College of San Mateo

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2014-2015 Instructional Program Review

Program Name: **Electronics Technology**
Program Contact: **Gonzales, Steven**
Academic Year: **2014-2015**
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**, **Institutional Priorities, 2013/14-2015/16**, **5 in 5 College Strategies, Spring 2011**, and other **Institutional Program Planning** as appropriate.

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 that is CSM and state approved. The faculty has been working with the state to finalize a proposal that has been corrected and refined to be current and relavent. Upon approval of the advisory council the proposal will be re-submitted to the state for approval of an Associates of Science Degree in Industrial Elctronics.

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2. Student Learning and Program Data

A. Discuss Student Learning Outcomes Assessment

1. Reflect on recent SLO assessment results for courses offered by the program. Identify trends and discuss areas in need of improvement.

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 75% (45 to 47 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 (68/78).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. This is exhibited by the results for these course; ELEC 405(40/50), ELEC 421 (19/24), and ELEC 441(19/24).

Reporting is still being addressed because the faculty for this program is mostly adjunct and data takes time to collect for the one full time faculty. This has been addressed and the next reporting period of data and results should be improved. Communications between the full time and adjunct faculty about assessment of SLO's has become a priority for the full time faculty so to better report and enter data into TracDat. 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? See **course-to-program SLO alignment mapping**.

Alignment of course SLO's to program SLO's is new to the Electronics Program (Electrical Power Pathways Certificate) and only has the last program review as data. 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; 48 students completed – 38 students continued on to Elec 112.

** Based on students continuing on or completing certificate. 47 students enrolled and 24 graduated and 23 went on to next course.

3. Evaluate the program SLOs in relation to survey data from the degree and certificate award earners survey. What does the survey data reveal about the effectiveness of the program SLOs? Identify trends and discuss areas in need of improvement.

The sample size of the respondents is very small (8 students) to properly reveal any trends or needed improvements. However the four program SLO's the respondents assessed; they Agreed Strongly 75% or better with an average of 80.35%. The program had no negative input from the respondents.

The department needs to stress getting a better sample size for the next program review period.

4. Describe any additional methods used to assess program SLOs and reflect on the results of those assessments.

No other assessment done

5. 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 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 2013-2014 school year reported an improved level of student success with an average of 75.6% for all reported age groups. This is an increase of 8.8% for this reporting period; the 25-29 year old age group posted a (78.1%) which was an increase of almost 20% and the highest increase of all of the reported groups. Only two age groups had decreased numbers. The 30-34 year old group had a large decline only posting a 9.6% success rate from 85.7% the year before. This decline could be to a smaller enrollment of 30-34 year olds in this reporting cycle. The 50+ age group also had a slight decline of 7%. The highest success rate was the 40-49 year old age group with a success rate of (82.1%) which was also a repeat for this group and an increase over last year by 3.5%. The 35-39 age group which comprises the average age of the programs night time students had an improved success rate of (74.7%) which is an increase of 8%. This group is made up of serious career goal oriented students that historically perform at a higher success rate 70%+. This supports the fact that seems to come from students who are more mature with life experiences that allow high retention that transposes to their work in class and in the lab.

Demographically the program has seen an increase; both with improvements in student success in Hispanic and black students small decrease in overall student success with students from ethnic and cultural minority groups and all students in general, however the decrease is less than 1% (.6%) from the 2011-2012 school year and can be attributed to on-going curriculum re-alignment. This curriculum re-alignment is what keeps the program current and up to industry standards.

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.
2. The faculty is currently exploring a hybrid course offering for Elec 231 and Elec 232, but more research is needed at this time.

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 Fion TE. 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 441is 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

D. Additional Career Technical Education Data - CTE programs only. (This information is required by California Ed. Code 78016.)

1. Review the program's **Gainful Employment Disclosure Data**, **External Community**, and other institutional research or labor market data as applicable. Explain how the program meets a documented labor market demand without unnecessary duplication of other training programs in the area. Summarize student outcomes in terms of degrees, certificates, and employment. Identify areas of accomplishment and areas of concern.

