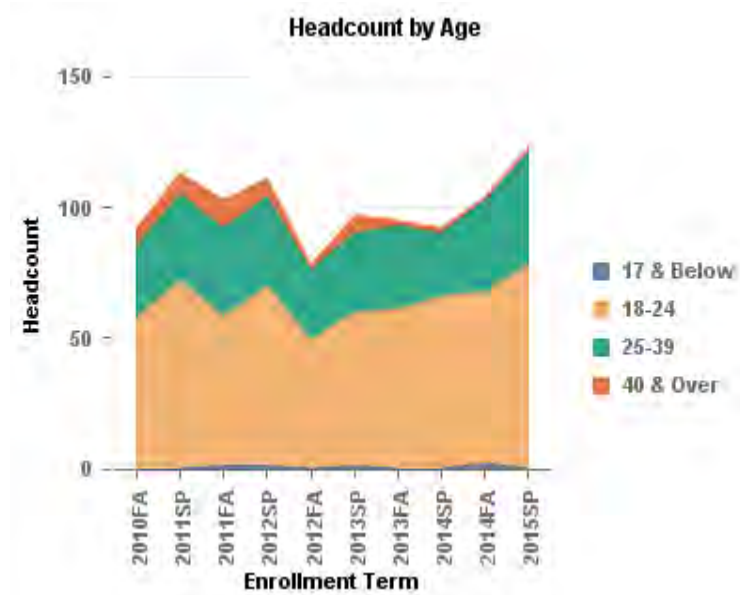
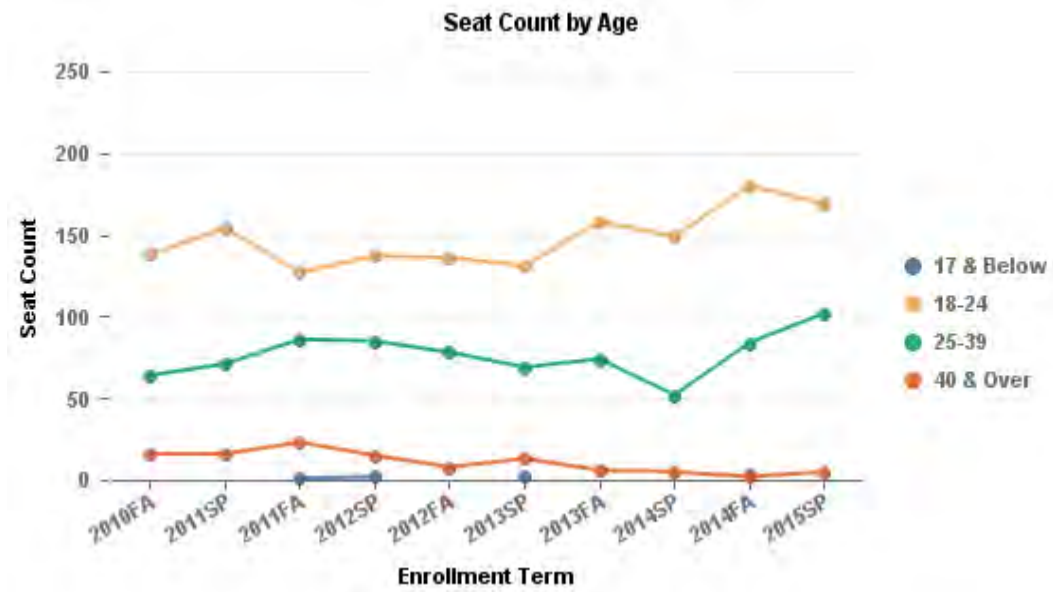


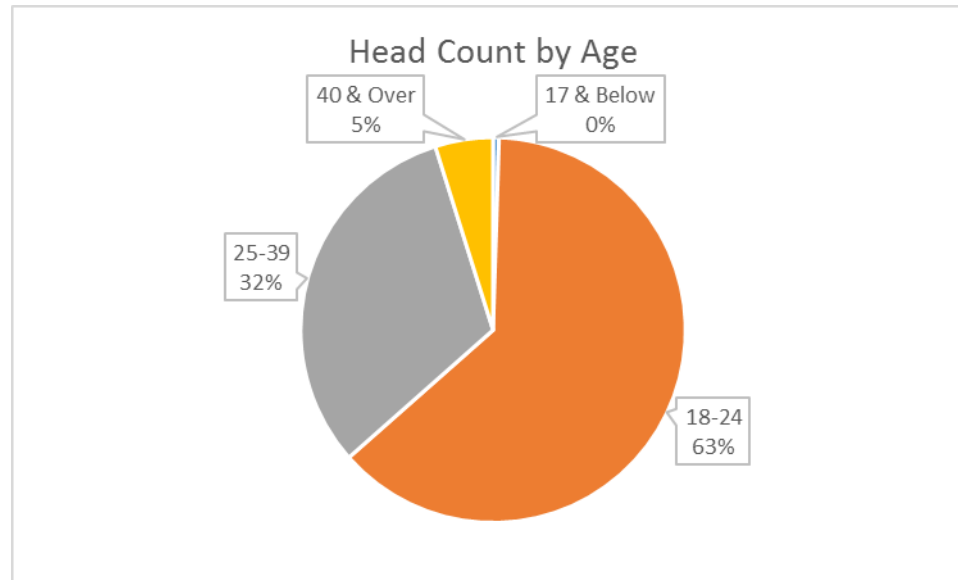
Figure 12 Seat count of engineering students by ethnicity



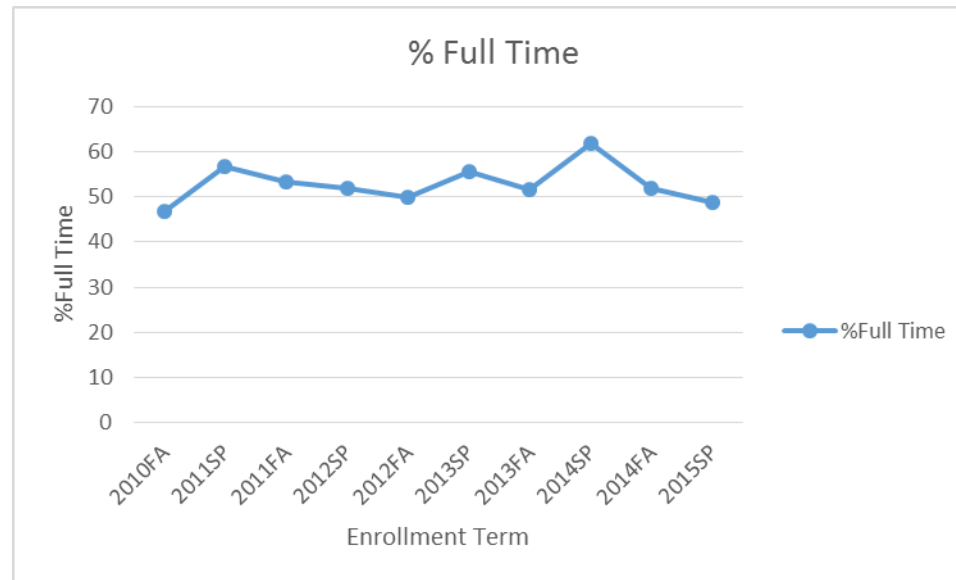
**Figure 13 Head count of engineering students by age**



**Figure 14** Seat count by age of engineering students



**Figure 15 Head count of engineering students by age over 2010FA-2015SP**



**Figure 16 Engineering full time students**



**4. (data) Identify enrollment patterns of the department/program in the last 6 years and provide an analysis of any notable trends or patterns.**

The program enrollment has shown substantial increase over the last few years as shown in Table 1. The fall 2015 enrollment data compared to fall 2010 indicates 20% increase in FTES and 31% increase in head count. The enrollment increase in engineering could be attributed to three factors- 1. Improvement of the laboratory facilities over the last few years, 2. Local colleges are curtailing their engineering offerings, 3. Engineering is an impacted major at San Jose State University which means that the entrance requirement has been increased thus increasing EVC's enrollment.

**Table 1. Academic statistics of engineering program 2010FA – 2015FA**

	2010FA	2011FA	2013SP	2013FA	2014FA	2015FA	Average	Trend
<b>Sections</b>	12.00	12.00	12.00	10.00	12.00	14.00	12.00	Same
<b>Stdts/Inst Hr</b>	13.04	13.23	14.84	13.83	15.63	20.43	15.17	Up
<b>Enrollment</b>	218.00	254.00	244.00	230.00	266.00	286.00	249.67	UP
<b>Weekly FTES</b>	41.65	42.29	40.36	41.21	47.36	50.14	43.84	UP
<b>Total FTES</b>	41.65	42.29	40.36	41.21	47.35	50.14	43.83	UP
<b>Total FTEF</b>	1.68	1.73	1.80	1.60	1.88	2.17	1.81	UP
<b>FTES/FTEF</b>	24.74	24.78	22.42	26.78	25.85	24.30	24.81	Same
<b>Retention Rate</b>	86.54	76.22	86.78	76.47	80.74	NA	81.35	Same
<b>Success Rate</b>	83.65	66.39	77.69	66.39	67.41	NA	72.31	Same
<b>Fill Rate</b>	51.43	53.14	60.00	52.00	62.29	82.29	60.19	UP

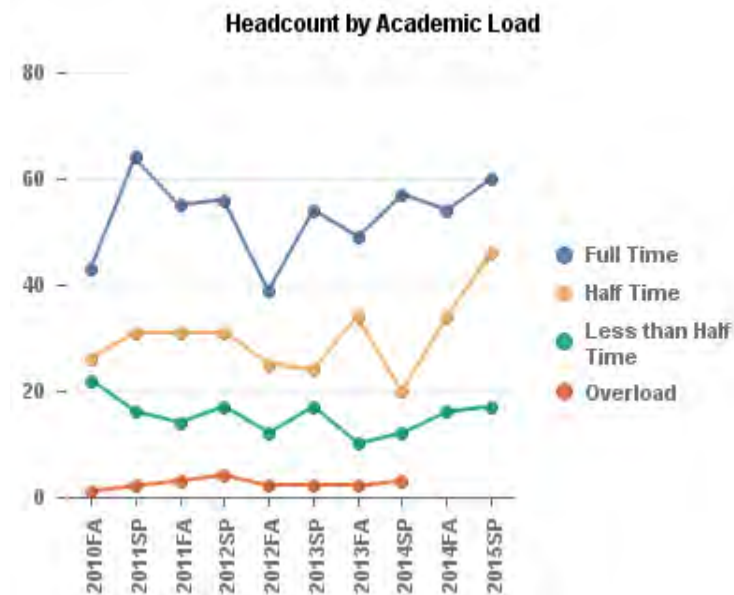
Figure 16 indicates about 50 – 60 % of the students in the program are full time. This presents a unique challenge in the way of offering the curriculum to meet students' needs. Traditionally majority of the program offerings have been during the day which causes problems to those who are part time students. This is especially true for those students who are working. Starting fall 2015 an additional section of the introduction to engineering class (ENGR 10) has been scheduled in the evening. The plan is also to offer an online section of statics (ENGR 69) to provide opportunities for those who are not able to attend on-campus class.

The full time equivalent student number is about 20 but there has been an increase over the last year. Based on the percent full time and part time enrollment reported above, also seen in Figure 16, this number is expected. About 40 to 50% of the students are part time students. Figure 17 shows the breakdown of the numbers over the years.



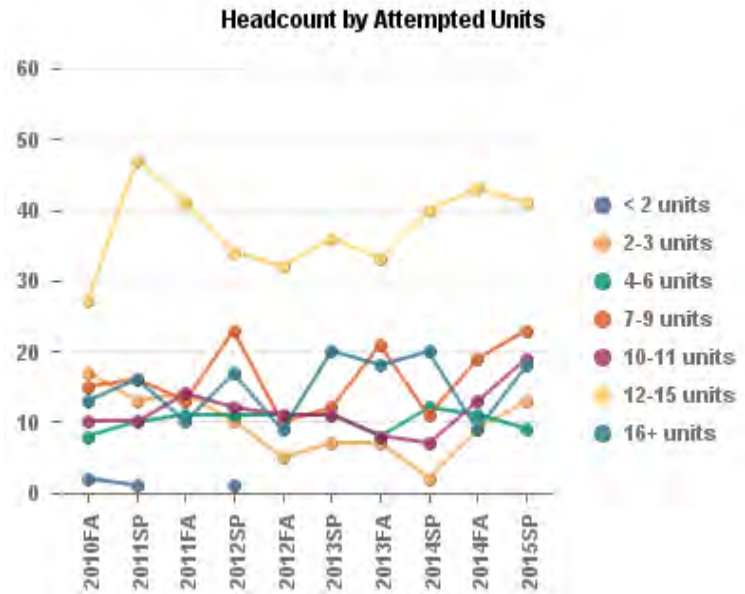
**Figure 17 Full time equivalent engineering enrollment**

Academic load attempted by the full time and part time students is shown in Figure 18. In contrast to Figure 17 which shows FTES Figure 18 indicates the actual number of students in full time and part time status. There seem to be a sharp increase in the load carried by the part time students. Earlier it was pointed out that number of part time students have increased and this is evident from this figure.



**Figure 18 Head count of engineering students by academic load**

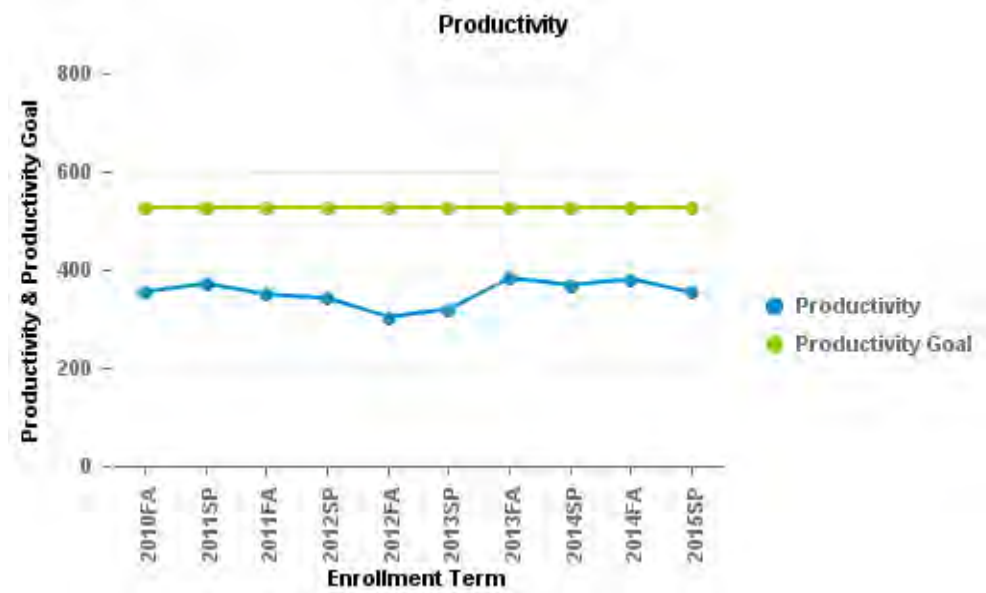
Figure 19 shows number of actual units attempted by the students. It is clear that large number of units attempted are in 12 to 15 unit range which represent the full time students. There are also some who have attempted 16 units and above.



**Figure 19 Head count of engineering students by units attempted**

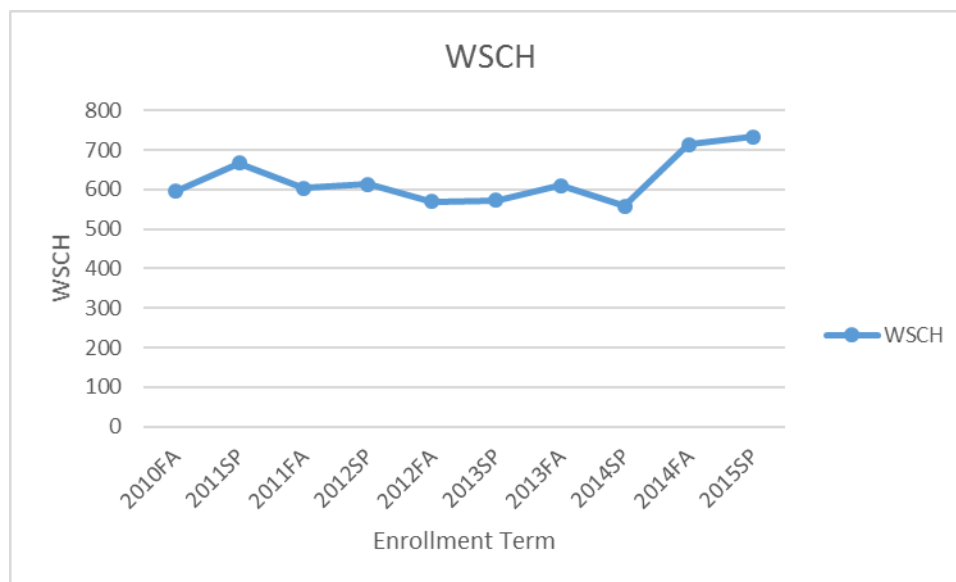
## **5. (data) Identify department/program productivity (WSCH/FTEF)**

Figure 20 show the productivities of the program. According this figure the productivity ranges from 300 to 400 WSCH/FTEF. However, these numbers are in error since the FTEF is based on additional Engineering courses that are part of the surveying program thus they should not be counted towards the engineering program. The FTEF for the courses within the degree program is about 1.68. So the productivity ranges from about 350 to 450 when the FTEF is corrected. These productivity numbers are expected from a technical program with many mathematics, physics, and chemistry prerequisites. The college target is based on a regular class that is enrolled by students from all disciplines. The WSCH data is shown in Figure 21.



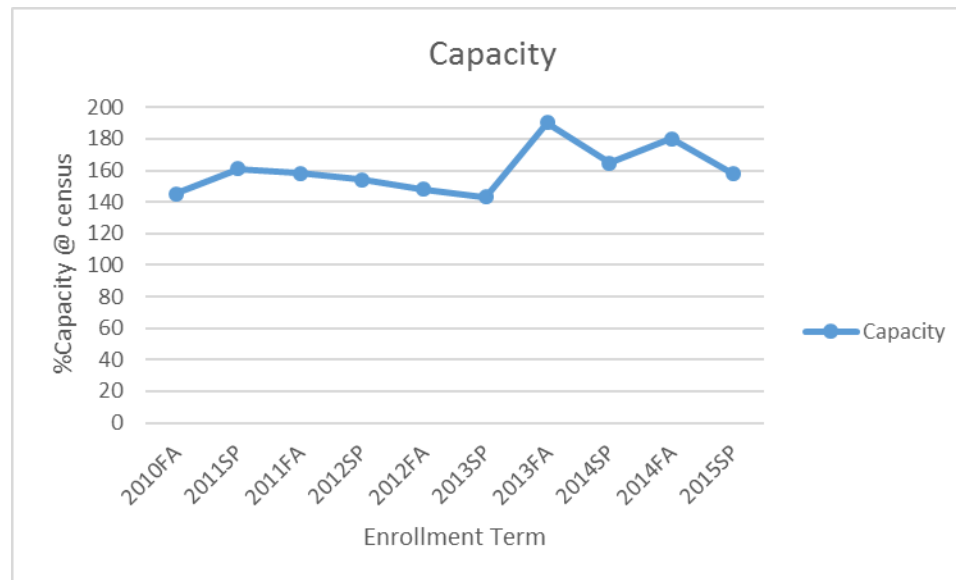
**Figure 20 Productivity of the engineering program**

Figure 21 shows the engineering programs weekly student contact hours (WSCH). This was relatively steady until a year ago. The WSCH have greatly increased over the last year due to the factors discussed earlier. The program WSCH range from 550 to about 725.



