INSTRUCTION PROGRAM REVIEW: SPRING 2013 SUBMISSION CYCLE

Program Name: Electronic Technology
Faculty Contact: Steven L. Gonzales

Academic Year: 2012-2013
Program Review Submission Date: 3/25/2013

I. Description of Program

The Mission Statement of the College of San Mateo lists three main elements that include transfer preparation, occupational preparation, and basic skills instruction. The Electronics Technology Program is Career Technical Education program that supports the mission and priorities of the College of San Mateo by offering a structured program of instruction focused on industrial electronic systems and leading to a certificate in Electrical Power Systems and Instrumentation (EPSI). The program is industry supported and aligned with entry-level employment needs of fourteen different industry clusters. The program has open access for all students for any of the listed class offerings and the Electrical Pathways program. The courses are academically comprehensive and industrially compliant with the skills and knowledge needed to be employed in the Electronics profession. Our curriculum is structured as a foundation that the student population where the student can gain knowledge and marketable skills needed for the 21st century economy. The program is endorsed by Pacific Gas and Electric, San Francisco PUC and East Bay Mud. It is the only program in Northern California (with this concentration) that is certified as a "Power Pathways" program by PG&E to educate and train apprentice level technicians that meet their requirements for these skills.

The Electronics Technology Program is student focused with hands on project based learning. It 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, focused on delivering current and timely skills required by the employers in the region. The curriculum presented to the students is crafted to span 14 industrial clusters positioning completers to pursue employment in many facets of the industrial electronics job market.

The faculty promotes the benefits of an academically strong, student learning objectives driven program and participates in on–going outreach to high schools, **R**egional **O**ccupational **P**rograms (**ROP**) and job re-training programs in the surrounding community. These activities are structured 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; electronic theory without the use of expensive equipment or parts. The faculty works 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. This is particularly relevant when there is the need for more in-depth explanation required outside of class meeting hours.

The program offers a state approved 19 unit certificate and we are currently awaiting approval of the proposal submitted for an Associates of Science Degree in Industrial Electronics.

II. Summary of Student and Program Data

A. Student Learning Outcomes Assessment

Student Learning Outcomes Assessments and testing for retention is on-going throughout the Electronics course offerings. In ELEC 111 and ELEC 112 a pretest is given at the beginning of the semester and then used to evaluate student retention during each testing period. The questions from the pretests are re-worded or presented in a different scenario that would result in the same outcome if the student understands the concept that is being tested. ELEC 231 and ELEC 232 rely on periodic testing during the 16 week semester as well as weekly quizzes as a measure of subject matter retention. ELEC 405, ELEC 421, and ELEC 441 use hands on laboratory experiments to test for understanding and retention.

We are in the process of providing additional training for the adjunct instructors in the use of the TracDAT software package.

B. Student Success Indicators

The Electronics program has had historically high student success in the both the 25-29 year old age group (77%) and the 35-39 year old group (84.3%). When the data averaged as a program reflects a (76.4 %) success rate. The older student group has numerous life skills and experiences to draw on and it transposes to their work in class and in the lab, resulting in their higher than average results. Demographically the program has seen a small increase in student success with students from ethnic and cultural minority groups. The program has experience a small drop in overall student success from the 2011-2012 school year, but this could be a result of the re-alignment of curriculum and content which increased the academic strength of the program. We should be able to measure this trend after another round of SLO assessment (need to see a trend of more than one year).

1. **Discuss any differences in student success indicators across modes of delivery** (on-campus versus distance education).
   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?

The Electronics program has one full time faculty and three 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.

D. Course Outline Updates

Courses to be updated	Faculty contact	Submission month
ELEC 111	Steven Gonzales	Dec. 2013
ELEC 112	Steven Gonzales	Dec. 2013
ELEC 231	Steven Gonzales	Dec. 2013
ELEC 232	Steven Gonzales	Dec. 2013
ELEC 405	Steven Gonzales	Dec. 2013
ELEC 421	Steven Gonzales	Dec. 2013

E. Website Review

Faculty contact(s)	Date of next review/update
Steven Gonzales	Summer 2013

F. 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 calibration and instrumentation. 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 a variety of industries.