The Industrial Electronics industry is filled with multi-faceted job descriptions with similar job skills. The Electronics Program has focused its resources on the utilities organizations and the sector of the industry that requires technical expertise in areas such as calibration, measurement, instrumentation and electro-mechanical skills. The projected need for academically strong technical sound personnel in this region is over 1000 positions per year, (based on data from Economic Modeling Specialists, Inc.).

The program at CSM is one of the few programs in Northern California that addresses the need for these skills across 14 industrial clusters.

The completers in this program are generally subjected to employment testing. In the 2014 school year the program's graduates performed at better than 70% passing on the Electronics Technician Test (ETT) at PG&E. PG&E has over a 90% fail rate for internal candidates. The programs success at helping students to prepare for future employment has been steady as completers find employment opportunities in, around and outside CSM's service area.

PG&E is continuing their plans to increase their diminishing technical workforce by hiring 26 new apprentices this year.PG&E is working closely with our professors and program to supply them with competent entry level apprentices. Tesla Motors continues to hire our graduates and is looking forward to expanding their operation in their Fremont plant. Both PG&E and Tesla are members of the programs Advisory Council.

One area of concern that has not changed from the couple of school years, some of our students are finding employment before they complete the 19 unit certificate and not all students return. This impacts our completion rate and the student fails to gain the knowledge and experience from the courses missed which may impact the student's future career path. We addressed this with PG&E and Tesla and reached a consensus that the students would be able to return and complete their studies.

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

The Electronics Program Advisor Council was reestablished in December 2012 and met twice during that school year. Fall 2014 was spent meeting with individual partners to address needs and wants that could be incorporated into new curriculum or possibly new class offerings.

The group did not meet in the Fall Semester and has a meeting schduled in April.

The current Advisory Council members are:

CSM: Kathy Ross, Dean Business & Technology

CSM: Roy Brixen, Professor Emeritus of Electronics

CSM: Steven Gonzales, Full Time Professor of Electronics

CSM: Dragos Micodin, Adjunct Professor of Electronics

CSM: Sami Abboud,Adjunct Professor of Electronics

CSM & Genetec: David Lawrence, Adjunct Professor of Electronics

Frank Simmons, Former CSM graduate of Electronics

PG&E: Alexandra Baker, Director of HR Electrical Power Pathways

PG&E: Joe Speck, Electrical Technician Apprentice Trainer

Tesla Motors: Open, currently seeking a member to fill this position.

The full time professor meets with our industrial partners by phone, e-mail or in person at least once a month.

We have invited L3 Communications to become part of the council to add to our cirriculum and oversee the internship that we are setting up for our students.

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 health is strong and still growing. Currently we are experiencing one of our largest enrollments to date. Our graduates continue finding meaningful employment in the profession.

Our day time course offerings contuies to be limited in the advance course offerings. The faculty has been addressing these issues on a continual basis through recruiting at the regional high schools, regional job and college fairs and job re-training organizations. This tactic seems to be working as the last two semesters saw an increase in day time students retention and class offerings.

A cronic factor that still undermines the day time enrollment is the lack of CTE at the high schools. This factor forces the faculty to be creative and forward thinking when recuiting and informing the commuity that our program exists and is a pathway to a solid professional career.Our staff go to any community fuctions like the San Mateo fair or Jazz on the hill at CSM and any other event that would allow a venue to speak to the public about our program and all that it offers. Our Dean and the full time faculty both work with the Jefferson Unified School District as an advisor for their current CTE programs and how to create a pathway to the CTE programs at CSM. The program has made contact with an ROP program in San Jose that trains student in electrical skills and a pathway to CSM is being explored.

5. Planning

A. Results of Program Plans and Actions

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

During the 2014-2015 school year the faculty made small changes to the current curriculum though out the progrms cirriculim to mantain industrial standards and current procedures. The Associate Degree proposal was returned to CSM for revisions again over the last review period and has been updatedto the state's request. Once the Advisory Council approves this proposal at the Spring meeting it will be re-submitted for state approval.