**Figure 21 Engineering weekly student contact hours**

Figure 22 contains engineering program's capacity data at census. It is interesting to see that the capacity is actually over 100% before the census. The capacity ranges from 140% to 190%! This indicates that students tend to under estimate the load requirement of the engineering courses and some end up dropping out due to the demand on their time. This is especially true for those who are working individuals and simply drop out. It should be noted that about 40% of the students are part time students.

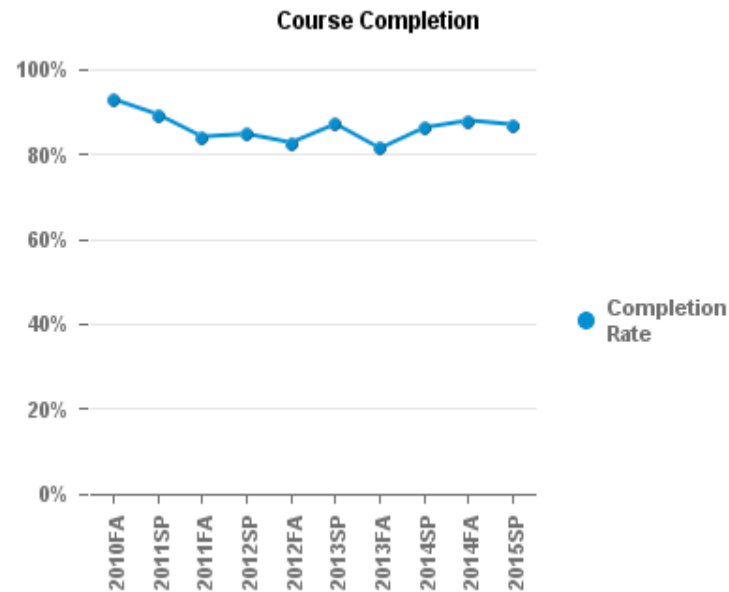


**Figure 22 Engineering program capacity at census**



**6. (data) Identify student success rate and patterns within the department/program paying particular attention to our college's target groups.**

Figure 23 to 28 show student performance such as completion, success, persistence. The student completion rate over 2010FA to 2015SP varies from 80% to 92%, Figure 23. The average completion rate is about 85% which is rather good for a technical program. The completion rate of Asian students have been around 90% and those of Hispanic students around 78%. The completion rate of White students have been varying a lot with an average of 80%. However, the completion rate of Hispanic students have been increasing over the last three years to about 82%, Figure 27.



**Figure 23 Overall course completion of engineering students- 2010FA-2015SP**

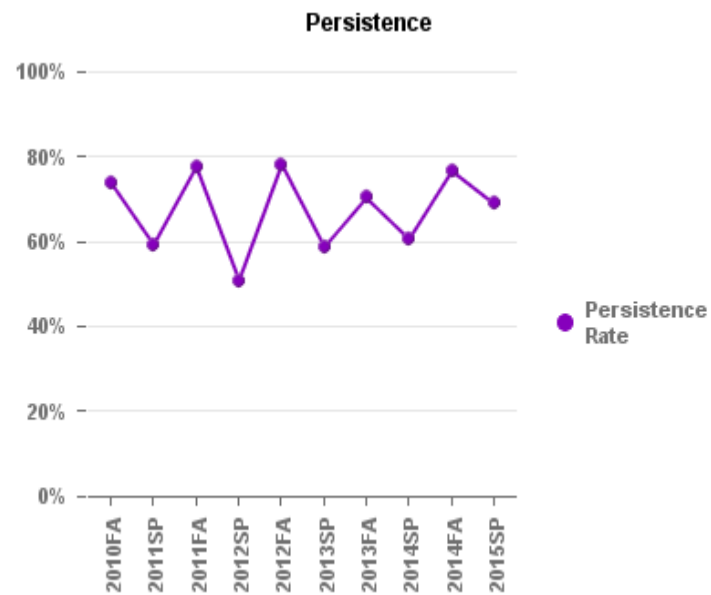
Figure 24 shows the success rate of the students in the program over 2010FA to 2015SP. The average success rate is about 78% and it varies from 73% to 90%. This data is very encouraging. Of course there is room for improvement and it is believed that the part time student population should be targeted in order to improve this number. The persistence rate is around 70% as seen from Figure 26. This is particularly important data since improvement could be made by encouraging those who dropped out or failed. Perhaps some mentoring could be made available to these individuals. The success rate of Asian students has been about 80% and those of Hispanic students about 70%. White students' success rate was about 79%, Figure 28.



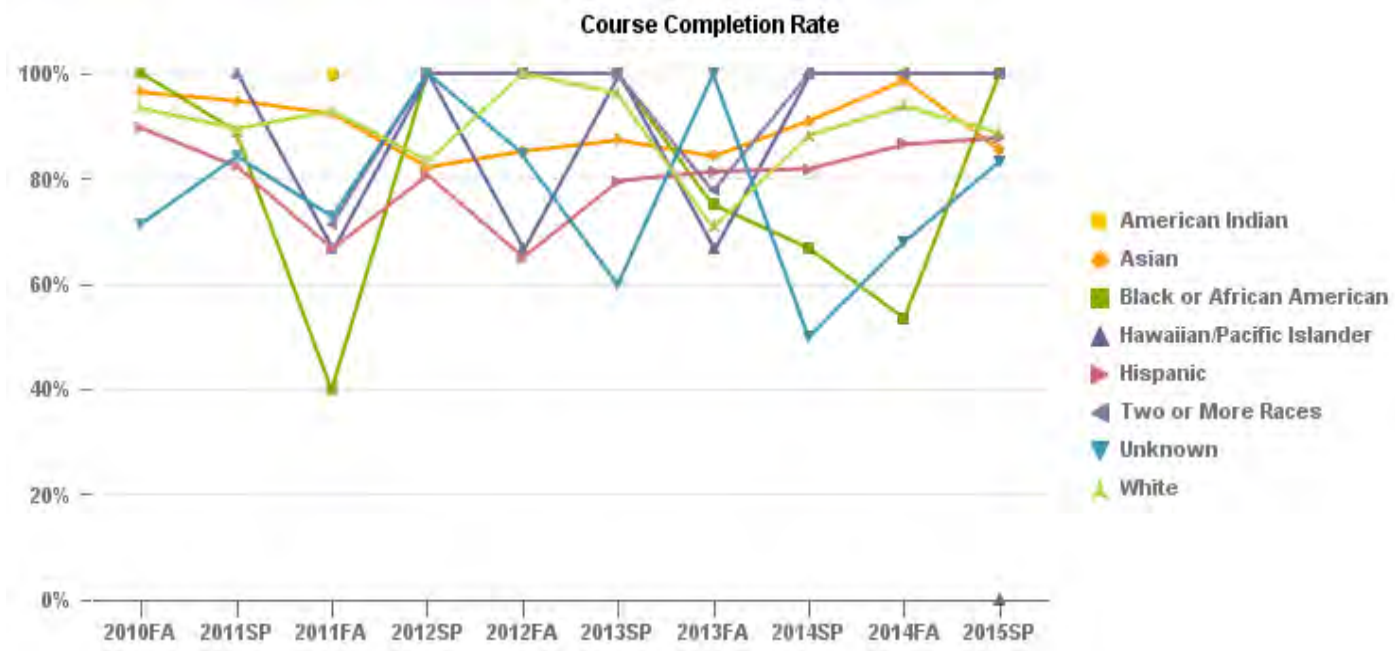
**Figure 24 Overall success rate of engineering students-2010FA-2015SP**



**Figure 25 Course completion and success rate of engineering students**



**Figure 26 Overall persistence of engineering students- 2010FA-2015SP**



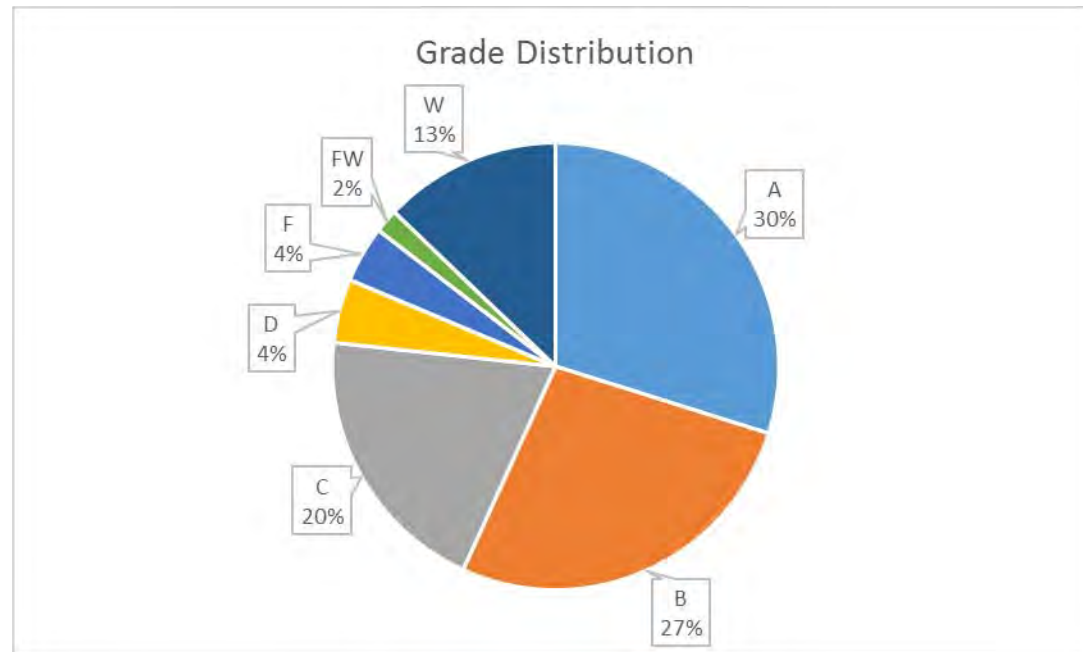
**Figure 27 Course completion rate of engineering students**



**Figure 28 Course success rate of engineering students**

The overall grade distribution for the course offered in engineering which also includes some courses in surveying program is shown in Figure 29. This figure shows about 77% passing and 23% failing. Of the failed students only 8% actual fail the courses since the remaining 15% actually drop the course. Thought some students drop out for personal or work reasons, some drop due to lack preparation. This population should be targeted to improve success rates. Unfortunately there are no tutoring opportunities in the engineering program.

The 5 year average student success is about 74% as noted earlier in the program summary section. This compares well with the data shown in figure 29. However there are many other factors that influence the data and the way/manner in which they are reported. The success standard for the EVC's engineering program is set at 67%, as noted earlier. This number takes into account the variabilities in demographics and other factors described in the program summary section. The 67% is actually about 90% of the State average. It should be noted that the actual success rate for EVC's engineering has been increasing.



**Figure 29 Average grade distribution of engineering students- 2010FA-2015SP**



**7. If the program utilizes advisory boards and/or professional organizations, describe their roles.**

This program does not utilize an advisory board since its content is required by the transfer schools. The courses within the program have articulation with CSU and UCs. The program offers only the lower division curriculum. Students transfer to four-year schools to complete their bachelor degrees in their chosen area of specialization.

## ***PART B: Curriculum***

- 1. Identify all courses offered in the program and describe how the courses offered in the program meet the needs of the students and the relevant discipline(s).**

List of all courses offered by the engineering department. Not all of these courses are included in the AA and AS degrees:

ENGR 001	Technology & Society	3.0
ENGR 010	Engineering Processes and Tools	3.0
ENGR 018	Engineering Design and Graphics	3.0
ENGR 050	Introduction to Computing	4.0
ENGR 060	Surveying	3.0
ENGR 061	Plane Surveying	3.0
ENGR 063	GIS for Civil Engineering and Surveying	3.0
ENGR 066	Properties of Materials	3.0
ENGR 069	Statics	3.0
ENGR 071	Circuit Analysis	4.0
ENGR 138	Work Experience	Variable

These courses were developed to meet the requirement of the lower division courses in engineering discipline. Not all of the above classes are taken by all the engineering students. The enrollment in these classes depends on the student's area of specialization, e.g. mechanical or electrical engineering etc.

**ENGR 001** satisfies area D sociology general education requirements for CSU. Students from engineering and other disciplines may enroll in this course. There are no technical and science prerequisites for this course. This course satisfies all the ILO of the college and it provides an opportunity to the students to critically analyze social behavior in relationship to technology.

The content includes discussion on societal impact of technology, relationship of technology in development of social structure, influence of society on the development of society, impact of politics on the technology and its transformation, and the environmental aspects of integration of technology into everyday life. It is offered as online and traditional format.

**ENGR 010** is the introduction to engineering course which satisfies an equivalent course at various universities (CSU/UC/Independent). All engineering students are required to enroll in this course since it is required by all majors. It is part of EVC's AA/AS degree. This course satisfies some ILOs and PLOs.

The content includes introduction to engineering, discussion of various fields of engineering, basic mathematical can computational models, some programming, and lots of hands-on design projects including Solar Energy, Wind Energy, Arduino-based Mechatronics (Robotics), Car Dynamics.

**ENGR 018** is required by most engineering disciplines and it is part of EVC's AA/AS degree. It satisfies an ILO and PLO.

The content includes engineering drawing principles, generation of technical drawings for production, assembly, and manufacturing. It utilizes CADD software and fast computers to create 3D models of engineering designs.

**ENGR 050** is required by most engineering disciplines and it is part of EVC's AA/AS degree. It satisfies most ILOs and PLOs.

It provides hands-on programming experience to the students. Engineering problems are modeled and solved using computers through programs written in C++. Students are taught C++ programming as part of the course. This course is also open to the computer science and others.

**ENGR 060** is required by civil engineering and surveying major. It is part of EVC's surveying and geomatics AA/AS. It satisfies some ILOs and PLOs.

The content includes surveying principles for construction and utilizes various high tech devices as those used in industry such as Total Station, GPS, Theodolite, etc. This course provides hands-on training to the students.

**ENGR 061** is required by civil engineering and surveying major. It is part of EVC's surveying and geomatics AA/AS. It satisfies some ILOs and PLOs.

It covers plane surveying concepts suitable for construction of highways, roadways, bridges, buildings, and verification of as-built projects. It provides hands-on practice using devices such as Total Station, GPS, and Theodolite.

**ENGR 063** is required by surveying and geomatics and some civil engineering majors. It is part of EVC's surveying and geomatics AA/AS. It satisfies some ILO and PLOs.

The concept of geographic information system (GIS) is covered as applied in surveying and geomatics field. Students practice creation of GIS data using industry standard GIS software called ArcView. This course may also be taken by anyone interested in the subject of GIS which is used in almost all fields from health care to business to engineering.

**ENGR 066** is required by all engineering disciplines and it is part of EVC's AA/AS degree. It satisfies most ILOs and PLOs.

It includes discussion of various properties of materials used for design and fabrication. Properties are assessed through experimentation, evaluation, and analysis of data. It requires a lot of equipment and large facility.

**ENGR 069** is required by almost all engineering disciplines and it is part of EVC's AA/AS degree. It satisfies some ILOs and PLOs.

The content includes discussion of equilibrium of systems and structures under various external loading conditions. This includes analysis of bridges, devices, towers, cranes, frames, and others.

**ENGR 071** is required by almost all engineering disciplines and it is part of EVC's AA/AS degree. It satisfies most of ILOs and PLOs.

It provides training on various topics related to electrical circuits such as determination of currents, voltages, and power consumption. It provides hands-on experiences through extensive evaluation of circuits by voltmeters, ammeters, oscilloscopes, function generators, etc.

**2. State how the program has remained current in the discipline.**

The program continually being improved by inclusion of relevant material in the courses within the department. Hands-on experience is emphasized in the department thus a concerted effort is given to the development of laboratories. New experiments are included and the old ones are continuously be revised. Many new equipment have been purchased and many more are being planned to be purchased. In many cases retrofit of the existing equipment have been performed in order to modernize them. Computerized data acquisition is the current method of experimentation in engineering labs so the efforts are under way to stays current in this respect.

It is the philosophy of the department that EVC's engineering students be provided with the latest or at least comparable educational experience with those of the transfer institutions. This serves two purposes- 1. Increases students' success in their educational goals which is school's mission and departments CTA. 2. Serves as recruiting tool for the department. The following is a partial list of activities to maintain currency in then discipline:

- Substantive experiments
- Modern equipment
- Comprehensive curriculum (one-stop shop)
- Up-to-date software
- Powerful computational facility
- Student access to facilities and equipment

- 3. All course outlines in this program should be reviewed and revised every six years. If this has not occurred, please list the courses and present a plan for completing the process, including timelines and dates for each course.**

All the course outlines in the program have been updated a few times within the last six years. The following updates have been performed:

- Content matter
- Textbooks
- Assessment/evaluation methods
- Student learning outcomes

- 4. Identify and describe innovative strategies or pedagogy your department/program developed/offered to maximize student learning and success. How did they impact student learning and success?**

A few pedagogical approaches has been adopted to improve student success and retention. These include

- Engineers are often required to work on group projects and communicate amongst their peers. All of the laboratory experiments are designed to have students work in groups. The effort has been given to maintain small groups and yet provide the students with the experience needed to be a successful engineer. In has necessitated to increase the number of laboratory equipment and stations. This method forces the students to communicate with each other in the lab and outside the lab when they get together to write their lab reports. Teamwork is an essential component of engineering an education.
- Lab manuals and lab experiments have been written to precisely explain the intent to each experiment and activity.
- Computerized data acquisition methods
- While conducting lab experiments, students have access to then lab manual and the experiment of the day using the IPAD that is provided at each station. Students do not need to purchase lab manual.

- The collected laboratory data is immediately uploaded to the course management system (currently Moodle) so that everyone has access to the data for further processing.

These methods have had positive impacts on the students' performance. Improvements have been noticed in the way students conduct their experiments, their timely and successful completion of the labs as well as final reporting. Students enjoy working on latest technology.

**5. Discuss plans for future curricular development and/or program (degrees & certificates included) modification. Use the Curriculum Mapping form as needed.**

The associate of arts and science degrees have been modified to reduce unit counts. No further program revisions are being planned. However, the existing laboratories are going through modernization thus requiring some additional development in terms of new lab experiments.