The completers in this program are generally subjected to employment testing by prospective employers. In February 2013, twelve students were invited to take the Electronic Technician Test (ETT) at PG&E with five passing and placed in the company's regional hiring pools. Over the next year PG&E is planning to hire three to six apprentice-level candidates each month and Tesla Motors (another of our Advisory Council members) is planning to increase their workforce by 600 technical personnel. The student success measurements have remained steady over the last academic year in the face of curriculum revision that increased the rigor of several courses.

Turning to the Gainful Employment Data available on the CSM website it appears that in 2011- 12 our 19 unit certificate program was estimated to take 10 months to complete. However, the certificate only started in January 2010 and most students could not handle a program of this rigor – they did not attend the summer session. Therefore, it appears no one completed on time. Rather, it is recognition of the few full time students we attracted that the material was not suitable for them in a summer session structure of 8 weeks. We no longer offer classes in this program during the summer and we tell students it takes 18 months to complete due to the now sequential nature of the curriculum.

One area of concern is that some of our students are finding employment before they complete the certificate and not all return to complete their certificate. This impacts our completion rate and the student fails to gain exposure to the more advanced courses that would be preparatory for advancement later in their career.

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

The Electronics Program Advisor Council has been reestablished after the original group moved on to other positions and careers. This new group met on December 13th, 2012 and the new members introduced themselves to the faculty and each other. Discussions about the History and future of the program were the topics for the first meeting.

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: Ken Manders, Adjunct Professor of Electronics & Engineering

CSM: Dragos Micodin, Adjunct Professor of Electronics

CSM & Genetec: David Lawrence, Adjunct Professor of Electronics

XP Power: 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: William Lebhertz, Production Supervisor

East Bay Mud: Open, currently seeking a member to fill this position.

SF PUC: Open, currently seeking a member to fill this position.

III. Student Learning Outcomes Scheduling and Alignment

A. *Course SLO Assessment*

Explain any recent or projected modifications to the course SLO assessment process or schedule.

The data collected from (2010-2011) and (2011-2012) suggests that students completing the required core courses for the certificate in Electrical Power Pathways are meeting or exceeding the 70% expected outcomes of listed SLO's. The reporting of this data to TracDat is not complete and is currently being updated.

At present there are no plans to change the current process of program or course SLO Assessment being done by the Electronics Program. Current success with completers gaining employment and advisory council information confirms that the present Student Learning objectives and curriculum is meeting industry standards and employment needs.

B. *Program SLO Assessment*

At present there are no plans to change the current process of program or course SLO Assessment being done by the Electronics Program. Current success with completers gaining employment and advisory council information confirms that the present Student Learning objectives and curriculum is meeting industry standards and employment needs.

C. SLO Alignment

In the Electronics Program Course Student Learning Objectives relate directly to the program SLO's.

Electronics Program SLO's

- Students will have a strong understanding of electronic fundamentals that includes: Series, parallel and series - parallel resistive circuits. Inductors, Capacitors and associated RC, RL and RCL circuits and their characteristics. (***associated to the SLO's in ELEC 111 and ELEC 112)***
- Students will be able to diagnose problems with circuits and systems using DC or AC voltage sources and repair or upgrade. (***associated to the SLO's in ELEC 111, ELEC 112 and ELEC 405)***
- Students will be able to read and understand schematic, block and wiring drawings and use them to diagnose circuit problems or perform upgrades. (***associated to the SLO's in ELEC 111, ELEC 112 and ELEC 405)***Students will have an understanding of transformers and power distributions systems using single or polyphase wiring. ***(associated to the SLO's in ELEC 405 and ELEC 421)***
- Students will demonstrate industry standard measurement and calibration techniques. (***associated to the SLO's in ELEC 441)***
- Student will be able to demonstrate how DC and AC motors and generators work. (***associated to the SLO's in ELEC 421 and ELEC 441)***
- Students will have an understanding of relays, solenoid and motor control circuitry and control devices. ***associated to the SLO's in ELEC 405 and ELEC 421)***

The program's mission and goals support student success in the classroom and in the industry that the student is seeking employment. The electronics program is aligned to the mission and Institutional priories of the College of San Mateo and the Electronics Industry that employs our graduates.