The faculty has been developing lesson plans and labs for the advance courses (ELEC 422, 424, 442 and 445) and will begin testing those lab and content during the summer break.

The faculty is standardizing materials and content presented in the core courses by sharing lecture notes (power point presentations), worksheets, quizzes, tests, and projects so each student is receiving the same information that will help them build a solid foundation. ELEC 111 & ELEC 112 has had completed lab books created that include: labs, worksheets and handouts. This will help standardize the courses and present the content needed for advancement in future course work and employment opportunities.

B. Program Vision

What is the program's *vision* for sustaining and improving student learning and success over the next three years? Make connections to the **College Mission and Diversity Statements**, **Institutional Priorities, 2013/14-2015/16**, and other **Institutional Program Planning** as appropriate. Address discussion in the Student Learning and Program Data section: SLO assessment results and trends in student success indicators.
[**Note**: Specific plans to be implemented in the next year should be entered in C of the Planning section.
CTE programs must address changes in the context of completion and employment rates, anticipated labor demand, and any overlap with similar programs in the area as noted in D1 and D2 of the Career Technical Education section.]

The Electronics Program's vision for the next six years is to continue to support the mission and priories 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 stdent sucess as amemeber of the Academic Senate and 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 21st century. (IPC Priority 3)

1. To guide future faculty and staff development initiatives, describe the professional activities that would be most effective in carrying out the program's vision to improve student learning and success.

The Electronics Program supports personal enrichment opportunities for faculty members. Examples would be attendance at conferences or courses that enhance content or develop teaching techniques. Exposure to information that assists instructors create new course objectives or improve student success are always encouraged. The current curriculum is structured with consideration of the needs of our industrial partners and suggested content from the International Society of Automation. Faculty has attended and is encouraged to attend courses offered by the ISA or other professional organizations that are positioned to add to our knowledge of the 14 industrial clusters represented by our program content.

Memberships in electronic or engineering professional organizations are – considered by the faculty and suggestions are made for memberships related to maintaining the currency of the program.

Apply when availbe for summer programs that will embeded the faculty in a position that will enhance skills or allow observation of techniques and work proceudres that confrimed or showed an area of improvement to the content being taught.

2. To guide future collaboration across student services, learning support centers, and instructional programs, describe the interactions that would help the program to improve student success.

Currently there are no tutors or instructional aides in the Learning Center that are prepared to assist the electronics students with assignments, computer programs and projects. This could potentially help students with problems outside of class or faculty office hours. Faculty is planning to meet with the Library and Learning Center staff to discuss developing these individuals. It could - improve student understanding and success rates and provide an informed knowledgeable resource.

The full time faculty is working with an ad hoc SotL committee to support and advance collaboration across disciplines such as mathematics, engineering and other sciences. The full time faculty is also working with the Reading Center to promote support for student assistance in reading and comperhension; learning tehniques that will help students that struggle with reading textbooks and other technical material. The full time faculty also serves on the academic senate which exposes the staff to what is going on at the school and what might impact the deptment. This involvement in school government gives insight into other student opportunities and services that can be passed on to the students.

3. To guide the **Institutional Planning Budget Committee** (IPBC) in long-range planning, identify any major changes in resource needs anticipated during the next three years. Examples: faculty retirements, equipment obsolescence, space allocation.

See the Resource Requests section below to enter itemized resource requests for next year.
Leave sections blank if no major changes are anticipated.

Faculty

Faculty: For the Electronics Program to stay current and informed of industry changes and updates our computers in the lab rooms will need to be updated and modified as the need arises with current and future software or hardware to allow our faculty and student body to stay compliant with industrial trends and procedures.

Equipment and Technology

Equipment and Technology: Currently the faculty is exploring designs for a workstation for hydraulics, pneumatics and vacuum experiments that will be included in ELEC 424 which is a course that will be offered for the A.S. Degree. Aslo the engineering dept. gave the electronics program two three axis robots the will be incorporated into motor control and communication courses once the devices are repaired.