Currently in the properties of materials course an interdisciplinary joint project is being conducted with the Biology department which involves determination of properties of various human bones. This is especially important for those students who are pursuing education and career in Bio-Engineering or Bio-Mechanics. Dr. Janice Toyoshima has been graciously participating in this effort by providing discussion and bones, e.g. femur, tibia etc., from the cadavers in her anatomy lab. It is also planned to expand this effort and have additional interdisciplinary projects from Biology, Automotive, and Art departments. The current versions of the engineering program, AA and AS are:

## ASSOCIATE IN ARTS DEGREE ENGINEERING

### Core Classes:

ENGR 010	Engineering Processes and Tools	3.0
ENGR 018	Engineering Design and Graphics	3.0
ENGR 050	Introduction to Computing	3.0
ENGR 066	Properties of Materials	3.0
ENGR 069	Statics	3.0
ENGR 071	Introduction to Circuit Analysis	3.0
CHEM 001A	General Chemistry	5.0
ENGL 001A	English Composition (or equivalent)	3.0
MATH 071	Calculus I with Analytic Geometry	5.0
MATH 072	Calculus II with Analytic Geometry	5.0
MATH 073	Multivariate Calculus	5.0
MATH 078	Differential Equations	4.0
PHYS 004A	General Physics	5.0
PHYS 004B	General Physics	5.0
PHYS 004C	General Physics	5.0
Core Requirements		62.0
General Education Requirements		24.0
<b>Total Units</b>		<b>86.0</b>

### G. E. Requirements are

Area A: Communication in the English Language and Critical Thinking      9 units  
*(Minimum 3 units Oral Communication & 3 units Written Communication)*



Oral Communications  
Written Communication (“C” grade or better)  
Critical Thinking

Area B: Physical Universe and Its Life Forms 9 units  
(*Minimum one course w/lab and 3 units of Math*)

Science with Laboratory Activity  
Science without Laboratory Activity  
Mathematical Concepts (“C” grade or better)

Area C: Arts and Humanities 9 units  
(*Minimum one course from Fine or Performing Arts and one course from Humanities*)

Fine or Performing Arts  
Humanities (Cultural Pluralism/Ethnic Studies)

Area D: Social and Behavioral Sciences 9 units  
(*Six of the units must be in U.S. and California History and Government*)

Area E: Lifelong Understanding and Self Development 3 units

**Total GE Units 24**

**Note: Number of GE units have already been satisfied through Math, Physics, and Chemistry courses. So the remaining 24 units are from the list shown above.**

## ASSOCIATE IN SCIENCE DEGREE ENGINEERING

### Core Classes:

ENGR 010	Engineering Processes and Tools	3.0
ENGR 018	Engineering Design and Graphics	3.0
ENGR 050	Introduction to Computing	3.0
ENGR 066	Properties of Materials	3.0
ENGR 069	Statics	3.0
ENGR 071	Introduction to Circuit Analysis	3.0
CHEM 001A	General Chemistry	5.0
ENGL 001A	English Composition (or equivalent)	3.0
MATH 071	Calculus I with Analytic Geometry	5.0
MATH 072	Calculus II with Analytic Geometry	5.0
MATH 073	Multivariate Calculus	5.0
PHYS 004A	General Physics	5.0
PHYS 004B	General Physics	5.0
Core Requirements		53.0
General Education Requirements		21.0
<b>Total Units</b>		<b>74.0</b>

### G. E. Requirements are

<u>Area A:</u>	Communication in the English Language and Critical Thinking ( <i>Minimum 3 units Oral Communication &amp; 3 units Written Communication</i> )	6 units
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Oral Communications  
Written Communication (“C” grade or better)  
Critical Thinking

Area B: Physical Universe and Its Life Forms 3 units  
(*Minimum one course w/lab and 3 units of Math*)

Science with Laboratory Activity  
Science without Laboratory Activity  
Mathematical Concepts (“C” grade or better)

Area C: Arts and Humanities 6 units  
(*Minimum one course from Fine or Performing Arts and one course from Humanities*)

Fine or Performing Arts  
Humanities (Cultural Pluralism/Ethnic Studies)

Area D: Social and Behavioral Sciences 6 units  
(*Six of the units must be in U.S. and California History and Government*)

Area E: Lifelong Understanding and Self Development 3 units

**Total GE Units 21**

**Note: Number of GE units have already been satisfied through Math, Physics, and Chemistry courses. So the remaining 21 units are from the list shown above.**

**6. Describe how your program is articulated with the High School Districts, CCOC (if applicable), and/or other four year institutions. (Include articulation agreements, common course numbering etc.)**

The Engineering courses are articulated with four-year institutions, i.e UCs, CSUs, and independent schools. Generally there are no common course numbering system for engineering courses. Efforts are under way to establish a common CID numbering system which will be finalized shortly. This also will allow for creation of a guaranteed two year degree program among community colleges and CSUs.

The Milpitas High School has articulated an equivalent one-year course of study with EVCs Engineering 010 “Engineering Processes and Tools”. This articulation agreement is included in Appendix A.

**7. If external accreditation or certification is required, please state the certifying agency and status of the program**

N/A

## ***PART C: Student Learning Outcomes and Assessment***

- 1. On the course level, list all the courses and their student learning outcomes and provide a link to the ACCC course outline of record.**

The following courses are within the program and all have SLOs established and assessed:

All the courses have current student learning outcomes. Here is the list:

ENGR 001	Technology and Society	2014
ENGR 010	Engineering Processes and Tools	2014
ENGR 018	Engineering Design and Graphics	2015
ENGR 050	Introduction to Computing	2014
ENGR 060	Surveying	2014
ENGR 061	Plane Surveying	2014
ENGR 063	GIS in Surveying	2015
ENGR 066	Properties of Materials	2015
ENGR 069	Statics	2014
ENGR 071	Introduction to Circuit Analysis	2014

SLOs for each of the above course are:

ENGR 001:

- a. Explain how the historic forces of politics, economics, and sociology interacted to bring about major societal and technological changes.
- b. Define the ethical role and responsibilities of developers and users of technology.

- c. Identify the process by which technology develops and be able to critically analyze developing technologies.
- d. Critically analyze the effect of industrial revolutions on societies and their impacts on the planet.
- e. Critically analyze the effect of information revolutions on societies and their impacts on development of global economy

ENGR 010:

- a. Describe the engineering profession.
- b. Perform engineering data analyses with Matlab and Excel
- c. Solve engineering problems using the engineering design methodology.
- d. Perform accuracy and dimensional analysis in computation of design parameters.
- e. Critically analyze engineering design impacts on society, environment, and economics.

ENGR 018:

- a. Given a specific engineering design, systematically identify necessary processes and steps to arrive at a feasible and workable design
- b. Communicate a complete design through multi-views, auxiliary views, section views, isometric views, dimensioning, tolerancing and working drawings.
- c. Create an engineering drawing using computer-aided design software.
- d. Explain the orthographical projection principles.
- e. Write Visual Basic Application (VBA) scripts to create drawings.

#### ENGR 050

- a. Incorporate program control mechanisms within C++ programs using “for” and “while” loops, “switch” blocks, “if” and “if-else” procedures.
- b. Use various types of input/output streams for inputting data and generating desired outputs.
- c. Set up and use value-returning and void functions.
- d. Set up and manipulate arrays and pointers.
- e. Communicate with a PC port.

#### ENGR 060:

- a. Describe the types of surveying and the surveying profession;
- b. Describe the scope and responsibilities of a professional surveyor;
- c. Use proper units in surveying;
- d. Conduct error analyses in observations;
- e. Operate a variety of equipment used in surveying;
- f. Take field notes;
- g. Perform leveling measurements and related calculations;
- h. Perform distance measurements and related calculations;
- i. Perform angle measurements and related calculations;
- j. Conduct traversing and carry out the calculations; and
- k. Write lab reports.

ENGR 061:

- a. Perform calculations involving distance, points and intersections, and make simple least-square adjustments.
- b. Calculate areas and volumes for irregular geometries and shapes.
- c. Perform mapping, control, boundary and construction surveys.
- d. Use the Public Land Surveying System (PLSS) in land surveying.
- e. Perform horizontal and vertical curve calculations and layouts.

ENGR 063:

- a. Use a GIS software.
- b. Incorporate CAD drawing and surveying data into GIS.
- c. Analyze and interpret GIS data
- d. Build a multipurpose land information system with GIS technology by linking geodetic reference, base map, cadastral overlay and other information overlays.
- e. Identify, formulate and solve GIS problems.

ENGR 066:

- a. Identify various types of atomic bonds and classify crystalline structures.
- b. Determine the hardness and toughness of materials.
- c. Assess the impact of heat treatment on the properties of materials.
- d. Evaluate various properties of polymers, metals and other materials.



- e. Perform corrosion analyses of various materials.

ENGR 069:

- a. Determine a net external force acting on a structure
- b. Perform force and moment calculations on a structure
- c. Perform an equilibrium analysis on a structure
- d. Determine the frictional forces acting on a structure
- e. Determine the centroid and center of mass of structures subjected to distributed loads

ENGR 071:

- a. Combine, reduce and analyze series, parallel, and network circuits using nodal, mesh and transformation techniques.
- b. Apply the principles of superposition, Thevenin's equivalent circuits, and Norton's equivalent circuits.
- c. Analyze circuits containing operational amplifiers.
- d. Perform power analysis in AC circuits and determine the characteristics of RLC circuits using the concept of impedance.
- e. Effectively use laboratory tools such as oscilloscopes, multimeters, function generators, and power supplies and communicate via written reports.

The program course outlines with their student learning outcomes can be found at the following link:

<http://www.evc.edu/home/curricunet> (link to the course outlines)

[http://www.evc.edu/discover-evc/student-learning-outcomes-\(slos\)/student-learning-outcomes-\(slo\)-](http://www.evc.edu/discover-evc/student-learning-outcomes-(slos)/student-learning-outcomes-(slo)-)

[assessment/course](#) (link to the SLO matrices)

2. **On the program level, defined as a course of study leading to a degree or certificate, list the Program Learning Outcomes (PLO), if applicable. Please note, you may be completing this program review as a department or discipline and do not offer any degrees or certificates. In this instance, please disregard this question.**

Both the AS and AA degrees have program learning outcomes. The two programs are:

### **AS/AA IN ENGINEERING Learning Outcomes**

Evergreen Valley College offers an Associate in Science degree and Associate in Arts degrees in Engineering. The program trains students with the necessary skills to gain employment as engineering technicians or transfer to four-year institutions to acquire bachelor's degree in any field of engineering. It provides students with the required formal theoretical and laboratory course work.

The Engineering program learning outcomes consists of two components – subject specific and supporting subjects' outcomes. The outcomes for the supporting subjects are broader in nature and are realized and emphasized by the strategic mission of the Evergreen Valley College. The subject specific outcomes are realized through training, theoretical and experimental, offered by the program.

#### **Outcomes for General Supporting Subjects (these are satisfied through the GE subjects):**

Any graduate of the Engineering program should be able to:

1. Identify, define and solve problems
2. Make ethical choices and act responsibly

3. Critically evaluate information
4. Function effectively in a team, exercise initiative, and perform in a leadership role
5. Recognize broad societal issues and concerns
6. Serve clients and society with sensitivity and accountability
7. Interact effectively with diverse cultures
8. Adapt to change, recognize the value of life-long learning
9. Write, speak, and listen effectively

**Outcomes for Core Specific Subjects:**

In engineering program

Upon completion of the program, students will be able to:

- I. Apply knowledge of mathematics, science, and engineering to identify, formulate, and solve engineering problems.  
(Maps to ILO #2: Inquiry and Reasoning)
- II. Design and conduct experiments as well as to analyze and interpret data  
(Maps to ILO #2: Inquiry and Reasoning)
- III. Design a system, component, or process to meet per customer specifications
- IV. Identify potential changes in behavior and properties of materials as they are altered and influenced by manufacturing processes and loading conditions  
(Maps to ILO #2: Inquiry and Reasoning)
- V. Assess the safety and environmental consequences of proposed design  
(Maps to ILO#4 Social Responsibility)
- VI. Demonstrate an awareness of the human and social ramifications of technological solutions in a global and societal context

(Maps to ILO#4 Social Responsibility)

The PLOs (I to VI) have been mapped to the course level SLOs and are shown later. All program level learning outcomes have been achieved through assessment of course level SLOs. There is no special intervention needed but improvement measures are always being taken.

**3. List or describe all assessment mechanisms you are using to evaluate course and/or program student learning outcomes. Please provide a link to all the course and/or program SLO assessment matrices.**

The course level SLOs are assessed through the following mechanisms.

- Exams
- Students surveys
- Quizzes
- Laboratory exercises
- Final exam

SLOs are assessed continually and summarized in the SLO matrices. The following show the SLO matrix for each course. The overall assessment result indicate successful achievement of these SLOs. In some cases some intervention was needed which have been incorporated. For example in Engineering 010 “Engineering Process and Tools” more time is allocated to the design process and documentation, in Engineering 050 “Introduction to Computing” additional laboratory examples and practices was included to master the concepts of loops and use of if-else structure in programming, in Engineering 066 “Properties of Materials” included extended experiment in hard-working and fatigue to help in understanding of changes in crystal structure. All course level SLOs were successfully assessed.

The program course outlines with their student learning outcomes can be found at the following link:

<http://www.evc.edu/home/curricunet> (link to the course outlines)

[http://www.evc.edu/discover-evc/student-learning-outcomes-\(slos\)/student-learning-outcomes-\(slo\)-assessment/course](http://www.evc.edu/discover-evc/student-learning-outcomes-(slos)/student-learning-outcomes-(slo)-assessment/course) (link to the SLO matrices)

[http://www.evc.edu/discover-evc/student-learning-outcomes-\(slos\)/student-learning-outcomes-\(slo\)-assessment/program](http://www.evc.edu/discover-evc/student-learning-outcomes-(slos)/student-learning-outcomes-(slo)-assessment/program) (link to the PLO matrices)

**4. Since your last program review, summarize SLO assessment results at the course and program level (if applicable).**

The SLOs for all courses within the degree program have been assessed and the results have been tabulated in their respective matrices. The SLOs for each course were mapped to the program level SLOs called PLOs and institutional level SLOs called ILOs. These are shown on the following pages.



## Institution Level SLO and Assessment Matrix

Date: 10/2/2012 revised 9/3/13; 4/14/15; 7/29/15

Institution SLOs	Assessment Plan for each SLO	Assessment Conducted Through:						Data/Analysis/Action Plan and Timeline
		Course/Activity Date	Course/Activity Date	Course/Activity Date	Course/Activity Date	Course/Activity Date	Course/Activity Date	
<b>Communication</b>  The student will demonstrate effective communication, appropriate to the audience and purpose	2014/2015 EVC ILO Written communication rubric -ACCT 063 (final class taken for accounting degree students) -NURS 004 (final class for nursing degree)	ACCT 063 Fall 2014	ENGR 066 Fall 2014	NURS 004 Spring 2015	ENGL 001A Spring 2016			Aggregated results (accounting F'14 and nursing S'15) N=48 (16 accounting & 32 nursing) Assessment Standards: Assessed the performance based on the EVC ILO Written Communication Rubric. Using 3 categories, clarity of expression, logical in context and organization, and correct grammar and punctuation. Papers assessed as unsatisfactory, satisfactory, and excellent in each of the areas. For assessment reporting, satisfactory and excellent are reported in aggregate.  Data: Clarity of expression 43/48 (90%) scored at least satisfactory
	2014/2015 -ENGR 066 (lab report with rubric) -ENGL 1A (final examination)							
	2015/2016							
<b>Inquiry and Reasoning</b>  The student will critically evaluate information to interpret ideas and solve problems.	2012/2013: Student assessment are planned as  - ENGR 066 Properties of Materials, Fall 2012. Assessment will be done through laboratory performance  - BIOL 071 Human Anatomy, fall 2012. Assessment was done through laboratory performance and report.  -Nursing Program: Critical Thinking assessment through standardized exam fall 2012; pending assessment results summer 2015	BIOL 071 Fall 2012	ENGR 066 Fall 2012	NURS program Fall 2012 &	CHEM 001A Sp13 & Sp15	AST - Math Fa '14 & Sp '15		ENGR. 66 (Properties of Materials):  In Engr. 66 students perform activities to determine properties of various engineering materials such as Iron, Aluminum etc. They conduct weekly experiments to evaluate the effects associated with various external stimuli on the properties such as strength, thermal, and electromagnetics. The data obtained based on their inquiries are analyzed and conclusions are made through reasoning. The findings are reported through comprehensive technical reports. Here is the result of Fall 2012 activities: Student success (%student) (beginning of the semester): -55% Not Acceptable (grade below 65% level)
<b>Information Competency</b>  The student will utilize information from a variety of sources to make an informed decision and take action.	Spring 2012: Student assessments are planned as - ENGR 001 Technology and Society, Fall 2013  - ENGL 001A, English Composition, Spring 2012  All assessment will be done through projects and exams.		ENGR 001 Fall 2013	ENGL 001A Spring 2012	BIOL 071 Spring 2013			ENGL 001A: Analysis A sample of 113 students was analyzed. The common elements of the assignment included research from a variety of credible sources, a thesis or topic, use of correct sentence structure and word forms, and documentation using MLA (Modern Language Association) formatting. Of the 113 students, 92 or 81.4% completed the assignment satisfactorily (received a passing grade). Twenty-one students (18.6%) either did not complete the assignment or received an unsatisfactory evaluation (failing grade).  Action Plan

Institution SLOs	Assessment Plan for each SLO	Assessment Conducted Through:						Data/Analysis/Action Plan and Timeline
		Course/Activity Date	Course/Activity Date	Course/Activity Date	Course/Activity Date	Course/Activity Date	Course/Activity Date	
<b>Social Responsibility</b>  The student will demonstrate effective interpersonal skills with people of diverse backgrounds and effectively function in group decision making.	Spring 2012: - Conduct a student survey in Spring 2012. Survey will be sent to all of the current EVC students via e-mail.  2013/2014 -Diverse Learning Environments (DLE) survey  Spring 2014 -SERV-001	Student Survey Spring 2012	Diverse Learning Survey 13/14	SERV-001 spring 2014				Analysis:  May 11, 2012: An electronic survey was created to gather student self-assessment related to this Institutional SLO. The survey utilized Likert-scale statements for self-assessment and was e-mailed to approximately 8,000 currently enrolled students at EVC. There were 821 responses (approximately a 10% response rate).  The majority of students indicated that they are socially responsible. For example, 95.74 percent of students surveyed strongly agreed/ agreed with the statement that they participate in activities that celebrate diversity and 90.74 percent of respondents reported that
<b>Personal Development</b>  The student will demonstrate growth and self-management to promote life-long learning and personal well-being	2013/2014:  -Diverse Learning Environments (DLE) Survey  -COUNS 014: spring 2012 (SLOs 1 & 2- ID learning styles and ID values as they relate to ST and LT goals) learning skills inventory and project presentation. Activities reassessed in Spring 2014 through self assessment and project presentation.  -Counseling Services: spring 2012 (assessment for SLO: The student will be able to describe his/her	Diverse Learning Survey 13/14	COUNS 014 Sp'12 & Sp'14	Counseling Services				DLE Survey: This survey is conducted through the Cooperative Institutional Research Program at UCLA. The survey is an integrated assessment of climate, diversity practice and outcomes. The survey is administered annually to students at 2 & 4 yr colleges with at least 24 units completed. 109 Full-time EVC students completed the survey. The following survey factors were reviewed for their relation to the ILO 1. Habits of Mind: EVCs rating was 47.1% which is lower than 4yr schools (50.4%). Intervention needed 2. Integration of Learning: EVCs student integration of learning rate was 45.8%, which was statistically lower than 4 yr colleges (50.7%).
Comments/Recommendations:		ILO#1Communication: 15/16 EVC Action Plan: 1. Identify additional campus courses (GE) to utilize the EVC ILO written communication rubric and report results 2015/2016 2. Share results with campus community to determine any college wide interventions 2015/2016 - 2016/2017 3. Establish EVC rubric for ILO Oral Communication 2015/2016  ILO#2 Inquiry Reasoning "closing the loop" 14/15: Nursing Program update June 2015: in Fall 2013, nursing program implemented the addition of the ATI critical thinking test to first semester fundamentals course. The students then retake the ATI critical thinking test at the end of 4th semester (before students graduate). The goal is to show growth in critical thinking/clinical reasoning. The first cohort graduated spring 2015. *Results pending analysis from nursing department. CHEM001A Update: The recommended interventions in spring 2013 (group & individual tutoring, review past exams, and reading quizzes) were implemented & assessed in Spring 2015. 4 multiple choice questions from the final exam were selected for the reassessment. An average of 79.6% of the 55 students tested got all correct responses; therefore, the interventions will continue.						