IV. 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.

The Electronics Program has met many challenges and obstacles over the last three years since the Electrical Pathways Program began in 2010. The health of the program is strong and growing as our success rate in graduates gaining meaningful employment in this profession improves. Our day time course offerings continue to be a concern in the areas of enrollment and retention. However, the faculty has been addressing these issues on a continual basis through recruiting at the regional high schools, regional occupation programs and job re-training organizations. A major factor contributing to under enrollment in the day courses is the lack of CTE courses at the high school level. Students at the high schools and many future students in the community have no exposure to the content or curriculum of our program and are unaware of the careers available. Outreach done by the faculty at every opportunity will improve our day course enrollment over time and our faculty is working 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.

V. Institutional Planning

A. Results of Plans and Actions

During the 2012-2013 school year the faculty made no changes to the current curriculum in any of the seven courses required for the certificate. The certificate was state approved at the start of the school year. The proposal to the state for an Associate Degree was returned to CSM for revisions and has been re-submitted for approval. The faculty has been developing lesson plans and labs for the advance courses (ELEC 422, 424, 442 and 445).

The program has re-organized the advisory council and will meet two times a year which will be supported with e-mail communications throughout the in between meetings to address recommendations and possible changes to courses or content.

Funding of projects and course development is an ongoing challenge; the dean and faculty has discussed applying for a National Science Federation small grant and has began constructing a proposal to be submitted in October.

The faculty is trying to standardize 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 for the advance courses and future employment tests.

B. Program Vision

What is the program's vision for sustaining and improving student learning and success during the *next six years*? Make connections to the College Mission and Diversity Statements, Institutional Priorities, 2008-2013, and other institutional planning documents as appropriate. Address trends in the SLO assessment results and student success indicators and data noted in Section II. Summary of Student and Program Data.

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)

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 enrichment 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.

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. Collaboration across disciplines such mathematics, engineering and other sciences must also be a priority to increase enrollment in the electronics program and give insight into other student opportunities at the college.

3. To guide the Institutional Planning Committee (IPC) in long-range planning, discuss any major changes in resource needs anticipated in the *next six years*. Examples: faculty retirements, equipment obsolescence, space allocation. Leave sections blank if no major changes are anticipated. Specific resource requests for the next academic year should be itemized in Section VI.A below.

   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: 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.

   Instructional Materials: Currently faculty is 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: The department needs staff support in the form of an electronics technician. 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

C. 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, 2008-2013. For each plan, list actions and measurable outcomes.

Plan 1

Title:

Bridge to Power Pathways

Description

This 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

Action(s)	Completion Date	Measurable Outcome(s)
Write a plan and organize curriculum	Spring 2014	Completion of plan and course outline.
Get approval from COI and dean	Spring 2014	Approval of Bridge to Pathways Boot camp
Begin teaching Bridge to Pathways	Summer 2014	Student completion & enrollment in ELEC 111 and ELEC 231

Plan 2

Title:

4T

Description

4T

Action(s)	Completion Date	Measurable Outcome(s)
4T		4T
4T		4T
4T		4T

For additional plans, cut/paste from above and insert here. Or add an additional page. Number your additional plans accordingly.

[Note: Itemize in Section VI.A. Any additional resources required to implement plans.]

VI. Resource Requests

A. Itemized Resource Requests

List the resources needed for ongoing program operation and to implement the plans listed above.

Faculty

Full-time faculty requests (identify specialty if applicable)	Number of positions
	Tab to add rows

Complete Full-Time Faculty Position Request Form for each position.

Description of reassigned or hourly time for prioritized plans	Plan #(s)	Cost
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	$18,200 approx

Equipment and Technology

Description (for ongoing program operation)	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
Dell Computers w/Windows 8 (x26)	$1000.00 each
Dell Computer Laser Printer	$500.00 each

Description (for prioritized plans)	Plan #(s)	Cost

Instructional Materials

Description (for ongoing program operation)	Cost

Description (for prioritized plans)	Plan #(s)	Cost

Classified Staff

Description (for ongoing program operation)	Cost

Description (for prioritized plans)	Plan #(s)	Cost

Facilities

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

Description (for prioritized plans)	Plan #(s)	Cost

B. Cost for Prioritized Plans

Use the resources costs from Section VI.A. above to provide the total cost for each plan.

Plan #	Plan Title	Total Cost
1		
2		
	For additional plans, add rows and number accordingly.	