

## CTE Program Review

Program Name: **Electronics Technology**

Program Contact: **Gonzales, Steven**

Academic Year: **2016-2017**

Status: **Submitted for review**

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### 1. Description of Program

Provide a brief description of the program and how it supports the college's [College Mission and Diversity Statements](#), [CSM Strategic Goals 2013/14 to 2015/16](#), and other [Institutional Program Planning](#) as appropriate. What is the program's vision for sustaining and improving student learning and success over the next three years?

The Electronics Technology Program is a vocational technical program that supports the mission and priorities of the College of San Mateo by having an open access to class offerings and current programs. The courses are academically comprehensive and industry compliant with the skills and knowledge need to be employed in the electronics profession.

The Electronics Technology Program is student focused with hands on project based learning that educates a diverse student population to enter the field of Industrial Electronics at an apprentice or entry level position. The program works closely with our industrial partners to improve and update curriculum to have the most current and timely information needed to make our graduates attractive to hiring industries in the region. The curriculum that has been presented to the students is crafted to span 14 different industrial clusters allowing completers to pursue employment in many faucets of the industrial electronics job market.

Our faculty promotes the benefits an academically strong, student learning objectives driven program and does on-going outreach to high schools and job re-training programs in the surrounding community to inform and recruit possible future students. The faculty also explores teaching techniques such as; computer programs that allow students to test, build and trouble shoot circuits and electronic theory without expensive equipment or parts. The faculty has worked with the library to obtain reading material that is content appropriate in other languages to support our diverse population where English is a second language and more in-depth explanation is required outside of class meeting hours.

The program offers a 19 unit certificate in Electrical Power Pathways, a 16 unit Advance Electrical Technical Content certificate and an Associates of Science Degree in Industrial Electronics, all are CSM approved and the 19 unit certificate and the Associates of Science Degree in Industrial Electronics is state approved.

### 2. Student Learning and Program Data

#### A. Discuss Student Learning Outcomes Assessment

1. Reflect on recent SLO assessment results for courses and degrees and certificates offered by the program. Specify how SLO assessment informs curriculum development and changes to curriculum.

##### 1. A. *Student Learning Outcomes Assessment*

Student Learning Outcome assessments and retention is a continual focus throughout the electronics course offerings. In ELEC 111 and ELEC 112 a pre-test is given at the beginning of the semester and then used to evaluate student retention during each testing

period (two per semester and final). The questions from the pre-tests are re-worded or presented in different scenarios that test the students understanding and retention of those concepts. The results from this assessment has shown a better than 81% (49 students per 60 enrolled) success rate in both ELEC 111 and ELEC 112 during the testing periods. Also during the semester in ELEC 111(14 SLO's) and ELEC 112(6 SLO's) assessments of all the SLO's for that testing period are examined by the instructor. The expected results for these course SLO's has averaged to be better than 70% for each SLO. The courses ELEC 231 and ELEC 232 rely on periodic testing during the 16 week semester (two tests and final) as well as weekly quizzes as a test for retention. It is expected that a student must pass all the SLO's in that testing period with 70% or better. Student success in these courses has supported this outcome (65/75).The courses; ELEC 405, ELEC 421, and ELEC 441 use hands on laboratory experiments to test for understanding and retention. The SLO's for each of these courses are embedded in the laboratory experiment. The results for understanding and retention in these course is assessed each week during the semester as each experiment is graded. These courses expect better than 70% understanding and retention.

Reports are collected at the end of the semester by the full time faculty and percentages calculated and recorded. The results of the reporting is reviewed by the faculty for updating course content and possible teaching techniques needed to improve student understanding, retention and success.

2. Comment on the success rates in the program SLOs that are aligned with specific course SLOs. What do the program SLO and course data reveal about students completing the program? Identify trends and discuss areas in need of improvement. Is the alignment between course and program SLOs appropriate and informative? Describe any additional methods used to assess program SLOs and reflect on the results of those assessments. See [course-to-program SLO alignment mapping](#).

Program SLO's are directly tied to the Course SLO's. The program SLO's encompass the entire power pathways curriculum of seven courses or 19 units. Students have demonstrated a better than 80%\* retention and understanding of basic and advanced electronic fundamentals (Program SLO #1) throughout the certificate. Students also demonstrated the operation and use of test equipment for analyzing AC and DC circuits (Program SLO #2). This is a skill that is learned in Elec 111 and students must use this with confidence to be able to complete the certificate. Understanding power factor as it relates to AC power transmission and generation (Program SLO #3) begins in Elec 111 and is reflected, reinforced and refined through each class offering.