# Evergreen Valley College

## Program Level SLO and Assessment Matrix

Program: Engineering, AA & AS

Date: 12/20/2012

	Program SLOs	Assessment Plan for each Program SLO	Program Courses								Data/Analysis/Action Plan and Timeline
			Course/ Activity	Course/ Activity	Course/ Activity	Course/ Activity	Course/ Activity	Course/ Activity	Course/ Activity	Course/ Activity	
Add	SLO #1	Design and conduct experiments as well as analyze and interpret data.  Fall 2011 (Engr. 66)  Spring 2012 (Engr. 50, 71)	Engr. 50	Engr. 66	Engr. 71						<p>Engr. 50: Students practiced writing computer programs to obtain solutions for given mathematical models. A semester-long design project was completed with 80% success rate, i.e. 80% of the students were able to complete the project. Exams were used to assess the progress. No changes are being planned.</p> <p>Engr. 66: Students were given opportunities to conduct various experiments, collect data, and determine various parameters. Reports were written to detail the activities. 100% of the students were able to complete their tasks. No changes are being planned.</p> <p>Engr. 71: Various circuit designs were introduced and students practiced through homework and laboratory activities. Results of the lab and exam assessments were satisfactory. No changes are being planned.</p>
			I	P	P						
			P	M	M						
Add	SLO #2	Design a system, component, or process to meet per customer specifications.  Fall 2011(Engr. 66)  Spring 2012 (Engr. 10, 18,50)	Engr. 10	Engr. 18	Engr. 50	Engr. 66	Engr. 71				<p>Engr. 10: Students were assigned a project to design a robot capable of seeking a light source. 80% of the students were able to meet 100% of the requirements.</p> <p>Engr. 18: Engineering drawing and design assignments were practiced in the laboratory. Students were able to produce a required drawing per specification needed. The results were satisfactory and no changes are being planned.</p> <p>Engr. 50: Students were assigned projects to control a stepper motor via custom C++ program. The laboratory performance was satisfactory and there is no changes being planned.</p> <p>Engr. 66 &amp; 71: Students conducted weekly experiments. Assessment was performed on the last lab activity and its corresponding report that each student submitted. 100% of the students were able to demonstrate competency in this SLO.</p>
			I	I	P	P	P				
			P	P	M	M	M				

Program:

Engineering, AA & AS

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	Program SLOs	Assessment Plan for each Program SLO	Program Courses										Data/Analysis/Action Plan and Timeline
			Course/Activity	Course/Activity	Course/Activity	Course/Activity	Course/Activity	Course/Activity	Course/Activity	Course/Activity	Course/Activity	Course/Activity	
													Competency was considered to be a grade of 75% and above. No changes are being planned.
Add	SLO #3	Identify potential changes in behavior and properties of materials as they are altered and influenced by manufacturing processes and loading conditions	Fall 2011(Engr. 66)	Engr. 66									Engr. 66: Discussion of various materials and their properties were presented in lecture and laboratory sessions. Students were given opportunities to practice and master the knowledge of material properties. Students performed hands-on experiments. The results of assessments (lab and exams) were satisfactory. No changes are being planned.
				I									
				P									
				M									
Add	SLO #4	Assess the safety and environmental consequences of a proposed design.	Fall 2011(Engr. 66)	Engr. 10	Engr. 66								Engr. 10: Students were introduced to the concept of environmentally friendly designs through lecture discussions. No changes are being planned.
				I	I								
					P								
					M								
Add	SLO #5	Demonstrate an awareness of the human and social ramifications of technological solutions in a global and societal context.	Fall 2011 (Engr.1)	Engr. 1	Engr. 10								Engr. 1: Students were introduced to the topic of technology and society. Various projects and literature surveys were given to raise their awareness of social impacts of a technology. They also demonstrated their understanding of impact of society on the development of technology. A group project is being planned to conduct a larger survey of an enabling technology.
				I	I								
				P	P								
				M	M								
Add	SLO #6	Work and communicate effectively, either independently or in a team, to solve technical problems using engineering principles.	Fall 2011 (Engr. 66)	Engr. 10	Engr. 18	Engr. 50	Engr. 66	Engr. 69	Engr. 71				Engr. 10,18,50,66,69,71: Throughout the semester students were given various opportunities via homework, lab activity, and design projects to improve their communication skills. They were also given guidance in conducting experiments and obtaining solutions to engineering problems. No changes are being planned.
				I	I	P	P	P	P				
				P	P	M	M	M	M				

**Program:**

Engineering, AA & AS

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Add	SLO #7	Demonstrate an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	Fall 2012 (Engr. 66)  Spring 2013 (Engr. 10, 18, 71)	Engr. 10	Engr. 18	Engr. 66	Engr. 71						Engr. 66: Students mastered using the laboratory equipment to obtain desired results. No changes are planned.  Engr. 10, 18, 71: will be assessed in Spring 2013.
				I	I	P	I						
				P	P	M	P						
				M	M	M	M						

Comments/Recommendations:

(Click the Add button to continue grid for each Program SLO)

Program Level SLOs are Student Learning Outcomes for a program that will be assessed to measure the effectiveness of that course of study (program is defined as course of study leading to a degree or certificate)

Write the Program Major Courses in the third section and mark the grid as follows:

I = the SLO is *introduced* in this course

D = the SLO is *developed and practiced with feedback* in this course

M = the SLO is *mastered and measured* in this course

Analysis/Action Plan: Once you collect and analyze assessment data, state what modifications will be made to improve the SLO outcomes and when.

*Once completed, provide electronic copy to Division Office and EVC SLO Coordinator*

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\* Modified from Bakersfield College; Approved by SLO Sub-committee 3/9/12

## SLOs for Technology & Society (Engr. 001)

Course: Technology and Society (Engr. 001)

	<b>Student Learning Outcomes (SLOs)</b> As listed on EVC ACCC Course Outline <i>"On completion of this course, the student will..."</i>	<b>Assessment Tool</b> List the tools to assess each SLO (such as rubrics, projects, assignment, survey, etc.)	<b>Evaluation Timeline</b> When will the SLO be assessed?	<b>Assessment Results</b> Summarize collected data including how data were collected and number of students.	<b>Analysis/Action Plan and Timeline</b> What, if any, changes will be made to instruction, or the SLO and when?
	SLO #1  Explain how the historic forces of politics, economics, and sociology interacted to bring about major societal and technological changes.	Embedded questions in project 1.	Fall 2012	19 students were assessed via project which included textbook reading as well as Internet search.  a. 45% of the students scored at B or A level. b. 35% of the students scored at C level. c. 20% of the students scored at D level.	This was an Online class. 80% of the students demonstrated competency on this topic. However, 20% of the students failed on this SLO. During reading of the student's submitted reports it was noticed that some of the students had difficulty expressing themselves. Some of the students had language difficulties. Some of the students were lacking critical thinking skills.  It is planned to include some additional guidance in terms of how and where to start on a research topic. In addition there will be some discussion on what specific areas to focus. This course will be offered in Jan 2014 or 2016 during the intersession.
	SLO #2  Evaluate the responsibility of society in general, and directors and users of technology in particular, to function in an ethical and professional manner.	Embedded questions in project 2	Fall 2012	19 students were assessed via project which included textbook reading as well as Internet search.  a. 30% of the students scored at B or A level. b. 50% of the students scored at C level. c. 20% of the students scored at F or D level.	This was an Online class. 80% of the students demonstrated competency on this topic. However, 20% of the students failed on this SLO. Even though 80% of the students passed this topic, in general student reports indicated lack of critical skills, especially those who were in the D bracket. It is planned to include some additional case studies where the subject of ethics and its associated impact in a society are discussed.

	<b>Student Learning Outcomes (SLOs)</b> As listed on EVC ACCC Course Outline <i>"On completion of this course, the student will..."</i>	<b>Assessment Tool</b> List the tools to assess each SLO (such as rubrics, projects, assignment, survey, etc.)	<b>Evaluation Timeline</b> When will the SLO be assessed?	<b>Assessment Results</b> Summarize collected data including how data were collected and number of students.	<b>Analysis/Action Plan and Timeline</b> What, if any, changes will be made to instruction, or the SLO and when?
					This course will be offered in Jan 2014 or 2016 during the intersession.
<a href="#">Add</a>	SLO #3 Identify the process by which technology develops and be able to critically analyze developing technologies.	Embedded questions in project 3	Fall 2012	18 students were assessed via project. This project involved using number of textbook references as well as the Internet. a. 21% of the students scored at B or A level. b. 60% of the students scored at C level. c. 19% of the students scored at F or D level.	81% of the students were able to succeed on this topic. However, larger portion of the students' performance was at "C" level. There was 19% of failure rate. Once again some of the failure was due to language difficulties. Great majority of the difficulties was due to inability to conduct critical analysis. It is planned to identify additional reference articles on the subject. Provide additional discussions. This will be incorporated in Jan 2014 or 2016 during the Intersession.
<a href="#">Add</a>	SLO #4 Critically analyze the effect of Industrial revolutions on societies and their impacts on the planet.	Embedded questions in project 4	Fall 2012	16 students were assessed on this project. Primarily students conducted Internet research. 40% of the students scored at B or A level. 48% of the students scored at C level. 12% failed.	It appears that students were able to see the difference in everyday life in the world before and after the industrial revolution. 88% scored at passing level. Only 12% failed and this quite possibly was due to the lack of work instead of lack of understanding. No plans to make any changes.
<a href="#">Add</a>	SLO #5 Critically analyze the effect of information revolutions on societies and their impacts on development of global economy.	Embedded questions in project 5	Intersession 2016		

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## SLOs for Engineering Processes and Tools (Engr. 010)

Course: Introduction to Engineering (Eng 10)

	<b>Student Learning Outcomes (SLOs)</b> As listed on EVC ACCC Course Outline <i>"On completion of this course, the student will..."</i>	<b>Assessment Tool</b> List the tools to assess each SLO (such as rubrics, projects, assignment, survey, etc.)	<b>Evaluation Timeline</b> When will the SLO be assessed?	<b>Assessment Results</b> Summarize collected data including how data were collected and number of students.	<b>Analysis/Action Plan and Timeline</b> What, if any, changes will be made to instruction, or the SLO and when?
<small>Add</small>	SLO #1 Describe the engineering profession ILO - Communication Information Competency	Written Exam.	10/8/2012	Data for this SLO was collected during the first exam and the final exam.	15 students were tested if they understood the various disciplines of engineering. The during the first exam all 15 were able to answer the questions appropriately. It was the same at the final exam. As a result the teaching method has been effective.
<small>Add</small>	SLO #2 Perform engineering data analyses with Matlab and Excel ILO - Information Competency, Inquiry and Reasoning	Exam Questions	12/19/2012	Data for this SLO was collected using an exam. Total of 14 students participated in the exam. Students were given problems to analyze engineering data and asked to compute key parameters. They were also required to provide analytical reasoning. The problems contained all elements of the SLO#2. Passing rate for: 1. Statistical Analysis 82%  1. Statical Analysis 5% of students scored under 50%.	As the result of assessment and analysis no changes is being planned to the course SLOS.



Course:

Introduction to Engineering (Eng 10)

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	<b>Student Learning Outcomes (SLOs)</b> As listed on EVC ACCC Course Outline <i>"On completion of this course, the student will..."</i>	<b>Assessment Tool</b> List the tools to assess each SLO (such as rubrics, projects, assignment, survey, etc.)	<b>Evaluation Timeline</b> When will the SLO be assessed?	<b>Assessment Results</b> Summarize collected data including how data were collected and number of students.	<b>Analysis/Action Plan and Timeline</b> What, if any, changes will be made to instruction, or the SLO and when?
<div>Add</div>	SLO #3  Solve non-linear engineering problems with Matlab and Excel  ILO - Inquiry and Reasoning, Information Competency	Exam Questions given as part of the final.	12/19/2012	Data for this SLO was collected using an exam. Total of 14 students participated in the exam. Students were given problems to analyze non-linear data and asked to solve for unknowns. They were also required to compute optimal solution for the problem. The problems contained all elements of the SLO#3. Passing rate for: 1. Problem Formulation 85% 2. Single Variable Solution 79% 3. Multiple Variable Solution 85 %  1. Problem Formulation 15% of students scored under 50%. 2. Single Variable Solution: 21% of students scored under 50% 3. Multiple Variable Solution: 15% of students scored under 50%. Overall success for the SLO was 83%	As the result of assessment and analysis changes are not needed at this time for the instruction in this SLO. Additional hours of lecture on non-linear problem exercises may be useful to help the remaining 15% students. Students may need to be referred to tutoring at the MSRC lab and EVC to provide and upgrade software such as MatLab at the MSCRC Lab computers. There may also be another way to help students by opening the Engineering Lab AB132 for more hours and assign tutors to help students work out problems.
<div>Add</div>	SLO #4  Perform numerical integration and differentiation with Matlab  ILO - Inquiry and Reasoning, Information Competency	Exam Questions given as part of the final.	12/19/2012	Data for this SLO was collected using an exam. Total of 14 students participated in the exam. Students were given numerical integration problem and asked to perform integration using the two well known methods, and compare the results. The problems contained all elements of the SLO#4. Passing rate for: 1. Numerical Integration 64% 2. Comparison and Analysis 50%  1. Numerical Integration 46% of students scored under 50%. 2. Comparison and Analysis: 50% of students scored under 50%. Overall success for the SLO was 57%	As the result of assessment and analysis changes are needed for this SLO. Additional hours of lecture and class exercises are needed on basic numerical integration. More homework problem exercises may be useful to help the remaining 50% students. Students may need to be spend a little more time at the MSRC tutoring lab and EVC may provide help to students by opening the Engineering Lab AB132 for more hours and assign tutors to help students work out problems.

**Course:** Introduction to Engineering (Eng 10)

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<p>Add</p>	<p>SLO #5</p>	<p>Create a model of a simple device or product.</p> <p>ILO - Social responsibility, Inquiry and Reasoning, Information Competency, personal Development, Communication</p>	<p>As part of a semester long project students were required to build a wooden model car that they built using a kit provided by EVC. A track for testing and final competition was prepared by the lab assistant Mr. Tony Perez. The competition was exciting and students learned the basic principles of motion.</p>	<p>12/12/2012</p>	<p>Data for this SLO was collected using a semester project. Total of 14 out of 15 registered students participated in the exam. Students were provided a project guide, report format, and a model car kit for a group of two students. They were required to produce a model car that will be tested on the lab tracks, and a final report as per the guidelines. The problems contained all elements of the SLO#5. Passing rate for:</p> <ol style="list-style-type: none"> <li>1. Model Car 93% (1 student did not complete)</li> <li>2. Class Report - 93% (1 Student did not complete)</li> </ol> <p>14 out of 15 students completed and presented their findings. The one final paper per group was submitted. There is a need for writing instruction for all students.</p> <p>Overall success for the SLO was 93%</p>	<p>This SLO does not need any changes but perhaps an additional course may be needed to assist our students who come from non-english speaking families. Sometimes even those who come from english-speaking families have difficulty comprehending word problems.</p> <p>A seminar or course in technical writing would be a good addition to help these students. Also there are some students that need basic english language instructions in both conversational english and reading and writing. These services are beyond the scope of this class and it may not be possible to help in the time allotted for this course.</p>
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## SLOs for Engineering Design and Graphics (Engr. 018)

**Course:** Engineering Graphics Design- ENGR-18

	<b>Student Learning Outcomes (SLOs)</b> As listed on EVC ACCC Course Outline <i>"On completion of this course, the student will..."</i>	<b>Assessment Tool</b> List the tools to assess each SLO (such as rubrics, projects, assignment, survey, etc.)	<b>Evaluation Timeline</b> When will the SLO be assessed?	<b>Assessment Results</b> Summarize collected data including how data were collected and number of students.	<b>Analysis/Action Plan and Timeline</b> What, if any, changes will be made to instruction, or the SLO and when?
<div>Add</div>	SLO #1  Communicate a complete design through multi-views, auxiliary views, section views, isometric views, dimensioning, tolerancing and working drawings.	Laboratory activities: sketching on graph papers, using computer drawings, quizzes and objective test.	5/1/2012	Data for this SLO was collected using a laboratory project. Each project carefully evaluated using printed and or sketches as well as the written exams. I have included a copy of each topic on SLO#1 with their grades.  Students average grade for these activities are the following:  1. Orthographic projection 95% 20 Students were participated 2. Orthographic-dimensions exam 86% 22 Students were participated 3. Dimensioning & Tolerance 86% 19 Students were participated 4. Auxiliary views 93% 18 Students were participated 5. Sectional views 96% 16 Students were participated 6. Sectional written quiz 65% 22 Students were participated 7. Isometric drawings 94% 21 Students were participated  Overall success for the SLO was 88%	As the result of assessment and analysis no changes is being planned to the course SLOS. Students were given an assignment to complete during the lab activity period and also given a written test involving all elements of the SLO#1.  Analysis of these data indicates that students learning objectives are achieved for most areas. Analyzing the sectioning quiz indicates the lower score for the question number one that related to the "web" sectioning. This is a conventional method that requires more knowledge and practice. More activities and lecture with actual mechanical part illustration, and/or a video presentation will be added

## SLOs for Introduction to Computing (Engr. 050)

Course: Engineering Graphics Design- ENGR-18

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	<b>Student Learning Outcomes (SLOs)</b> As listed on EVC ACCC Course Outline <i>"On completion of this course, the student will..."</i>	<b>Assessment Tool</b> List the tools to assess each SLO (such as rubrics, projects, assignment, survey, etc.)	<b>Evaluation Timeline</b> When will the SLO be assessed?	<b>Assessment Results</b> Summarize collected data including how data were collected and number of students.	<b>Analysis/Action Plan and Timeline</b> What, if any, changes will be made to instruction, or the SLO and when?
<a href="#">Add</a>	SLO #2 Use computer-aided design software to create an engineering drawing.	Laboratory projects using AutoCAD software application.	Fall 2015	95% of the students scored passing grade.	As the result of assessment and analysis no changes is being planned to the course SLOS. No improvement plans are needed.
<a href="#">Add</a>	SLO #3 Explain the orthographic projection principles.	Performance test and quiz	Fall 2015	90% of students were able to complete this SLO. 10% failed to score above 75%.	This SLO was mastered by the students. the 10% failure is based on 75% passing rate. There will be some additional assignment for those who have difficulty in this area.
<a href="#">Add</a>	SLO #4 Write VBA scripts to create drawings.	Lab activity, Test	Fall 2015	80% of the students were capable of passing this SLO. The passing score was set at 75%.  20% had difficulty in writing script.	As the result of the assessment there will be additional material coverage and examples in the lab on this subject. This should help the 20% who did not pass this SLO.
<a href="#">Add</a>	SLO #5 Take an engineering design idea; systematically identify necessary processes and steps to arrive at a feasible and workable design.	Final design project presentation, evaluation matrix.	Spring 2016		

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\* Modified from Bakersfield College; Approved by SLO Sub-committee 3/9/12

## SLOs for Properties of Materials (Engr. 066)

Course: Properties of Materials (Engr. 066)

	<b>Student Learning Outcomes (SLOs)</b> As listed on EVC ACCC Course Outline <i>"On completion of this course, the student will..."</i>	<b>Assessment Tool</b> List the tools to assess each SLO (such as rubrics, projects, assignment, survey, etc.)	<b>Evaluation Timeline</b> When will the SLO be assessed?	<b>Assessment Results</b> Summarize collected data including how data were collected and number of students.	<b>Analysis/Action Plan and Timeline</b> What, if any, changes will be made to instruction, or the SLO and when?
	SLO #1 Identify various atomic bonds and classify crystalline structures.	Embedded questions in exam 1.	Fall 2014	28 students were assessed using embedded questions in exam#1. a. 90% of the students scored at B or A level. b. 7% of the students scored at C level. c. 3% of the students failed on classifying structure of crystals.	Based on the result observed via exam#1 and homework assignments there will be no special intervention at this level.
	SLO #2 Determine hardness and toughness of materials.	Embedded questions in final exam.	Fall 2014	24 students were assessed using embedded questions in the final exam. a. 44% of students scored at B or A level. b. 44% of the students scored at C level. c. 12% of the students scored at D level.	88% of the students passed the course. The remaining 12% were not successful which is within expected level. In order to help those in the D level, the recommendation is to place and an additional emphasis on this subject during the actual hands-on experimentation where students are performing test. This intervention will take place in Fall 2015.
	SLO #3 Assess impact of heat treatment on properties of materials.	Embedded questions in final exam.	Fall 2014	24 students were assessed using embedded questions in the final exam. a. 90% of the students scored at B or A level. b. 6% of the students scored at C level. c. 4% of the students scored at D level.	This subject was mastered by 90% of the students! Based on these results there will be no special intervention. However, in order to help those in the D bracket it is planned to provide additional discussion and analysis of data after students perform lab experiments on this subject. This change will be done in Fall 2015.