Instructional Materials

Instructional Materials: The faculty is still exploring the updating of the textbooks used in ELEC 111 and ELEC 112 as well as researching ebooks as a possible replacement to hold down student expenditures. Software packages are also being reviewed for possible use, but at this time there is not a defiant time table or priority driving this.

Classified Staff

Classified Staff: The department needs staff support in the form of an electronics technician ($54,960 – $65,000 annual for full time). In the past the department had the use of a technician who was shared with the machine tool program. The Electronics Department has benefitted from multiple grants over the last five years that have added approximately $500,000 in new

technology and equipment to the two primary labs. This equipment needs constant re-calibration and maintenance which the instructors are not able to execute. In addition we receive numerous shipments of supplies and consumable material that need to be inventoried and put away. The labs continuously need the stations worked on both for mechanical issues as well as cleanliness. (Due to the nature of the equipment the maintenance staff is not allowed to clean the stations.)

Facilities

No changes at this time

C. Program Plans and Actions to Improve Student Success

Prioritize the plans to be carried out next year to sustain and improve student success. Briefly describe each plan and how it supports the **Institutional Priorities, 2013/14-2015/16**. For each plan, list actions and measurable outcomes. (Plans may extend beyond a single year.)

Plan 1: Bridge to Power Pathways

This is a two week program that would help students bridge the gap between being prepared and not being prepared to start the Electrical Power Pathway Programs with proper math and reading comperhension skills.

Actions Needed:	Completion Date:	Measureable outcome:
Write a plan and organize curriculum	Fall 2015	Completion of plan and course outline.
Get approval from COI and dean	Spring 2016	Approval of Bridge to Pathways Bootcamp
Begin teaching Bridge to Pathways	Fall 2016	Student completion & enrollment in ELEC 111 and ELEC 231

6. Resource Requests

Itemized Resource Requests

List the resources needed for ongoing program operation.

Faculty
NOTE: To make a faculty position request, complete **Full-time Faculty Position Request Form** and notify your Dean. This request is separate from the program review.

Full-time faculty requests	Number of positions
Provide 3 units of reassigned time to the one F/T faculty to handle program coordination, curriculum development and administrative responsibilities related to industry partnership development.	1

Equipment and Technology

Description
Cost

Description	Cost
Kelvin HydraBasics Trainer (x6)	$1695.00 each
Pneumatics Basic Trainer (x6)	$1495.00 each
Fluke P5510 Pneumatic Pressure Tester (x2)	$2200.00 each
Fluke 91025 Dry Well Temperature Calibrators w/9930 Data Collection Software(x2)	$3300.00 each
Ashcroft 6 inch 0=300 PSIG Pressure Gauge (x2)	$400.00 each
Automation Direct GS-100 Variable Frequency Drive (x12)	$140.00 each
Automation Direct Programmable Logic Controller (x12)	$1000.00 each
B&B Electronics USPTL4-USB to RS-485 Data Comm Converter (x24)	$100.00 each
B&B Electronics USO9ML2-LS USB to RS-232 Data Comm Converter (x24)	$130.00 each
B&B Electronics USB type A male to type B standard USB cables (x24)	$130.00 each

Instructional Material

Description	Cost

Classified Staff

Description	Cost

Facilities
For immediate or routine facilities requests, submit a CSM Facility Project Request Form.

Description	Cost

7. 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 2015
ELEC 231	Steven Gonzales	fall 2015
ELEC 445	Steven Gonzales	fall 2015
ELEC 405	Steven Gonzales	Spring 2015
ELEC 421	Steven Gonzales	Fall 2015
ELEC 422	Steven Gonzales	Fall 2015
ELEC 424	Steven Gonzales	Fall 2015
ELEC 441	Steven Gonzales	Fall 2015
ELEC 442	Steven Gonzales	Fall 2015
ELEC 424	Steven Gonzales	Fall 2015

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 2016

C. SLO Assessment Contacts

Faculty contact(s)	Date of next review/update
Steven L. Gonzales	Fall 2015