Demonstrating and understanding of environmental measurement and sensory read back data to control and operate (Program SLO #4) is a skill set that is not developed until a student takes and completes Elec 421 and Elec 441. This skill set must be obtained to pass these courses and better than 75% \*\*of students do.

\*based on the number of students who continued on to the next sequenced class. Elec 111; 54 students completed with 36 continuing on to Elec 112.

\*\* Based on students continuing on or completing certificate. Completion and advancement to the next classes included 38 students, 16 graduated with 22 advancing on to the next course.

3. For any courses in the program that satisfy a GE requirement, which GE SLOs are supported or reinforced by the course SLOs? What do assessment results for the course SLOs (and for the GE SLOs, if available) reveal about student attainment of the GE SLOs? See [GE SLO Alignment Summary Report](#) or [All Courses GE SLO Alignment Data](#).

Our program does not support any GE SLO's

## B. Student Success Indicators

1. Review [Student Success and Core Program Indicators](#) and discuss any differences in student success indicators across demographic variables. Also refer to the [College Index](#) and other relevant sections of the [Educational Master Plan: Update, 2012](#), e.g., Student Outcomes and Student Outcomes: Transfer. Basic Skills programs should also refer to [ARCC](#) data.

The Electronics program in the 2015-2016 school year reported a small decrease in overall student enrollment from 549 students in

2014 -2015 to 497 students in 2015-2016. This is a reduction of 9%, however there had been an increase of student enrollment in the 2013-2014 school year of 14% from the 2012-2013 school year, so this decrease could be where we belong in actual student enrollment in the current economy.

The department did achieve a decent percentage of student success with an average of 72.4% for all reported age groups. This is an overall decrease of 5% for this reporting period; the 19 and younger age group posted an improvement of 2.4% over the last reporting. This is a very encouraging improvement because this is normally a under performing age group. The 25-29 age group posted a 76.5 % for student success which was down 1.6 %, but still performing above the 70% range. the 50 and over age group had the most significant increase of 7.88% for a total of 87.5%. The 30-34 year old age group posted a 70.8% which was a decrease of 9.9% and may have been caused by a reduction in the numbers of students in this age group from the last reporting.

Demographically the program has continued to see an increase in student success in the Hispanic Students; an increase of 8.8% from the 2014-2015 reporting period and the Black students an increase of 10.9% from the 2014-2015 reporting period. This is the second time that both of these groups improved from the prior reporting period. Overall the program did have a small decrease from the 2014-2015 reporting period of 3.2% which can be explained by the under performing from the white students who had a larger than normal decrease in student success 8.9%.

To address student success improvement the instructors in the core classes are spending time to coach the students in proper study skills and data collection. This will enhance their chance for success if the students follow through with the tips and suggestions made by the faculty

2. Discuss any differences in student success indicators across modes of delivery (on-campus versus distance education). Refer to [Delivery Mode Course Comparison](#).

1. The Electronics program does not offer any distance learning courses. The hands on project based learning content of this program requires on campus attendance for students to gain complete understanding of the information given through lecture, computer programs and lab experiments.

C. Program Efficiency Indicators. Do we deliver programs efficiently given our resources?

Summarize trends in program efficiency as indicated in the [Student Success and Core Program Indicators](#) (LOAD, Full-time and Part-time FTEF, etc.)

The Electronics program has one full time faculty and four part time faculty that total .54 FTE. This total of 1.54 FTE is needed to present the core courses required for the certificate offered by the Electronics Program. Our program has an overall retention percentage of 82.9% and a withdraw percentage of 17.1 %. Our small class size ( ELEC 111 / ELEC 112 is 30 students max. and ELEC 405, 421 and 441 is 24 students max.) is due to the hands on nature of labs and safety procedures that must be adhered to when working with voltages and currents.

### 3. Career Technical Education

A. Career Technical Education Data (This information is required by California Ed. Code 78016.)

1. Review the program's available labor market data, as applicable. Here are two relevant links:

- [State Of California Employment Development Department, Labor Market Information Division](#) (the official source for California Labor Market Information)
- [Employment data](#) (by Program Top Code) from the State Chancellor's Office

Explain how the program meets a documented labor market demand without unnecessary duplication of other training programs in the area.