Course: Properties of Materials (Engr. 066)

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	<b>Student Learning Outcomes (SLOs)</b> As listed on EVC ACCC Course Outline <i>"On completion of this course, the student will..."</i>	<b>Assessment Tool</b> List the tools to assess each SLO (such as rubrics, projects, assignment, survey, etc.)	<b>Evaluation Timeline</b> When will the SLO be assessed?	<b>Assessment Results</b> Summarize collected data including how data were collected and number of students.	<b>Analysis/Action Plan and Timeline</b> What, if any, changes will be made to instruction, or the SLO and when?
<small>Add</small>	SLO #4 Evaluate various properties of polymers, metals and other materials.	Laboratory activities.	Fall 2014	24-28 students were assessed throughout Fall 2014 semester via laboratory experimentation and reporting. a. 30% of the students scored at B or A level. b. 61% of the students scored at C level. c. 9% of the students scored F or D.	Based on the assessment result there will be no specific intervention in the way the topic is covered. In order to reach the 9% who were not successful it is planned to provide additional discussion on how to evaluate material properties after conducting texts on the specimens. The plan will be carried out in Fall 2015.
<small>Add</small>	SLO #5 Perform corrosion analyses of various materials.	Embedded questions in final exam	Fall 2014	24 students were assessed via embedded questions in the final exam. a. 31% of the students scored at B or A level. b. 44% of the students scored at C level. c. 25% of the students scored at F or D level.	This subject was covered towards the end of the semester. The result indicate that 25% of the students failed to show competency in this subject. While 75% of the students passed this topic still there is a lot of room for improvement. It is planned to allocate more time to this topic in the lecture as well as during the lab. More problem solving should help students improve in this subject. This plan will be incorporated in Fall 2015.

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## SLOs for Statics (Engr. 069)

Course: Statics (Engr. 069)

	<b>Student Learning Outcomes (SLOs)</b> As listed on EVC ACCC Course Outline <i>"On completion of this course, the student will..."</i>	<b>Assessment Tool</b> List the tools to assess each SLO (such as rubrics, projects, assignment, survey, etc.)	<b>Evaluation Timeline</b> When will the SLO be assessed?	<b>Assessment Results</b> Summarize collected data including how data were collected and number of students.	<b>Analysis/Action Plan and Timeline</b> What, if any, changes will be made to instruction, or the SLO and when?
Add	SLO #1 1. Determine a net external force acting on a structure	Final Exam with embedded questions.	5/24/2012	95% of the students scored higher than 70% on this SLO. The overall score was 91%. Everyone passed this SLO. The passing rate for this SLO was set as 70%.	No changes are being planned for this SLO. No additional activities are being planned on this SLO.
Add	SLO #2 2. Perform force and moment calculations on a structure	Final Exam with embedded questions.	5/24/2012	85% of the students scored higher than 70% on this SLO. The passing score for this SLO was set as 70% so everyone passed this SLO.	No changes are being planned for this SLO. 15% of the class could improve their performance by additional practice problems which will be provided via web.
Add	SLO #3 3. Perform an equilibrium analysis on a structure	Exam #2 with embedded questions.	4/12/2012	9% of the students scored less than 70% on this SLO. That is 91% of the students scored more than 70% thus passed the SLO. The passing score for the SLO is taken to be 70% or higher.	Based on the results seen there will be no changes to this SLO. However, additional in-class problem solving will help those 9% of the students. There will also be some additional sample problems that will be made available online.
Add	SLO #4 4. Determine the frictional forces acting on a structure	Exam #2 with embedded questions.	4/12/2012	100% of the students scored higher than 70% on this SLO. In fact the average score was 96%.	There will be no changes to this SLO. No additional activity is being planned.

Course: Statics (Engr. 069)

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	<b>Student Learning Outcomes (SLOs)</b> As listed on EVC ACCC Course Outline <i>"On completion of this course, the student will..."</i>	<b>Assessment Tool</b> List the tools to assess each SLO (such as rubrics, projects, assignment, survey, etc.)	<b>Evaluation Timeline</b> When will the SLO be assessed?	<b>Assessment Results</b> Summarize collected data including how data were collected and number of students.	<b>Analysis/Action Plan and Timeline</b> What, if any, changes will be made to instruction, or the SLO and when?
<small>Add</small>	SLO #5 5. Determine the centroid and center of mass of structures subjected to distributed loads	Embedded questions in exam #2.	4/12/2012	56% of the students scored less than 70% on this SLO. The average score was 68%. This is close to the passing score which was set at 70%. However the class score was unevenly divided.	No changes to the SLO is needed. To improve student success in this subject the following are being planned: 1. Additional in-class examples 2. Additional sample problems placed online. 3. In-class practice problem done by students.

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## SLOs for Introduction to Circuit Analysis (Engr. 071)

Course: Introduction to Circuit Analysis (Engr. 071)

	<b>Student Learning Outcomes (SLOs)</b> As listed on EVC ACCC Course Outline <i>"On completion of this course, the student will..."</i>	<b>Assessment Tool</b> List the tools to assess each SLO (such as rubrics, projects, assignment, survey, etc.)	<b>Evaluation Timeline</b> When will the SLO be assessed?	<b>Assessment Results</b> Summarize collected data including how data were collected and number of students.	<b>Analysis/Action Plan and Timeline</b> What, if any, changes will be made to instruction, or the SLO and when?
	SLO #1 1. Combine, reduce and analyze series, parallel, and network circuits using nodal, mesh and transformation techniques.	Final exam with embedded questions.	5/24/2012	95% of the students scored higher than 70% on this SLO. In fact the average score on this SLO was 90%.	No change is planned for this SLO. The success rate was well above the passing threshold which was set at 70%.
	SLO #2 2. Apply the principle of superposition, Thevenin's equivalent circuits, and Norton's equivalent circuits.	Final Exam with embedded questions.	5/24/2012	85% of students scored higher than 70% on this SLO. It was noticed that the actual difficulty was due to complexity of the sources present in the problem.	No change to the SLO is planned. The concept itself was mastered but this SLO will be assessed using two separate problems, i.e. one for the superposition and one for the Thevenin's equivalent circuit. This SLO was successfully completed since the passing threshold was set at 70%.
	SLO #3 3. Analyze circuits containing operational amplifiers.	Exam #2 with embedded questions.	4/12/2012 & Fall 2015	50% of the students scored below 70% on this SLO. However the overall average on this SLO was 68% which is very close to the passing threshold which is set to 70%.  Fall 215: This SLO was re-assessed and only 11 percent of the students failed this SLO.	No change to this SLO is planned. To improve student performance the following are planned: 1. Provide additional in-class examples 2. Provide additional sample problems on the web.  Fall 2015: 89% of the students scored passing grade. The passing score was set at 70%. There is 11% of the students who still have difficulties with this concept. There will be more in-class discussion on this topic in order to reach these individuals.

	<b>Student Learning Outcomes (SLOs)</b> As listed on EVC ACCC Course Outline <i>"On completion of this course, the student will..."</i>	<b>Assessment Tool</b> List the tools to assess each SLO (such as rubrics, projects, assignment, survey, etc.)	<b>Evaluation Timeline</b> When will the SLO be assessed?	<b>Assessment Results</b> Summarize collected data including how data were collected and number of students.	<b>Analysis/Action Plan and Timeline</b> What, if any, changes will be made to instruction, or the SLO and when?
<input type="button" value="Add"/>	SLO #4 4. Perform power analysis in AC circuits and determine the characteristics of RLC circuits using the concept of impedance.	Exam #2 with embedded questions.	5/10/2012	43% of the students scored below 70% on this SLO. However the overall average of the SLO was 74%. The class was polarized on this SLO.	No change is planned for this SLO. The result shows a polarized class on this SLO. Even though the overall average was 74% which is higher than the passing percentage set for the SLO (70%) this low success rate must be addressed. The following are planned: 1. Spend more time on this subject 2. Provide more examples in the class 3. Provide additional samples problems via web
<input type="button" value="Add"/>	SLO #5 5. Effectively use laboratory tools such as oscilloscopes, multimeters, function generators, and power supplies and communicate via written reports.	Laboratory experiment #7 "AC Circuits". Practical demonstration and written report.	4/25/2012	100% of the student were able to effectively use the laboratory equipment to conduct experiments and produce written reports.	No change to the SLO is planned.

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**5. What plans for improvement have been implemented to your courses or program as a result of SLO assessment?**

Many changes have been initiated as the SLOs were assessed. Interventions include modification at the lecture level as well as any changes needed in the laboratory settings. For example, some lecture material have been expanded and some been removed due to their relevancy or lack thereof. In the Engineering 050 “Introduction to Computing” course a lecture was devoted to the introduction to computer hardware such as description of various components etc. Due to the fact that all of the program students are very well versed on this material there is no longer a need for this coverage. The time now being used to actually provide additional coding principles. This change was a direct result of assessment where students needed additional help. In Engineering 010 “Engineering Process and Tools” more time is allocated to the design process and documentation, in Engineering 050 “Introduction to Computing” additional laboratory examples and practices were included to master the concepts of loops and use of if-else structure in programming. In Engineering 066 “Properties of Materials” included an extended experiment in hard-working and fatigue in order to help students in understanding of changes in crystal structure due to deformation.

All SLO assessments have met the minimum requirement established and quite often surpassed the minimum threshold. All are documented and shown in the previous matrices.

**6. As a result of SLO assessment data, will you be requesting additional resources for your program or courses (i.e. additional faculty, equipment request, program personnel...)?**

To improve and excel in training offered to the department students there is a continued need for upgrading of the existing equipment and the laboratory facilities. The program vitality rests on the currency of the curriculum. Early on in this report it was mentioned that the engineering department defines effectiveness and success by the quality of its graduates and transfer rate of the students. In addition, employability is of concern as well. The department can only assess its students based on what it provides to the students in the way of equipment, resources, and hands-on training. Learning in an engineering program takes place by application of the theoretical concepts through laboratory practices.

The needed resources were identified in the previous sections and a list of equipment is also provided in the section E of this report.

## ***PART D: Faculty and Staff***

1. **List current faculty and staff members in the program, areas of expertise, and how positions contribute to the program success.**

There is one full-time faculty member in the engineering program.

### **A. Full-Time Engineering Faculty**

#### **Tabrizi, Abdie**

Area of Expertise: Theoretical and experimental focus in thermal sciences in mechanical engineering with a degree of doctor of philosophy. Expertise in engineering, computational mathematics, physics, computers.

Industry Experience: General Motors, NASA, Applied Materials, KLA Tencor, Advanced Plastics Inc, Wayne Pump.

Activities: Design analysis of engine/transmission, controllers, airbag systems, ABS brakes, aircraft icing, helicopter blade erosion, thermal shock, tribology in disk drives, injection molding systems, pump design and verification, HVAC system etc.

Courses taught at EVC: Engineering 10, 18, 50, 66, 69, 71; Physics 4A, Math 111, 13, 25, 63, 71, Engr. Tech. 160 (SG 100), and Electronic 122.

Courses taught at SCU/SJSU/UT/PURDUE: Dynamics, Statics, Thermodynamics I, II, Fluids, Viscous Flow I,II, Heat Transfer, Thermal System Design, HVAC, Advanced Energy Conversion, Acoustics, Vibration, Aircraft Dynamics, Advanced Engineering Math I,II, Mechanics of Bodies, Prof. Engr. Review, Fortran.

### How Does My Position Contribute to Program Success?

- Develop engineering curriculum
- Develop program level and course level student learning outcomes
- Oversee assessment of the above student outcomes
- Provide guidance to students
- Develop laboratory equipment and experiments
- Conduct outreach activities
- Help with orientation activities
- Help with operation of laboratories
- Publicize the program through hosting the Society for the Advancement of Chicanos and Native Americans in Science (SACNAS) outreach conference every year
- Publicize the program through hosting workshops for the local high schools and middle schools such as Oak Grove High, Overfelt High, Geneses High School, Franklin-McKinley school district and others
- Participate in the school's yearly high school counselor's day to disseminate the program information
- The contact person for the division to provide help to the faculty in setting up the campus course management system for online delivery of course material (currently use Moodle)
- Help in evaluating the new adjunct faculty and provide support as needed
- Organize articulating engineering courses between Evergreen Valley College and Milpitas High, Yerba Buena High, and San Jose Union School District (SJUSD).
- Help with articulation efforts between four-year schools.
  - Acquire donated supplies and equipment from local companies such as Roache and Bio-link and others
  - Ran workshops offered through the NSF grants
  - Reviewed NSF research proposals
  - Currently represent the division at various campus committees including Staff Development committee, SLO committee, Distance Education committee, hiring committees etc.

- Oversee the surveying and geomatics program, acquire equipment, software etc.
- Help within the division at various levels

**2. List major professional development activities completed by faculty and staff in this department/program in the last six years and state proposed development and reasoning by faculty in this program.**

Professional Development in the Past Six Years:

- Attended Engineering Liaison Committee (ELC) conferences of California
- Attend the yearly Hazmat Trainings and hold certificates
- Attend the local meetings of engineering organizations
- Member of Silicon Valley Engineer's Council (SVEC)
- Obtained a "Train the Trainer" professional Certificate in Nanotechnology
- Obtained a certificate in Vodcasting for providing curriculum content to students through Apple's iTune facility
- Participated in the statewide curriculum development conference
- Offered workshops in laboratory safety to the campus faculty
- Participate in Bechtel Engineering Transfer conference
- Participate in the Project Lead the Way (PLTW) regional center conference. This is a joint activity between local high schools, community colleges, and universities
- Participated in the Juno/GPS/GIS/Geo-Spatial Professional Development Day offered through the Bay Area Community College Consortium and hosted by Mission College
- Participated in conferences for developing Student Learning Outcomes for courses and programs
- Attended in online education conferences
- Presented a talk on creating iPhone and other portable media apps in mathematics

- Participate in yearly engineer's week activities and seek scholarships from the Silicon Valley Engineer's Council for the students.
- Presented a talk on Assessing the Assessor at the Young Rhetoricians' Conference, Monterey Bay Resort conference 2013, Monterey, CA.
- Participated in STEM workshop at the Lawrence Livermore laboratory site
- Participated in a workshop on the use of National Instruments system in data acquisition

#### I. Publications

- NCAHE First Level Practicing Engineering Exam, an overview (King Saud University, Saudi Arabia)
- Framework for Assessing Learning Outcomes in Engineering, an overview (King Saud University)
- Properties of Materials Laboratory, theory and practice (textbook)
- Circuit Analysis Laboratory, theory and practice (textbook)
- Principles of GPS for Land Surveying (textbook)
- Tabrizi A., Toyoshima J., Research poster in Bio-Engineering
- Tabrizi A, Beas E., Design and Fabrication of Low-Pass Filter Using 3D-Printer, 2014
- Tabrizi A, Toyoshima, J, *Bone Compression Experiments as a Tool for Introducing Students to Biomechanics* at the Human Anatomy and Physiology Society Annual Conference, Las Vegas 2013.
- Yu, Z., Gee, G., Tabrizi, A., Torres, D., Redd, T., Miller, J. , Crossfield, J. and Mourtos, N. , *Development and Implementation of a 3D Laser Scanning Course for Land Surveying*, 2009 North America Surveying and Mapping Educators Conference, Johnson City, TN, July 8-10, 2009

## II. Conferences and Presentations

- Presented a poster session on Bone Compression Experiments as a Tool for Introducing Students to Biomechanics at the Human Anatomy and Physiology Society Annual Conference, Las Vegas 2013.
- Tabrizi A, Rosas V., et al, Greywater research project poster, NASA Space grant summer 2015.
- Tabrizi A, Guzman J., et al, Aerial Survey research poster, NASA Space grant summer 2015.
- Presented a talk on Assessing the Assessor at the Young Rhetoricians' Conference, Monterey Bay Resort conference 2013, Monterey, CA.

### Proposed Professional Development Activities and Reason for Such Activities:

- Attend engineering conferences to stay current in latest technology and engineering education
- Learn the new course management system (Canvas) to provide supplemental material to the engineering students as well as conduct online classes using this system.
- Attend online education conference to stay current on the online education practices.
- Continue as a member of SLO committee to support EVC in its SLO activities.
- Participate in recruitment and mentoring of adjunct faculty in the program. Engineering courses require extensive laboratory components and new adjunct faculty must be trained in the use the equipment and the facility.
- Continue with learning and implementation of new equipment and modification of the old in the labs.

## **B. Adjunct Faculty**

Dr. Parviz Entekhabi, Hartnell College

### How Does My Position Contribute to Program Success?

- Teach Engineering 18 “Engineering Design and Graphics”. This is one of the core classes in engineering program and required by the AA/AS degrees. This course is also a part of the surveying and geomatics program.
- Assist with the CADD/BIM modification efforts that is under way.
- Assist with Engr. 010 design project

### **C. Staff**

Mr. Antonio Perez: Engineering Laboratory Technician

#### How Does My Position Contribute to Program Success?

- Help in laboratory development
- Help in student laboratory sessions
- Help in laboratory equipment set up and acquisition
- Help in outreach activities
- Help with orientation activities
- Help with operation of laboratories
- Publicize the program through outreach and retention events
- Publicize the program through outdoor bulletin postings
- Participate in the school’s yearly high school counselor’s day to disseminate the program information

#### Professional Development in the Past Six Years:

- Attended at training session for Microchip 32 bit microprocessors
- Attend the yearly Hazmat Trainings and hold certificates

- Developed course of instruction for new Electronics Engineers at Hitachi GST
- Self-study courses on Microprocessors, CAN communication fundamentals.

Proposed Professional Development Activities and reason for Such Activities:

- Gain additional knowledge in the area of GPS, GIS, and 3-D scanning to support the equipment and laboratory
- Hazmat training- to ensure compliance with the district and state regulations
- Attend training in engineering and related technology to help in development of laboratory systems.

**3. Identify current schedule for tenure review, regular faculty evaluation, adjunct faculty evaluation, and classified staff evaluation.**

**A. Current schedule for tenure review**

There is no tenure-tracking faculty in this program.

**B. Regular faculty evaluation**

The department tries to evaluate tenured faculty members in the spirit of *FACBA*. Each term the Dean sends an email to all the tenured faculty members and urges them to have at least one of their classes visited by another faculty member who will collect the student evaluations. The student evaluations are then summarized and kept on file in the dean's office. If the dean detects a problem, a conference will then be convened by the dean with the faculty member. If the dean does not detect any problems, a regular conference with the faculty member and the dean will still take place at least once every three years to go over the student evaluations and to discuss issues and concerns related to the faculty members' teaching.

**C. Adjunct faculty evaluation**

Adjunct faculty have been evaluated according to the procedure as outlined in the *Faculty Association Collective Bargaining Agreement (FACBA)*. An evaluation committee is formed, which usually consists of the Dean of the Division and a peer faculty member. At least one, and usually all, of the committee members observe the performance of the adjunct faculty member. During the observation, student evaluations are conducted and collected by the committee member. The adjunct faculty member



is given a written summary of these evaluations and a post evaluation conference is held with the adjunct faculty and the evaluation committee.

**D. Classified staff evaluation**

Classified staff are periodically evaluated in accordance with the schedule set forth in the CSEA contract, as follows:

**Probationary New-Hire Classified Employees**

Probationary new-hire classified employees are evaluated three times during the first year (twelve months) of employment. The first two evaluations take place after the third and sixth months of employment, and a final evaluation after eleven months, using the full progress report form

**Probationary Promotional Classified Employees**

Classified employees promoted to a higher classification, according to the CSEA contract, serve a probationary period of at least six months. Probationary promotional classified employees are evaluated at the end of the third and fifth months of employment in the new classification.

**Permanent Classified Employees**

After the probationary period, all classified employees are evaluated annually, on the employee's anniversary date of hire.

**4. Describe the departmental orientation process (or mentoring) for new full-time and adjunct faculty and staff (please include student workers such as tutors and aides).**

**A. The Departmental Orientation Process for New Faculty**

No tenure-track new faculty is added to the program in the last six years. However, the procedure for new faculty orientation does exist. In addition to the orientation process given by the school, the department also has a mentor program. For each of the new faculty members, in his/her first semester of service, the Department appoints a tenured faculty member as the mentor for the new faculty member. The mentor serves as a guide and supporting person, assisting the new member in the school environment and answering questions related both to students (such as admission and registration procedures, adding and dropping classes, etc.) and faculty (such as tenure procedure, teaching assignments, and committee work).

**B. The Departmental Orientation Process for Adjunct Faculty**

Most of our adjunct faculty members have been teaching for us for several years. For new adjunct faculty, when he or she is hired to teach a particular class, we provide the latest course outlines containing all the course related information for the class and the syllabus used by our current faculty members, and describe in detail how our classes are conducted, together with student matters such as adding and dropping students, attendance policy, etc. The adjunct faculty is then mentored as needed.

**C. The Departmental Orientation Process for Staff (including student workers such as tutors and aides)**

Only one part-time lab assistant was added to the program. He was oriented by the Dean on school procedures and by faculty members on the facilities, equipment and safety issues related in the engineering and surveying programs.

The department uses a work study student to oversee the engineering computer facility (AB121). Each spring an application for obtaining a work study student is submitted to the school for the following year. In fall of each year a candidate for the position is interviewed by the faculty and upon acceptance he or she is then given orientation. The orientation includes all aspect of operation of the facility. A work schedule is developed and posted at various locations around the department.

## ***PART E: Facilities, Equipment, Materials and Maintenance***

- 1. Identify and discuss the facilities, equipment, equipment maintenance, and materials allocated to the program. Identify and explain additional facility needs and rationale.**

The program utilizes a lot of specialized equipment/instruments and software. Fortunately, in the recent years we have been able to acquire some equipment via NSF grants and school budget. Some VETA money was also made available through the surveying program due to duplicity of some of the courses within these programs.

The program has two small storage rooms for the equipment/instruments and use the following facilities:

- Computer lab - AB-121 which has 30 desktop computers.
- Two small storage rooms – AB-132
- One equipment room – across A5-102
- Prototype shop – AB121b
- Circuit analysis laboratory- A5-102
- Properties of materials laboratory – AB-131
- Engineering classroom – AB-134 (also used by other disciplines)

There are many equipment and devices that are used in engineering laboratories. Table 2 and 3 provides a list of these resources.

**Table 2. Engineering Equipment Inventory**

Model	Equipment
MT	ADMET MTEST Instrument Interface
MTQ	ADMET MTSEST QUATTRO Instrument Interface
MX6R	AMSCOPE Metallurgical Microscope
IPAD2	Apple Computer Products
Arduino Uno	Arduino.CC Microcontroller
1021	Baldor Grinder
20-1360-115	Buehler Mounting Press
FDK10	Buehler Wet Belt Sander
1015	Buehler Wet Cutoff Saw
C31	Cahn Microbalance
Magician	DAGU Robot Chassis
#1 1/2	Dake Arbor Press
Optiflex 990	Dell Computer
#12	DiAcro Turret Punch
Model	Equipment
E66MAG	EVC Engineering Magnetics Experiment
SOLAR-10	EVC Engineering Solar Experiment
VSS40H	Fatigue Dynamics Flex Tester
FM206-DSA	HAKKO Soldering Rework Station Triple Port
FX88d	HAKKO Soldering Station
M300	Harrison Lathe
DJ500	HP Designjet 500 C Sheet Printer
PS800	HP Designjet 800 Postscript C Sheet Printer
1055cm	HP Designjet D Sheet Printer

T610	HP Designjet T610 E Sheet Printer
2050	Kip Image Scanner
FTV1	Lagun Milling Machine
FG7002c	LG Precision Function Generator
Makerbot 2x	Makerbot Dual Head Thermal Extruder 3d Printer
M9803R	Mastech Bench MultiMeter
HY3002d-3	Mastech Triple output Power Supply
IM7500	Meiji Metallurgical Microscope
Digiprep	Metkon Grinder Polisher
Metapress-A	Metkon Mounting Press
Ecopress 200	Metkon Mounting Press Dual Head
MPS20	Miller Spot Welder
35s	Miller MIG Welder Millermatic
OPTIPHOT	Nikon Microscope
Scout Pro	Oahus
200t	Pace Technology Grinder Polisher
XPLOER GLX	Pasco Data Acquisition Device
PX24a	Pexto Box Brake
X-Stream	Pitsco Windtunnel
CS20	Power Matic Coping Saw
3003b	PROTEK Power Supply
DG4102	RIGOL Digital Function Generator
Number 20	Rockwell Delta Contour Saw
17-600	Rockwell Delta Drill Press
ARM 10	Roland High Resolution Resin 3d Printer
Redboard- Arduino	SparkFun Microcontroller
SM1006	TecQuipment Creep Tester
SM1090	TecQuipment Rotary Fatigue Tester

TEK2012b	Tektronix Digital Oscilloscope
FA1735	Thermodyne Electric Furnace
Change O Matic	Tinius Olsen High Force Impact Tester
Model 92T	Tinius Olsen Low Force Impact Tester
Model Selectotwist	Tinius Olsen Torsion Tester
Model 6	Tinius Olsen Universal Tester
V.5	Vex Robotics
524	Wilson Hardness Tester
574	Wilson Rockwell Hardness Tester

**Table 3. Engineering Pasco Sensors Inventory**

Model	Sensor
PS-2119	<a href="#">Acceleration Sensor (3-axis) ( PS-2119 )</a>
<a href="#">PS-2175</a>	<a href="#">GPS Position Sensor ( PS-2175 )</a>
ME-6838a	<a href="#">Photogate and Pulley System ( ME-6838A )</a>
<a href="#">PS-2112</a>	<a href="#">Magnetic Field Sensor ( PS-2112 )</a>
<a href="#">PS-2115</a>	<a href="#">Voltage-Current Sensor ( PS-2115 )</a>
PS-2168	<a href="#">General Science Sensor ( PS-2168 )</a>
PS-2162	<a href="#">2-Axis Magnetic Field Sensor ( PS-2162 )</a>
PS-2184	<a href="#">Current Probe</a>
PS-2104	<a href="#">Force Sensor ( PS-2104 )</a>
PS-2189	<a href="#">High Resolution Force Sensor (PS2189)</a>
PS-2175	<a href="#">GPS Position Sensor ( PS-2175 )</a>
PS-2205	<a href="#">Dual Load Cell Amplifier ( PS-2205 )</a>
PS-2198	<a href="#">Load Cell Amplifier ( PS-2198 )</a>
PS-2200	<a href="#">100 N Load Cell ( PS-2200 )</a>
PS-2201	<a href="#">5 N Load Cell ( PS-2201 )</a>
ME-9498a	<a href="#">Photogate Head ( ME-9498A )</a>
PS-2103a	<a href="#">Motion Sensor ( PS-2103A )</a>
PS-2120	<a href="#">Rotary Motion Sensor ( PS-2120 )</a>
PS-2175	<a href="#">GPS Position Sensor ( PS-2175 )</a>
PS-2204	<a href="#">Displacement Sensor ( PS-2204 )</a>
ME-6838a	<a href="#">Photogate and Pulley System ( ME-6838A )</a>
PS-2107	<a href="#">Absolute Pressure Sensor ( PS-2107 )</a>

PS-2125	<a href="#">Temperature Sensor ( PS-2125 )</a>
PS-2134	<a href="#">Temperature Type K Sensor ( PS-2134 )</a>
PS-2131	<a href="#">Skin/Surface Temperature Probe ( PS-2131 )</a>
ME-6810	<a href="#">Time-of-Flight Accessory ( ME-6810 )</a>
ME-9498a	<a href="#">Photogate Head ( ME-9498A )</a>
CI-6537	<a href="#">Force Sensor ( CI-6537 )</a>
CI-6746	<a href="#">Economy Force Sensor ( CI-6746 )</a>
CI-6558	<a href="#">Acceleration Sensor ( CI-6558 )</a>
CI-6538	<a href="#">Rotary Motion Sensor ( CI-6538 )</a>
ME-9498a	<a href="#">Photogate Head ( ME-9498A )</a>
CI-6742a	<a href="#">Motion Sensor II ( CI-6742A )</a>
ME6838a	<a href="#">Photogate and Pulley System ( ME-6838A )</a>
PS-2158	<a href="#">Analog Adapter ( PS-2158 )</a>
PS-2159	<a href="#">Digital Adapter ( PS-2159 )</a>
ME8976	Small A Base
ME8735	Large A Base
ME9472	Table Clamp
ME8736	Short Pole
ME8741	Long Pole
ME8978	Flex Rod
ME8743	Swivel Clamp
ME9507	Multi Clamp
ME8744	Multi Swivel
ME9433	Combo Pulley
SE7347	No Bounce Pad
ME8986	Rubber Cord
SE9409	Elastic Cord



SE8759	Hooked Mass
EM8652	Zero Gauss Chmb
ME8987	Flex Arm I Beam
SE8827	Meter Stock 6pk
PS2189	Hi Res Force Snsr
PS2107	Ab Pressure Snsr
PS2500	Snsr Extension Cable
ME9825a	Matter Model

**2. Describe the use and currency of technology used to enhance the department/program. Identify projected needs and rationale.**

The equipment and devices listed in Table 2 and 3 are used to support the engineering laboratory experiments. These are integral party of the courses offered in the engineering curriculum. Over the years a concerted effort has been put into modification, retrofit, and acquisition of equipment. There is a continued need to replace and add new equipment and devices to provide a comparable experience to the engineering students. This is particularly important to maintain the existing articulation with the UCs and CSU systems.

Many of the large equipment that are being used in engineering have been brought from the San Jose City College when Evergreen Valley College was established. As was mentioned earlier, the engineering department was moved from the City College to EVC at that time. These one of a kind large equipment have been used ever since and along the way they have been repaired and retrofitted. There are only one copy of these equipment thus making it difficult to run tests by all the students in a timely manner. It is being proposed that the department is given monetary resources to acquire newer units for the following

- Tensile machine – to run tensile, compression, and flexural experiments on metal and plastics
- Torsion machine – to run torsion experiments on metals and plastics
- Cutoff wheel – to prepare specimens for metallographic testing
- Heat treatment furnace – to conduct heat treating of metals for evaluation of various properties
- X-ray machine – for determination of crystallographic planes
- CNC machine – for creating CADD driven models and prototyping
- PC-based data acquisition devices with oscilloscope and function generator capability for circuit analysis lab
- Digital oscilloscopes – to increase number of existing units from 10 to 25 for the circuit analysis laboratory
- Digital function generators - to increase number of existing units from 10 to 25 for the circuit analysis laboratory
- Digital multimeters – to provide for the ENGR. 10 and Engr. 71 laboratory experiments
- Laser printers with scanning capabilities
- NI data acquisition units – to modernize data acquisition
- New and powerful computers in the computer lab to handle all the design software in engineering. The current computers are way under power.
- Data projector in each lab room with WIFI capability to present information to the students while conducting experiments.
- Mobile computer such as tablet or laptop with necessary power and capacity to be able to run engineering applications and move from lecture to labs as needed.
- Large multi-touch monitors for the labs
- Smart board for the lab and lecture rooms

**3. If applicable, describe the support the program receives from industry. If the support is not adequate, what is necessary to improve that support?**

The engineering program does not receive any support from industry. However, some equipment have been donated in the past.

## ***PART F: Future Needs***

### **1. Current Budget**

#### **A. Budget allocated for the department/program through the division budget (fund 10). Discussion of its adequacy and needs if applicable along with rationale.**

Over the few years the department supply budget was \$2500.00 per year which was through fund 17 from the lottery funds. The department is in need of additional equipment funds due to the extensive need for equipment, devices, and supplies. Earlier it was pointed out that the engineering curriculum entirely laboratory based training and that in order to maintain articulation with the transfer schools the instruction must parallel those of the transfer institutions. This necessitates funding to supplement and improve the laboratories. The program used to have \$2500 from fund 10 in the equipment account but it no longer have access to this fund. The lottery fund from fund 17 which is only for supply purchases has replaced it. Hopefully in the future additional fund 10, 17 and VTEA funds may become available.

#### **B. External (fund 17) funding the department/program receives and describe its primary use.**

Departments supply budget is from fund 17 through the lottery account.

#### **C. Grant or other external funding available**

Currently there are no grant funds are available.

2. Explain any grants or other external funding sources for which your program would be a good candidate. Do you have plans to apply for such sources?

NSF is a primary funding source available. In the past the department has had two NSF grants. A few years ago a proposal was written to the NSF in connection with establishing a new biomedical program. Unfortunately the effort was unsuccessful Schools needs to have a grant write to help in this effort.

3. **Please describe any unmet needs for your program and how you plan to address them. Are any additional resources needed to accomplish your program's CTAs?**

The proposed list provided in section 2 of PART E is what the department needs in order to maintain currency and provide adequate access to the students. Access is a major part of the department and school's CTAs. The rationale for this need has already been provided but partially is copied below.

Many of the large equipment that are being used in engineering have been moved from the San Jose City College when Evergreen Valley College was established in 1975. As was mentioned earlier, the engineering department was moved from the City College to EVC at that time. These one of a kind large equipment have been used ever since and along the way they have been repaired and retrofitted. There are only one copy of these equipment thus making it difficult to run tests in a timely manner. Students have to take turn to use these systems. The learning outcomes of the program will be accomplished with acquisition of additional equipment and upgrading the old. This applies to the computer facility as well due to the demand for high power and fast computers. Please refer to the section 2 of part E for equipment need.

4. **What faculty positions will be needed in the next six years in order to maintain or build the department? Please explain.**

The engineering program has been operating with one full time faculty for the last six years. The current full time faculty is already teaching 140% load every semester in addition to developing and running the labs as well as the program. Even though the program also has some adjunct faculty, there is a need to have an additional full time faculty to share the load and program development. The program can only grow so much with only one person in charge!

In addition to the faculty position the program also need a staff position. The Engineering and Surveying and Geomatics program shares a half-time technician. This will not be adequate as the program grows; especially considering the heavy maintenance requirements of the equipment used in the labs. A full-time technician is recommended for Engineering, Surveying and CADD.

#### **5. Facilities that will be needed in the next six years in order to maintain or build the department.**

The engineering facilities should be upgraded in the following manner:

- Provide adequate power outlets in AB-121, AB-131, A5-102 since most equipment are electrically operated.
- Provide adequate WIFI access – the current access is very slow and sometimes non-existing.
- Install secure doors to the equipment room (across A5-102) replacing old mesh screen. This will provide security to the equipment as well keeping the equipment clean and dry.
- The counter in the circuit's lab needs to be removed in order to add some tables to set up experiment stations.
- Remodel the properties of materials' lab to remove the partitions and open up the space for better space utilization. Currently the materials class, 25 to 30 students, meets in a room of 15x20 feet with many equipment already taking up most of the room. This creates hazardous condition and it does not provide a proper learning environment.
- The engineering labs require supplies to operate. The current funding is not adequate, for example in the materials lab each students gets a specimen for each experiment that costs \$10-15 dollars. There are many experiments during the semester and many students. This depletes the available funds quickly. Sometimes a single specimen is given to a group of students in an attempt to minimize the cost. This, of course, impacts individual learning and experiences. Fund 10 budget for supplies and small equipment is needed.
- Computers capable of high speed processing for the labs (AB-121, AB-131), faculty, and staff. Current computers slow for the amount of computation that are being done in engineering courses.
- The list of needed equipment is given in PART E section 2.
- Room Ab-142 should be designated as Circuit Analysis laboratory since the current room is too small to hold the required number of students and equipment. There is a concern to safety and health for the students in the current room (A5-102).

- Some of the newly vacated automotive facility should be given to the engineering in order to provide adequate space to the Engr. 10 laboratory activities. Currently the lab activities for this course are done in three separate rooms that makes the supervision of the students during experimentation very difficult. There is also a concern on the safety of the students.

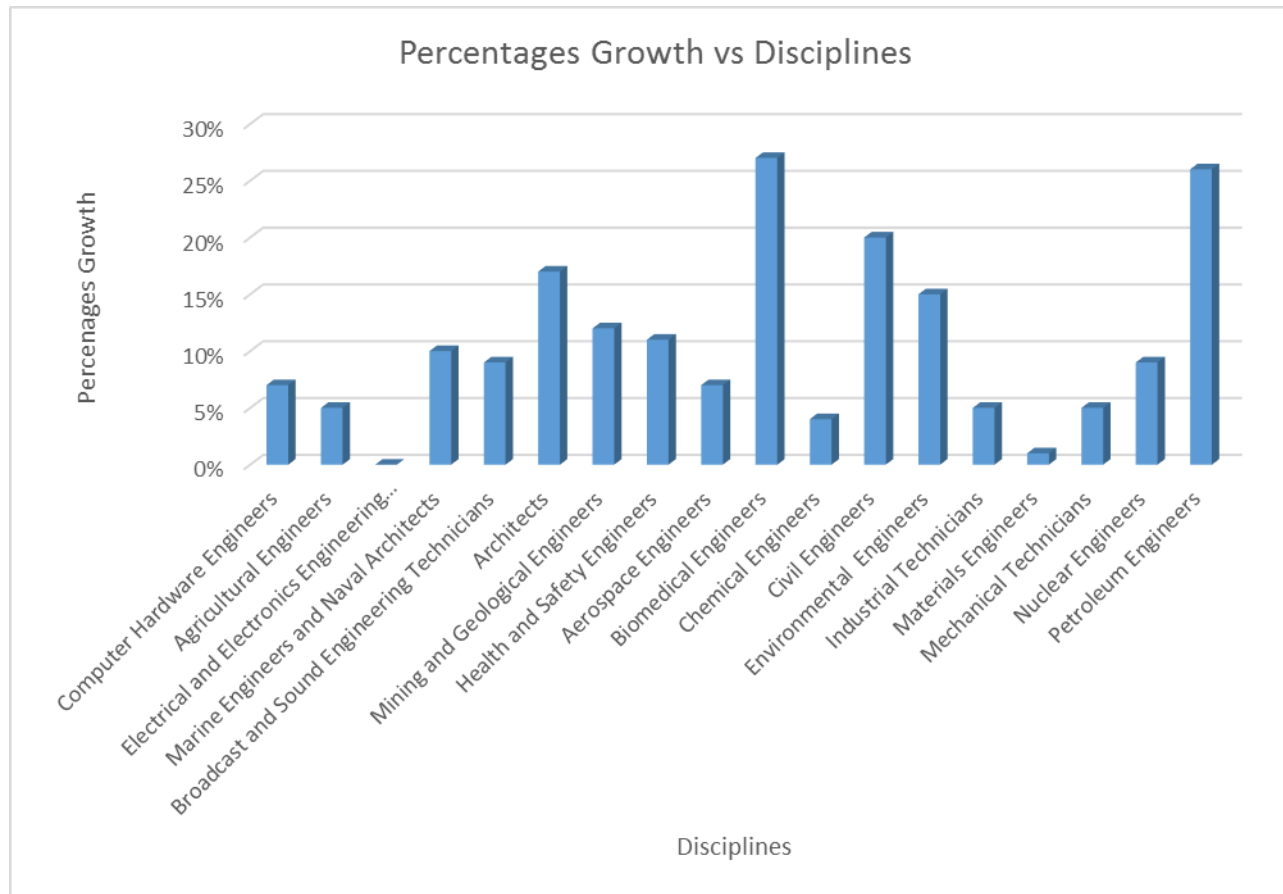
### ***PART G: Additional Information***

This section provides additional information about the occupational outlook of engineering graduates. The employment data for most engineering disciplines is shown in Table 4 below. These are entry level salaries and quickly go up.