The Electrical Power Pathways Program at CSM is a one of a kind college program in the Northern California Region. Our program's goal and objective is to educate entry level technicians in Industrial Electronics / Electrical and electro-mechanical skills. This skill set is applicable to 14 industrial clusters state and nationwide. Our graduates have performed on employment tests with a better than 70% passing rate on both PG&E and Bay Area Rapid Transits employment exams. In 2015 one of our graduates passed the PG&E exam with a perfect 100% which had never been done before.

As of Sept. 2016 the Northern California Technologies Region (Alameda County, Santa Clara County, San Francisco Area, San Mateo County, Santa Cruz County) has a 2.6% unemployment rate. The jobs boom is so robust that of the industries tracked by the state's jobs reported which consists of 38 job sectors; It showed that there was a 83 percent jobs gained in 2015 as compared to 2014, where 25 of 46 industries, or 54 percent, gained jobs. In the industrial cluster(s) requiring technicians there was a significant increase( over 2%) in the San Mateo and San Francisco between 2014 and 2016.

2. Summarize student outcomes in terms of degrees and certificates. Identify areas of accomplishment and areas of concern. [collegeofsanmateo.edu/institutionalresearch/degcert.asp](http://collegeofsanmateo.edu/institutionalresearch/degcert.asp)

As of the 2015-2016 School Year the college has not issued an Associates of Science Degree or an Advance Content Certificate (16 units) in Industrial Electronics, this is due to the department not offering the Advance content courses needed to complete the Associates of Science Degree or receive the Advance Certificate. This has been partly due to the courses not being completely developed or tested for lab content. The department was identifying needed equipment, purchasing or building needed fixtures to teach the curriculum. Development of content and lab experiment is impeded by the full time instructor teaching the summer with the Bart Grant and not having extra time during the fall or Spring semester to work on content or labs.

Our students earn their 19 unit certificate and graduate each semester and the department averages 30 students a year who earn their 19 unit certificate.

3. Review and update the program's Advisory Committee information. Provide the date of most recent advisory committee meeting.

Advisory Committee meeting 6/2/2016. The Committee discussed continuing the intern program at L3 Communication even though the company is relocating in the near future. Discussed implementation of the Bart Grant this summer (2016) and how it might / would impact the Electrical Power Pathways Program. Discussed PG & E's information that came from a prior meeting with PG&E Director of Workforce Development, Alex Baker; A plan to re-incorporate retired technical workers and contractors back into the current substation technical workforce. This will reduce the number of students hired by PG&E annually. The Committee Chairman is trying to get a member of Tesla to attend meetings, but has not found one to date that can commit. The open discussion was on seeking out new industrial partners and inviting a representative from Bart to attend this Committee on a permanent basis.

The Committee Chairman meets with our industrial partners by phone, e-mail or in person at least every quarter throughout the school year.

Members: In attendance:

Kathy Ross, Dean of Business and Technology at CSM

Roy Brixen, Professor Emeritus in Electronics Technology

Steve Gonzales, Professor (Lead faculty of Electronics Technology)

Pam Wailke, L3 Communication representative

Frank Barlett, L3 Communication representative

Robert Scott, San Clara Water District representative

Tesla were not present.

Met with PG&E off site prior to this meeting, but no representative was present.

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#### 4. Additional Factors

Discuss additional factors as applicable that impact the program, including changes in student populations, state-wide initiatives, transfer requirements, advisory committee recommendations, legal mandates, workforce development and employment opportunities, community needs. See [Institutional Research](#) as needed.

The Electronics Program overall health is good, but enrollment is down due to the up swing in the local economy. Companies are hiring at an increased rate limiting our number of students during the day time hours. Our evening courses are full and strong and our graduates continue to find meaningful employment in the profession.

Our day time core course offerings are still offered each semester, but are impacted by low enrollment. This requires the department to cancel courses because 20 or more students are not enrolled. Not having day time courses has affected the growth of the program and the faculty has addressed this through continued recruiting at the regional high schools, regional job and college fairs and job re-training organizations. This tactic is undermined by the lack of CTE programs at the local high schools, but the state has recognized this short coming and CTE program focus is going to be in the spotlight over the next few years. The faculty is also doing out reach to industrial partners and other industrial employment clusters that need a skilled technical workforce.