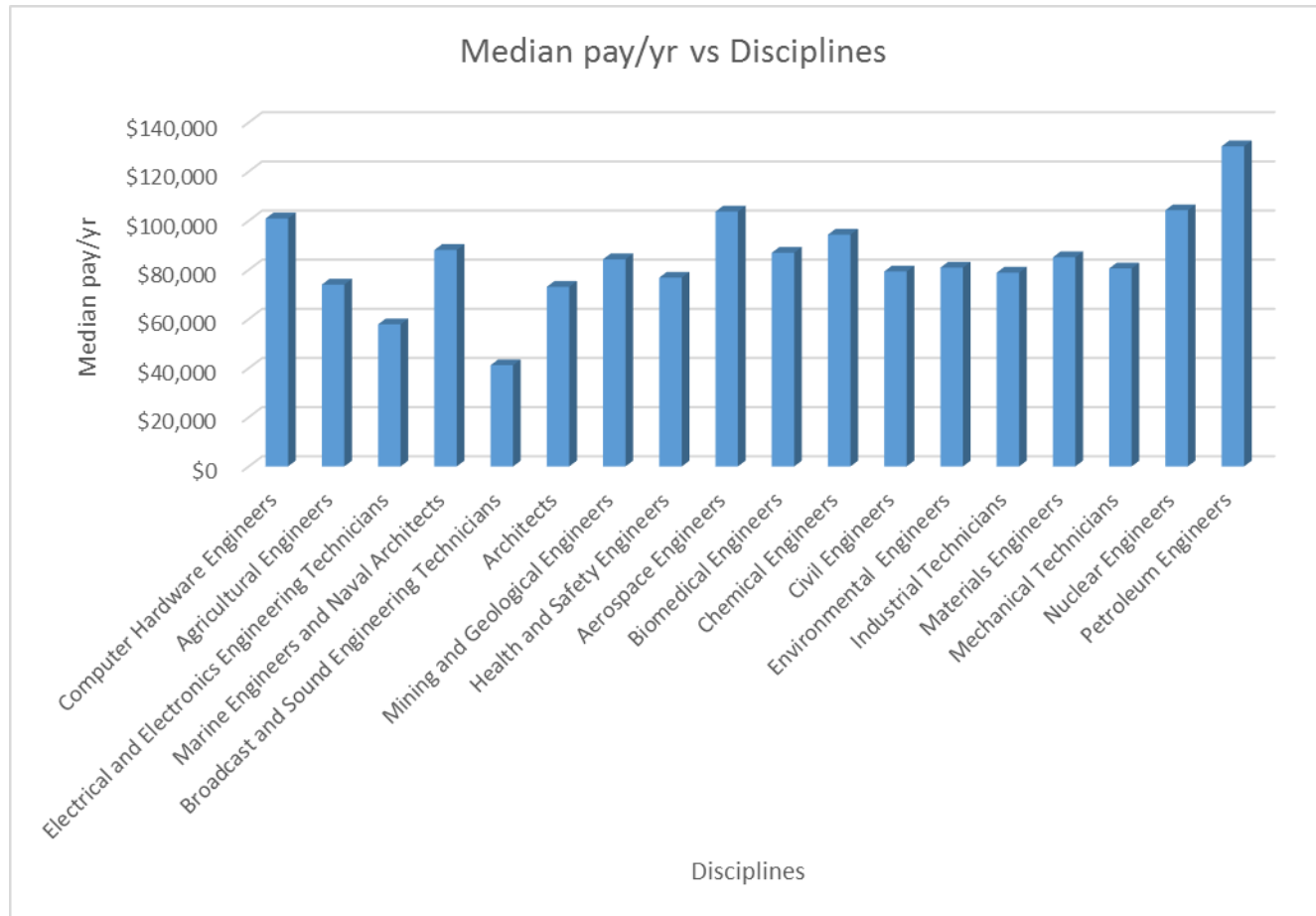
<b>Jobs Market for Engineers</b>				
<b>DISCIPLINES</b>	<b>2012 MEDIAN PAY/YR</b>	<b>2012 MEDIAN PAY /HR</b>	<b>NUMBER OF JOBS 2012</b>	<b>% Growth 2012-2022</b>
Computer Hardware Engineers	\$100,920	\$48.52	83,300	7%
Agricultural Engineers	\$74,000	\$35.58	2,600	5%
Electrical and Electronics Engineering Technicians	\$57,850	\$27.81	146,500	0%
Marine Engineers and Naval Architects	\$88,100	\$42.36	7,300	10%
Broadcast and Sound Engineering Technicians	\$41,200	\$19.81	121,400	9%
Architects	\$73,090	\$35.14	107,400	17%
Mining and Geological Engineers	\$84,320	\$35.14	7,900	12%
Health and Safety Engineers	\$76,830	\$36.94	24,100	11%
Aerospace Engineers	\$103,720	\$49.87	83,000	7%
Biomedical Engineers	\$86,960	\$41.81	19,400	27%
Chemical Engineers	\$94,350	\$45.36	33,300	4%
Civil Engineers	\$79,340	\$38.14	272,900	20%

Environmental Engineers	\$80,890	\$38.89	53,200	15%
Industrial Technicians	\$78,860	\$37.92	223,300	5%
Materials Engineers	\$85,150	\$42.36	23,200	1%
Mechanical Technicians	\$80,580	\$38.74	258,100	5%
Nuclear Engineers	\$104,270	\$50.13	20,400	9%
Petroleum Engineers	\$130,280	\$62.64	38,500	26%

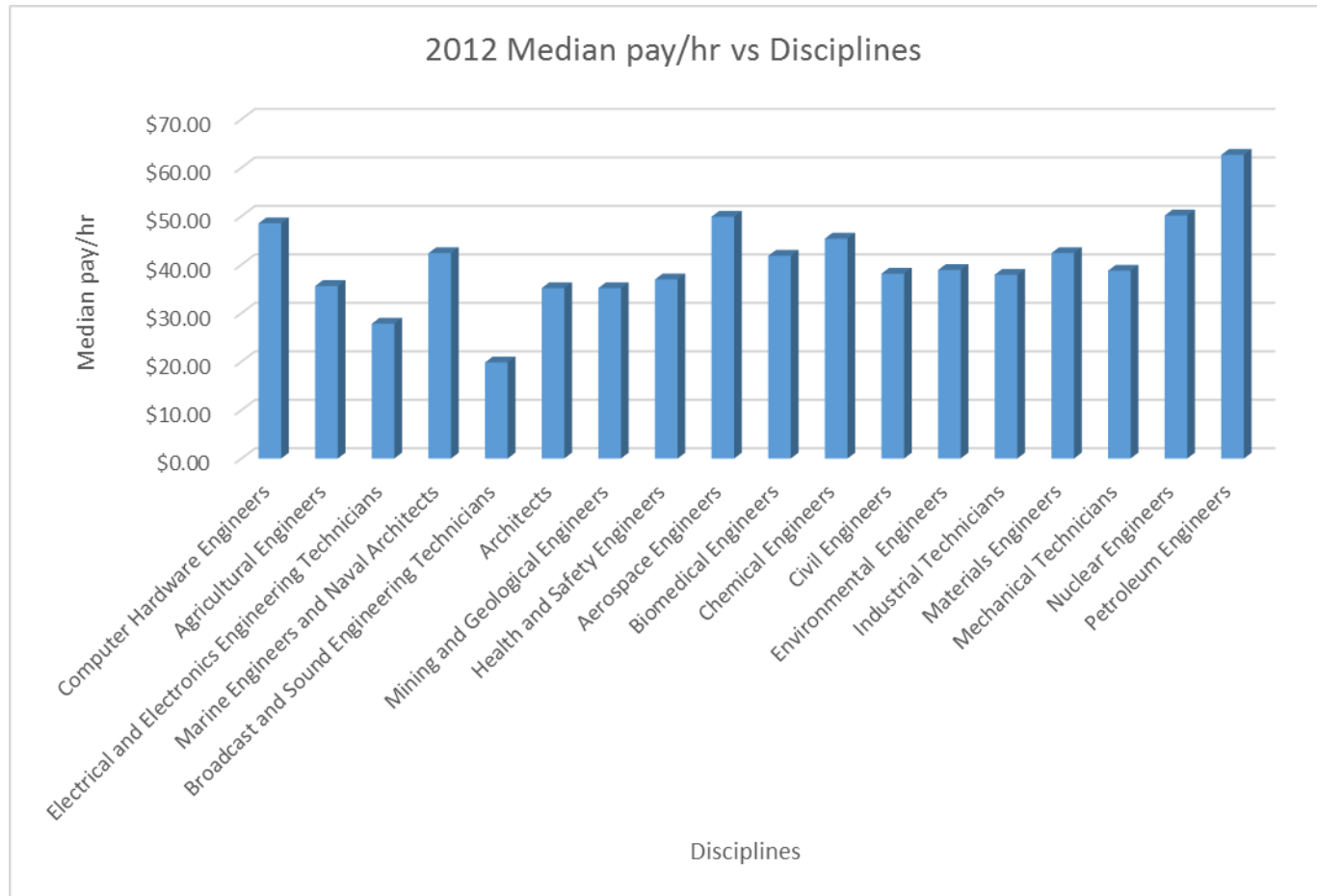




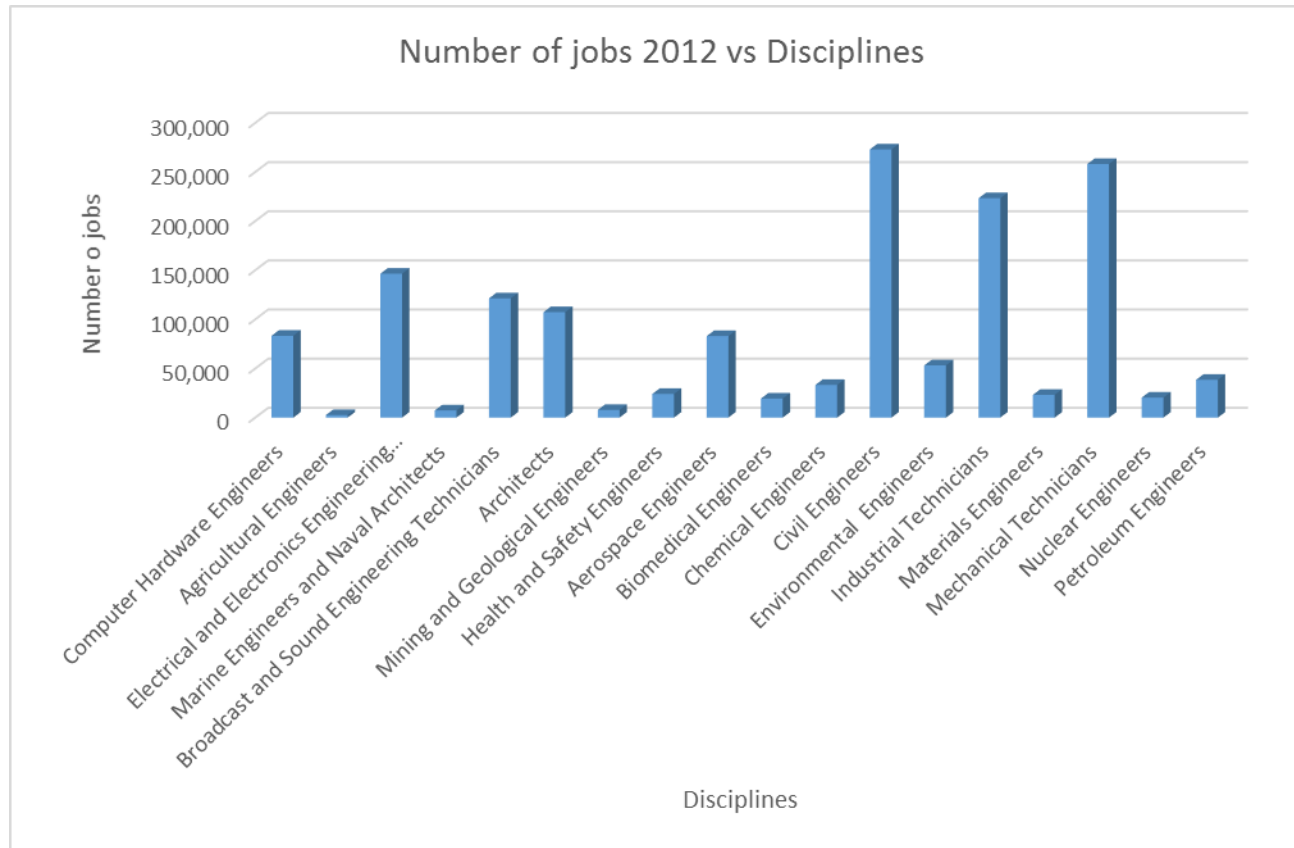
**Figure 30 Expected job growth in engineering over 2012-2022**



**Figure 31 Median salaries in engineering disciplines**



**Figure 32 Media pay per hour in engineering disciplines**



**Figure 33 Current number of jobs in engineering disciplines**

***PART H: Annual Assessment: Program Faculty and PR committee***

No program review data available.

### ***PART I: Resource Allocation Table***

Program Reviews provide a valuable source of information for the College as it makes decisions on resource allocation, both in terms of funding and cuts. The following information, in table format, will be used by the College Budget Committee to help inform EVC's Budget and Planning Process.

Item Title	Response
Productivity (WSCH/FTEF)	431 (over the last academic year)
Student Success Rate (Retention Rate)	75.74% (over the last academic year)
Number of class sections offered by your program	6 per semester.
Changes in enrollment	+25% (over the last academic year)
Your Program's Current Budget (from Fund 10)	none
Current External Funding (from Fund 17)	\$15,000 (Most recent Fiscal Year)
Future Needs: Faculty (Estimated Additional Cost)	\$130K Annual cost (enrollment growth is expected. Also need to replace the faculty who left the college)
Future Needs: Staff (Estimated Additional Cost)	\$40,000.00 Annual cost (for lab assistant)
Future Needs: Facilities (Estimated Additional Cost)	\$250K which includes onetime cost large items as well as smaller devices. Most of this money is used to replace 50 year old machines in the lab.
Future Needs: Supplies (Estimated Additional Cost)	\$10K to accommodate in house fabrication of laboratory systems

*\* Do your program's future needs assume that your program's enrollment will remain stable or do they depend upon enrollment growth? If they depend on growth, please explain the growth projections on which you are basing your assumptions. You may attach any supporting documentation to explain or support assumptions.*

# Appendix A

## Articulation Agreement Engr. 010

EVC & Milpitas High School

2015-2016



## **ARTICULATION AGREEMENT**

This **Articulation Agreement** is in effect between **Evergreen Valley College (EVC)** and Milpitas High School (MHS). It affirms the commitment that each has with respect to program articulation.

EVC and MHS staff, representing their respective educational programs, have met, analyzed, and compared the content and exit competencies of their course of instruction. They have agreed that the **Introduction to Engineering, Engineering Exploration and Green Urban Design (Engineering Focus)** classes articulates with Evergreen Valley College's Engr. 10 "Engineering Tools & Processes".

The attached Articulation Agreement shall be placed into effect on this date. **This agreement will remain in effect for one school year, ending in 2016.** Appropriate instructional and administrative staff must meet to review and update this agreement.

**The Ultimate Goal Of This Articulation Agreement Is To Help The Student To Succeed In Their Chosen Program Of Study/Career Pathway:**

### ***Benefits to the Students:***

- Provides incentives for students to continue their education.
- Allows students to receive college credit and/or advanced placement through effort and achievement at the secondary schools, reducing duplication of effort and time, thus lowering costs.

### ***Benefits to Secondary Schools/Evergreen Valley College:***

- Supports matriculation by preparing students for an identified Program of Study/Career Pathways
- Goal oriented, better prepared students increases retention.

### ***Benefit to the community and Industry:***

- Tech Prep program allows industry and community opportunities for direct input into the curriculum
- Tech Prep consortia improves communication with other educational entities and prospective employers
- Provides employees with relevant competencies for career applications



**ARTICULATION AGREEMENT**  
**Evergreen Valley College**  
**School Year: 2015**

College	EVC	High School District/ROP	Milpitas High School
Course Name/Number	Engineering Tools & Processes	Course Name/Number	3 Courses -Introduction to Engineering/ Engineering Exploration/ Engineering Focus-Green Urban Design
Program	Engineering	Program	Engineering Academy
Units	3 credits: Lecture = 2 hour(s); Lab = 3 hour(s)	Hours	5 per semester (10 Credits per year)
Textbooks/Software/Equipment	Thinking like an Engineer & Studying Engineering	Textbooks/Software/Equipment	Engineering Fundamentals (copyright 2014 for grade levels 9-12)  Energy, Power, and Transportation Technology(copyright 2012 for grade levels 9-12)  Software: Autocad 2014, Autocad Architecture 2014 ,Google Docs and Drive/ Dimension Elite 3D Printer/UPrint Plus 3D printer

<p>This course introduces students to the engineering profession and the devices, processes, and techniques utilized in solving engineering problems. Computers and associated components, hardware and software, are introduced. The use of spreadsheets and</p>	<p>This course utilizes the Engineering design process to develop the core skills necessary for an engineering career. Integration of current technology continually infused into course. The different branches of engineering and the nature of engineering work are explored.</p>
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<p>mathematical software in engineering problem solving and data presentation is discussed. Engineering report writing and technical presentations are practiced in the class. Students also learn the engineering process through a term project.</p>	<p>Documentation of the engineering process is executed with the Engineering Design Brief template which includes research, design, construction of prototype, testing and project summary. Electronic engineering portfolios to compile work.</p> <p>Project Management, leadership roles, teamwork and accountability are integrated into all projects to meet 21st century engineering skills.</p> <p>Professional mentors are provided to provide students real world knowledge on industry requirements. Visits and tours to local technology companies included.</p>
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## ARTICULATION AGREEMENT

## COURSE COMPARISON PAGE

1. EVERYDAY ENGINEERING	1.Engineering Fields Research Project (research of all engineering fields)
1.1 CHOOSING A CAREER	
1.2 CHOOSING ENGINEERING AS A CAREER	
1.3 CHOOSING A SPECIFIC ENGINEERING FIELD	2. Engineering Career Field Project (budgeting and life planning for future with Engineering Career)
1.4 GATHERING INFORMATION	
1.5 PURSUING STUDENT OPPORTUNITIES	
2. ETHICS	3.Engineering Ethics and Failures research and discussion
2.1 ETHICAL DECISION-MAKING	
2.2 ENGINEERING CREED	4.Engineering Design Brief Introduction for Industry (Basics of Engineering Concepts)
3. DESIGN AND TEAMWORK	
3.1 THE DESIGN PROCESS 43	
3.2 BRAINSTORMING IN THE DESIGN PROCESS	5.Team Building skills for collaboration (Exercise to help students understand how individuals get to be different and learning to accept those differences as a positive asset.)
3.3 EXPERIMENTAL DESIGN: PERIOD ANALYSIS	
3.4 PROJECT TIMELINE	
3.5 CRITERIA AND EVALUATION	
3.6 WORKING IN TEAMS	6.Personal Academic Goal Setting
4. ENGINEERING COMMUNICATION	
4.1 BASIC PRESENTATION SKILLS	
4.2 SAMPLE PRESENTATIONS	7.Google Docs/Tools Basics (document sharing, word process, spreadsheets, graphic editing engineering)
4.3 BASIC TECHNICAL WRITING SKILLS	
4.4 COMMON TECHNICAL COMMUNICATION FORMATS	8.Integration of Math (Units, Scale, Reading standard ruler and precision instruments accurately. Application of precision measurements)
5. ESTIMATION	
5.1 GENERAL HINTS FOR ESTIMATION	
5.2 SIGNIFICANT FIGURES	
5.3 REASONABLENESS	9.Autodesk (Autocad 2014) 2d Modeling and 3d Modeling for Engineering with drafting basics for scale, dimension and plots /view ports
5.4 NOTATION	
6. SOLVEM	
6.1 DEFINING SOLVEM	
6.2 REPRESENTING FINAL RESULTS	
6.3 AVOIDING COMMON MISTAKES	10. Engineering Portfolio (A digital collection of student's best engineering technical projects in digital format using Google Education Tools )
7. GRAPHING GUIDELINES	
7.1 GRAPHING TERMINOLOGY	11.Engineering Project Management
7.2 PROPER PLOTS	
7.3 GRAPH INTERPRETATION	
7.4 MEANING OF THE LINE SHAPES	
7.5 GRAPHICAL SOLUTIONS	12. Engineering Prototype Design and Build with testing
8. INTERPOLATION	
8.1 SINGLE INTERPOLATION	13. Green Energy Technology for Engineering (research, reflection and application of Green Technologies in Industry)
8.2 COMPLEX INTERPOLATION	
9. STATISTICS	
9.1 HISTOGRAMS	
9.2 STATISTICAL BEHAVIOR	14.Green Urban Design for Engineering (research, reflection and application of Green Urban Design in Industry)
9.3 DISTRIBUTIONS	
9.4 CUMULATIVE DISTRIBUTION FUNCTIONS	
9.5 STATISTICAL PROCESS CONTROL (SPC)	
10. FUNDAMENTAL DIMENSIONS AND BASE UNITS	15.Industry Mentoring Program (Students are matched with an industry professional in the engineering field that serves as a mentor on the requirements and skill required for an engineering career)
10.1 THE METRIC SYSTEM	
10.2 OTHER UNIT SYSTEMS	
10.3 CONVERSION PROCEDURE FOR UNITS	
10.4 CONVERSIONS INVOLVING MULTIPLE STEPS	

10.5 CONVERSIONS INVOLVING "NEW" UNITS  
 10.6 DERIVED DIMENSIONS AND UNITS  
 10.7 EQUATION LAWS  
 10.8 CONVERSION INVOLVING EQUATIONS  
 11. UNIVERSAL UNITS  
 11.1 FORCE  
 11.2 WEIGHT  
 11.3 DENSITY  
 11.4 AMOUNT  
 11.5 TEMPERATURE  
 11.6 PRESSURE  
 11.7 GAS PRESSURE  
 11.8 ENERGY  
 11.9 POWER  
 11.10 EFFICIENCY  
  
 12. DIMENSIONLESS NUMBERS  
 12.1 COMMON DIMENSIONLESS NUMBERS  
 12.2 DIMENSIONAL ANALYSIS  
 12.3 RAYLEIGH'S METHOD  
  
 13. EXCEL WORKBOOKS  
 13.1 CELL REFERENCES  
 13.2 FUNCTIONS IN EXCEL  
 13.3 LOGIC AND CONDITIONALS  
 13.4 LOOKUP AND DATA VALIDATION  
 13.5 CONDITIONAL FORMATTING  
 13.6 SORTING AND FILTERS  
  
 14. EXCEL GRAPHS  
 14.1 AVAILABLE GRAPH TYPES  
 14.2 STATISTICS IN EXCEL  
 14.3 AUTOMATED CALCULATIONS  
  
 15. MODELS AND SYSTEMS  
 15.1 LINEAR FUNCTIONS  
 15.2 LINEAR RELATIONSHIPS  
 15.3 POWER FUNCTIONS  
 15.4 EXPONENTIAL FUNCTIONS  
  
 16. MATHEMATICAL MODELS  
 16.1 SELECTING A TRENDLINE TYPE  
 16.2 INTERPRETING LOGARITHMIC GRAPHS  
 16.3 CONVERTING SCALES TO LOG IN EXCEL  
 16.4 DEALING WITH LIMITATIONS OF EXCEL  
  
 17. ALGORITHMS, PROGRAMS,  
 AND FUNCTIONS  
 17.1 SCOPE  
 17.2 WRITTEN ALGORITHMS  
 17.3 GRAPHICAL ALGORITHMS  
 17.4 PROGRAMS IN MATLAB  
 17.5 DEBUGGING MATLAB CODE  
 17.6 FUNCTIONS IN MATLAB  
  
 18. INPUT/OUTPUT IN MATLAB  
 18.1 INPUT  
 18.2 OUTPUT  
 18.3 PLOTTING  
 18.4 STATISTICS  
  
 19. LOGIC & CONDITIONALS

16. Computer Science Principles using SNAP!  
 (loops, abstraction, custom scripts, variables, if then/else  
 loops)  
  
 Design Projects  
 Lego Block  
 Nasa Crane  
 Catapult  
 Marble Maze  
 Robotic Unit (new for 2015-2016)  
 Solar Oven  
 Solar Car  
 Windmill  
 Simple Machine  
 Computer Programming SNAP!  
 Hovercraft  
 Green Urban Design City Model

19.1 TRUTH TABLES  
19.2 BINARY NUMBERS  
19.3 LOGIC AND RELATIONAL OPERATORS IN MATLAB  
19.4 CONDITIONAL STATEMENTS IN MATLAB

20. LOOPING STRUCTURES  
20.1 for LOOPS

21. Design Projects  
21.1 Race car energy, velocity, drag force analysis using a race track and wind tunnel testing  
21.2 Solar cell and energy characterization  
21.3 Wind turbine design, 3D prints, and wind tunnel testing  
21.4 Mechatronics

<ol style="list-style-type: none"> <li>1. Describe the engineering profession</li> <li>2. Perform engineering data analyses with Matlab and Excel</li> <li>3. Solve non-linear engineering problems with Matlab and Excel</li> <li>4. Perform numerical integration and differentiation with Matlab</li> <li>5. Create a model of a simple device or product</li> </ol>	<ol style="list-style-type: none"> <li>1.Explain the differences between the various branches of engineering</li> <li>2. Examine the engineering profession and understand how to work effectively in an engineering environment to help with career evaluation and selection</li> <li>3.Adapt to new ideas and changing technologies. Are familiar with the strengths and limitations of various technological tools and mediums and can select and use those best suited to their communication goals.</li> <li>4.Effectively use the engineering design process to produce a creative design that satisfies the customer's requirements. Successfully apply problem solving skills applicable to engineering problems</li> <li>5.Effectively present technical solutions by means of presentations and written reports</li> <li>6.Work effectively in teams by engaging in group assignments and projects consisting of students with diverse backgrounds</li> <li>7.Design, construct, test, troubleshoot and execute various project prototype requirements.</li> <li>8.Research and Identity what curriculum is necessary in order to graduate from high school, junior college and university with an engineering emphasis</li> <li>9.Understand, reflect and discuss the importance of ethics and failures in engineering and how it applies to industry</li> </ol>
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## ARTICULATION AGREEMENT

## MEASUREMENT PAGE

Midterm Exams	Final Exams
Final Exam	Engineering Design Briefs
Projects (5 designs)	Project Prototypes
Laboratory activities	Senior Year Exit Interview and Portfolio
Homework	

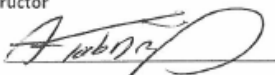

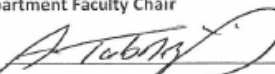
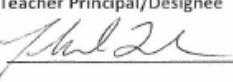

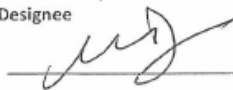
Credit for the course listed will be granted if the following criteria are met:

- ☐ Stipulated grade of B or better
- ☐ Certification of specific competencies
- ☐ Other



## ARTICULATION AGREEMENT

## SIGNATURE PAGE

<b>College instructor</b>	<b>High School Teacher</b>
Signature: <u></u>	Signature: <u></u>
Type name: <u>Abdie Tabrizi</u>	Type name: <u>Scott Keller/Robert Smith</u>
Date: <u>4/20/2015</u>	Date: <u>3/17/2015</u>
Phone: <u>408-274-7900 x 6855</u>	Phone: <u>408-635-2800 ext 4097 and 4052</u>
Email: <u>abdie.tabrizi@evc.edu</u>	Email: <u>skeller@musd.org bsmith@musd.org</u>
<b>College Department Faculty Chair</b>	<b>High School Teacher Principal/Designee</b>
Signature: <u></u>	Signature: <u></u>
Type name: <u>Abdie Tabrizi</u>	Type name: <u>Cheryl Lawton</u>
Date: <u>4/20/2015</u>	Date: <u>3/19/15</u>
Phone: <u>408-274-7900 x 6855</u>	Phone: <u>408-635-2851</u>
Email: <u>abdie.tabrizi@evc.edu</u>	Email: <u>clawton@musd.org</u>
<b>College Instructional Dean/Designee</b>	<b>High School Assistant Superintendent of Instruction/Designee</b>
Signature: <u></u>	Signature: <u></u>
Type name: <u>Michael Highers</u>	Type name: <u>Matthew Duffy</u>
Date: <u>4/20/15</u>	Date: <u>3/30/15</u>
Phone: <u>408-270-6490</u>	Phone: <u>408-635-2600 ext. 6006</u>
Email: <u>michael.highers@evc.edu</u>	Email: <u>mduffy@musd.org</u>

Please Attach Official EVC/High School Course Outlines/Syllabi and Any Other Pertinent Documentation

**Milpitas High School  
Introduction to Engineering  
Bob Smith, instructor**

**Dear Parents and Students,**

Welcome to the world of Engineering. In this class students will be designing a series of small projects. Each project will be of the student's own design within a given set of parameters. The class objective is not just project completion, but the development of successful work habits and an understanding of how the design process works.

**Goals:**

1. Strive to become a better person
2. Develop a positive attitude
3. Become a team member not just an individual who happens to be on a team

**Course Description:**

Through a series of hands-on projects, activities and computer integrated instruction, students will explore the world of design as it applies to Engineering. We use the same programs and tools used by business and industry - AutoCad, AutoCad Inventor, and Sketch Up. Student will learn to design projects, create prototypes, and prepare drawings to industry standards so the product can be manufactured. Creation of an Engineering Design Brief documenting the complete engineering process is required. Introduction to our 3D printers for prototyping included.

**Class Outline:**

1. Team Building and Leadership Training
2. IC3 Digital Literacy Certification - Safe and responsible use of the Internet
3. Engineering Fields Project
4. Curriculum Planning- Engineering Pathway Matrix
5. Sketching and Graphic Communication Practices
6. AutoCad 2D & 3D
7. AutoCad Inventor
8. Plane Design Project
9. Bridge Project
10. Solar Cooker
11. Ball Launcher
12. NASA Crane
13. Electricity/Electronics
14. 3D Printing

**Possible Project Additions:**

1. Robotic Unit

**Daily classroom activities:**

Each design project will be a team effort. There are individual responsibilities within the team but each project design is a joint effort between all team members. Just like a real world job.

**Bring:**

1. Good attitude
2. Notebook and pencil (not pen) – every good designer has a notebook and pencil with them (that means a functioning eraser also).
3. Any other required material assigned by me

**Projects on time:**

Each project has points assigned and students earn their grade by completing quality steps on their projects on time. The important points are **quality** and **on time**. To complete a design project on time, students must learn to follow a strict time schedule requiring self-discipline and the development of time management skills. Most students and teams who fall behind do so because they aren't managing their time in class properly. When a team or student falls behind, they are responsible for catching up; normally during Open Lab. Open Lab is every day at 7:00AM.

**Open Lab:** Every day 7:00AM

**Daily work and assignments** (Things I grade on every day):

1. Punctuality
  - A. Come every day
  - B. Arrive on time
  - C. Start work immediately and stay on task
  - D. Manage time
2. Cooperative with teacher and others
  - A. Ability to follow instructions
  - B. Ability to follow proper classroom, safety, and clean up procedures
  - C. Good attitude
  - D. Helpful with others
3. Initiative
  - A. Effort in completing quality work
  - B. Willingness to suggest and receive change requests
4. Skillful completion of assignments and projects
  - A. Craftsmanship
  - B. Accuracy
  - C. Thoughtful planning
  - D. Adherence to original plans
  - D. Complexity of project
  - E. Thorough knowledge of machines and equipment
5. Organization and record keeping
  - A. 3 ring binder brought to class every day
  - B. Pencil/pen brought every day
  - C. All other supplies needed for class, brought to class

**Evaluation/Grading:** You earn grades, I don't give grades.

All assignments are graded using the following scale:

97-100 = A+	93-96 = A	90-92 = A-	87-89 = B+	83-86 = B	80-82 = B-
77-79 = C+	73-76 = C	70-72 = C-	67-69 = D+	63-66 = D	60-62 = D-
0-59 = F					

All assignments may be made up for partial credit. Extenuating circumstances may be considered.

**Attendance:**

School attendance policies will be followed. When absent, you have as many days to make up the work as days you were absent. All make up work will be done at home or during and turned in during Open Lab. Open Lab is held every day at 7:00AM.

**Tardy:**

You must be in your seat when the bell rings. If not, you will be marked absent. If you are not in your seat when the bell rings, it is your responsibility to come to me and request I change your absence to a tardy. If you fail to do this, you will remain marked absent. Employers today want employees who, among other things, are on time. Tardiness is not accepted in the business world and tardiness is not accepted here. If you are tardy on a regular basis, then your pay (your grade) will be lowered because you are not as productive an employee as you could have been if you were on time. As a general guideline, your grade will be reduced if you have a combination of tardies and absences that total 10. Reduced again when you reach a total of 15, and again when you reach 20, etc.

**Behavior:**

1. Be a good person, make wise choices.
2. All Milpitas High School rules regarding behavior will be followed.

**Ear buds/head phones:**

You will never listen to music during class. The only time ear buds will be out is when you are doing approved research. As soon as that research requiring ear buds is done, the ear buds must be put away. Cell phone will never be out without my permission.

**Multi-tasking:**

Multi-tasking results in none of the tasks being done well (research studies prove so).

**Web research:**

You may never view any non-approved website. Research is research. It's simple. It deals with the topic at hand. Viewing non-approved websites will result in equipment use sanctions determined by me.

**Misuse of equipment:**

Any misuse of any equipment will result in equipment use sanctions determined by me.

**Cheating/copying:**

Consequences will be determined by me.

**Theft prevention:**

If you don't want it stolen, don't bring it to school.

**Hall pass:**

On a scrap piece of paper you write the following:

1. Your name:
2. Date:
3. Time:
4. Where to:
5. Where from:

6. My signature:

**Other:**

1. See goals!

**12th Grade Engineering Focus- Green Urban Design**  
**Engineering and Technology Academy**  
**Milpitas High School**  
**5.0 Units Per semester**

This course serves as the final of a sequence of college preparatory, career-technical education courses in a three year Engineering and Technology Academy program of study. The purpose of this course is to provide students knowledge, skills, and values associated with sustainable urban design. This 12th grade CTE course will build on that knowledge, educating students about the green technology, health and structure of their larger community. They will be able to apply the principles they learn to making one aspect of their community more sustainable.

You will learn and use the Engineering Design Process to work out a number of engineering tasks and projects concerning Green Urban Design. These tasks will be performed through computer labs and hand- In addition, each student will learn how to use project management in teams to meet deadlines and presentations. Last, you will be expected to learn and use a variety of software tools to help assist in your project development, research and presentation.

<p><b>12th Grade Engineering Focus-Green Urban Design</b>  <b>(A-G Approved Class)</b>  Autocad Certification Test  Engineering Design Brief Review (Concepts and Basic Ideas)  Team Project Management  Engineering Ethics and Failures  Technical Drawing Review and Project  Sustainable Hovercraft Project  E-portfolio  Digital Citizenship  Safety Test Review  Autocad project #1  Life in 10 Years Part II  Green Urban Design Research Project  Green Urban Design Project      -Windmill Project (alternative energy sources review from 11th grade)      -Mapping town      -Green Building      -Green Transportation      -Green Public Spaces      -Policy  <b>Autodesk Architecture Unit</b>      **Construction of your Green Urban City**      -3D Modeling Project for Green Urban Design  Computer Science Programming with SNAP!  Senior Portfolios  Exit Interviews</p>	<p><b>Goals:</b>  1. Strive to become a better person  2. Develop a positive attitude  3. Become a team member not just an individual who happens to be on a team</p> <p><b>Grading</b>  93-96 = A  90-92 = A-  87-89 = B+  83-86 = B  80-82 = B-  77-79 = C+  73-76 = C  70-72 = C-  67-69 = D+  63-66 = D  60-62 = D-  0-59 = F</p> <p><b>Breakdown of Grade</b>  35% Technical Drawings  40% Engineering Design Briefs/  Group/Individual Projects/ could be  Mentoring  10% Quizzes/Homework, other items  15% Semester Final</p>
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**Attendance:**

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**11th Grade Engineering Exploration Green Energy**  
**Engineering and Technology Academy**  
**Milpitas High School**  
**5.0 Units Per semester**

Students will utilize the Engineering design process and develop a clear understanding of alternative energy sources and how they can be applied. Students integrate Autocad, 3d Printer, Google Docs, and a variety of other 21 Century tools to develop professional level design briefs and working prototypes. Areas of focus will be solar, wind and green transportation.

<b>11th Grade Engineering Explorations- Green Technology</b> <u>(A-G Approved Class)</u> <b>Fall</b> Engineering Design Brief Review (Concepts and Basic Ideas) Team Project Management Safety Test Review Google Docs Review E-portfolio Updates Autocad Project #1 (Electric Motor) Climate Change Project Icouldbe Mentoring Program Solar Car  <b>Winter/Spring</b> E-portfolio Icouldbe Mentoring Program Wind Turbine Project Introduction to Computer Science with SNAP! Simple Machine Project My Life in 10 Years Project	<b>Goals:</b>  1. Strive to become a better person 2. Develop a positive attitude 3. Become a team member not just an individual who happens to be on a team  <b>Grading</b> 93-96 = A 90-92 = A- 87-89 = B+ 83-86 = B 80-82 = B- 77-79 = C+ 73-76 = C 70-72 = C- 67-69 = D+ 63-66 = D 60-62 = D- 0-59 = F <b>Breakdown of Grade</b> 35% Technical Drawings 40% Engineering Design Briefs/ Group/Individual Projects/Icouldbe Mentoring 10% Quizzes/Homework, other items 15% Semester Final
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**Engineering and Technology Academy**  
**Milpitas High School**  
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