The college is in the process of hiring a Workforce Development Director who will help with the outreach and creation of strategies that will help to improve enrollment and outreach to current and new industrial partners.

#### 5. Planning

##### A. Results of Program Plans and Actions

Describe results, including measurable outcomes, from plans and actions in recent program reviews.

During the 2015-2016 school year the faculty continued to review, update materials and content in all of the courses that make up the 19 unit certificate. Changes are made to keep the course offerings current and maintain industrial standards and procedures. The Associate Degree was approved in March 2015 and the faculty has been finalizing the development of lesson plans and labs for the advance courses (ELEC 422, 424, 442 and 445) and will complete testing of those labs and content during the 2017 summer break.

Standardizing of materials and content in the core courses is ongoing by sharing lecture notes (power point presentations), worksheets, quizzes, tests, and projects so each student is receiving the same information throughout the program and helping them amass a solid technical foundation. The ELEC 111 & ELEC 112 lab books are reviewed each semester and updated as needed to reflect the needs of the industry. The advance course are updated as industrial partners or trends are identified that students need to

have knowledge of to make them more attractive to employers.

## B. Future Program Plans and Actions

Prioritize the plans to be carried out to sustain and improve student success. Briefly describe each plan and how it supports the [CSM Strategic Goals 2013/14 to 2015/16](#). For each plan, list actions and measurable outcomes. Plans may extend beyond a single year. Describe the professional activities and institutional collaborations that would be most effective in carrying out the program's vision to improve student learning and success.

The Electronics Program's vision for the next six years is to continue to support the mission and priorities of the college and continue to address and serve the needs of the regional electronics / electrical industrial community by promoting academic excellence in educating the regional community about the careers and opportunities available in industry and how to obtain them. (IPC Priority 2)

The program will continue to recruit high school graduates and underserved populations in the area to increase enrollment. The faculty will develop diverse teaching techniques and procedures to ensure student success and completion rates. Student success is one of the institutional priorities that the electronics program focuses on in each class offering by structuring courses to provide the most up to date information and faculty using conceptual project based learning and diverse teaching techniques. (IPC Priority 1)

The full time faculty is involved in developing campus wide programs focused on student success as a member of the Academic Senate and was involved in the creation of Mindset 4.0.

Our course offerings will continue to be open access and faculty will be observing and updating curriculum mandated by industrial trends to maintain the college's cutting edge education for the 21<sup>st</sup> century. (IPC Priority 3)

## 6. Program Maintenance

### A. Course Outline Updates

Review the [course outline update record](#). List the courses that will be updated in the next academic year. For each course that will be updated, provide a faculty contact and the planned submission month. See the [Committee on Instruction](#) website for [course submission instructions](#). Contact your division's [COI representatives](#) if you have questions about submission deadlines. **Career and Technical Education courses must be updated every two years.**

Courses to be updated	Faculty contact	Submission month
ELEC 111	Steven Gonzales	fall 2017
ELEC 231	Steven Gonzales	fall 2017
ELEC 445	Steven Gonzales	fall 2017
ELEC 405	Steven Gonzales	Spring 2017
ELEC 421	Steven Gonzales	Fall 2016
ELEC 422	Steven Gonzales	Fall 2016
ELEC 424	Steven Gonzales	Fall 2016
ELEC 441	Steven Gonzales	Fall 2016
ELEC 442	Steven Gonzales	Fall 2016
ELEC 424	Steven Gonzales	Fall 2016

## B. Website Review

Review the program's website(s) annually and update as needed.

Faculty contact(s)	Date of next review/update
Steven L. Gonzales	Spring 2017

## C. SLO Assessment Contacts

Faculty contact(s)	Date of next review/update
Steven L. Gonzales	Fall 2017

## 7. Dominant Themes Summary for IPC

Briefly summarize the dominant, most important themes or trends contained in this program review, for division deans to collect and forward to the Institutional Planning Committee. What are the key program issues that matter most? (Brief paragraph or bullet points acceptable).

The dominant focus in the Electronics Department is to stay current with industrial trends, procedures and technologies. This requires the faculty to meet and interact with industrial partners (advisory committee) and others in the surrounding technical community. During those meetings; best practices and procedures will be defined to insure that our graduates can be desirable to employers and have success in an technological laden environment.

One of the other focus' is to identify pathways and create certificate programs that will lead to employment opportunities in other electro-mechanical industrial clusters.