

# Bakersfield College

## Program Review – Annual Update 2015

### **I. Program Information:**

Program Name: Electronics Technology

Program Type:  Instructional       Student Affairs       Administrative Service

**Bakersfield College Mission:** Bakersfield College provides opportunities for students from diverse economic, cultural, and educational backgrounds to attain Associate and Baccalaureate degrees and certificates, workplace skills, and preparation for transfer. Our rigorous and supportive learning environment fosters students' abilities to think critically, communicate effectively, and demonstrate competencies and skills in order to engage productively in their communities and the world.

Describe how the program supports the Bakersfield College Mission:

**The Electronics Technology program at Bakersfield College provides training for electronics technicians, automation technicians, instrumentation technicians, consumer electronics technicians, maintenance mechanics, radio and telecommunications technicians, installation technicians, electronic systems fabrication technicians, operators, and other related occupations. In the near future, we will also provide classes for a new Engineering Technician Associates of Science degree.**

**Bakersfield College, as part of the California Community College system, provides CTE, transfer, and basic skills coursework. Our program successfully serves the CTE statewide goal for our discipline. In addition, we have participated in several of the strategic goals and initiatives of the college, including student success (though our participation in the C6 consortium and its activities), and fiscal sustainability (through our participation in the STEM program and through sizeable grants from Chevron and the Central California Section of the International Society of Automation. Our facilities and equipment are exemplary among similar programs in the State, and as such, they have contributed both to student success and a positive example of Bakersfield College's commitment to relevant technology and high-wage, high-growth occupations within our service area.**

Program Mission Statement:

**The EIT faculty and staff strive to offer effective, up to date and student centered instruction, being sensitive to the diversity of our students, their educational needs, and their career goals. The Electronics Technology program is one of the EIT programs. We provide relevant course and lab work geared toward day and night students seeking careers in EIT related fields, also meeting the needs of students seeking training for career advancement or skills updating. We use a multi-dimensional approach in preparing our students not only for their specific career goals, but also provide activities that assist them with meeting their personal, academic, and intellectual goals. Our faculty actively pursues professional development, program/facilities improvement, and college/community involvement, seeking partnerships and collective efforts.**

Our program, first and foremost, provides our diverse student population with the ability to earn a degree, a Certificate of Achievement, and four different Work Skills Certificates as evidence of their participation in this career and technical education program. Our rigorous and technically challenging program develops the skills and competencies in technical support fields within the various industry sectors for which we prepare students.

**II. Progress on Program Goals:**

A. List the program’s current goals. For each goal (minimum of 2 goals), discuss progress and changes. If the program is addressing more than two (2) goals, please duplicate this section.

**Note: Last year’s goals were based upon the department goals, which were suitable when the APR was by department rather than by program. This year, we established program-specific goals, and will continue with those goals in future years.**

Program Goal	Which institutional goals from the Bakersfield College Strategic Plan will be advanced upon completion of this goal? (select all that apply)	Progress on goal achievement (choose one)	Comments
1. Utilize both the Electronics Technology Advisory Committee and the BSIA Advisory Committee to refine the course content and goals/outcomes of the short-term certificate, two-year certificate/AS degree, and the BSIA educational levels to create a seamless pathway to employment within the industry sectors we serve.	<input checked="" type="checkbox"/> 1: Student Learning <input checked="" type="checkbox"/> 2: Student Progression and Completion <input type="checkbox"/> 3: Facilities <input type="checkbox"/> 4: Oversight and Accountability <input type="checkbox"/> 5: Leadership and Engagement	<input type="checkbox"/> Completed: _____ (Date) <input checked="" type="checkbox"/> Revised: new 2015-16 (Date) <input type="checkbox"/> Ongoing: _____ (Date)	This is a revision of the previous goal. We are getting feedback from two advisory boards instead of just one like in the past, so we are working on making sure the suggestions and feedback that relate to the lower division coursework are incorporated from both sources. Additionally, there is a strong need for us to make the pathways more clear for short term, two-year, and four year preparation. We will redesign the CA and AS degree, and add three new CA’s so we can increase our completion rates for the applicable standards on the success scorecard.

<p>2. Refine the curriculum and course delivery systems to provide the maximum flexibility for students to receive their educational levels of choice.</p>	<input checked="" type="checkbox"/> 1: Student Learning <input checked="" type="checkbox"/> 2: Student Progression and Completion <input type="checkbox"/> 3: Facilities <input type="checkbox"/> 4: Oversight and Accountability <input type="checkbox"/> 5: Leadership and Engagement	<input type="checkbox"/> Completed: _____ (Date) <input checked="" type="checkbox"/> Revised: new 2015-16 (Date) <input type="checkbox"/> Ongoing: _____ (Date)	<p>As mentioned in other sections of this document, we really need to schedule classes using both classrooms and our lab rooms so we can offer the sections needed for growth and the BSIA. Additionally, we need to offer courses in a number of topics in a hybrid form and several online so we can accommodate the BSIA and even the lower-division students that work full-time. Otherwise, a significant portion of potential students will not be able to participate in the BSIA program.</p>
<p>3. Develop logistical and development plans, and implement those plans for each of the lab facilities that serve our program.</p>	<input checked="" type="checkbox"/> 1: Student Learning <input type="checkbox"/> 2: Student Progression and Completion <input checked="" type="checkbox"/> 3: Facilities <input type="checkbox"/> 4: Oversight and Accountability <input type="checkbox"/> 5: Leadership and Engagement	<input type="checkbox"/> Completed: _____ (Date) <input checked="" type="checkbox"/> Revised: new 2015-16 (Date) <input type="checkbox"/> Ongoing: _____ (Date)	<p>With the number of sections in our program (lower-division and BSIA) set to more than double over the next few years, and the potential to add a new automation lab (explained elsewhere in this document), we need to develop a comprehensive schedule of lab and classroom utilization, as well as a compatible scheduling of all ELET and BSIA sections over the next several years in order to adequately offer the needed course sections.</p>

<p>4. Develop clear pathways for each possible career path within our area of “technical support systems for commercial and industrial sectors.</p>	<input checked="" type="checkbox"/> 1: Student Learning <input checked="" type="checkbox"/> 2: Student Progression and Completion <input type="checkbox"/> 3: Facilities <input type="checkbox"/> 4: Oversight and Accountability <input type="checkbox"/> 5: Leadership and Engagement	<input type="checkbox"/> Completed: _____ (Date) <input checked="" type="checkbox"/> Revised: new 2015-16 (Date) <input type="checkbox"/> Ongoing: _____ (Date)	<p>This is explained in detail elsewhere in this document. Essentially, we want a student who is interested in some type of technical career to be able to understand all the options within ELET, ENGR, INDT, and BSIA so they can take courses in the correct sequence, earn certificates (JSC and CA’s), know what courses are needed for the AS degree/four-year BSIA, and will be able to understand the nature of the job titles and career pathways that they have chosen. This information is available, but is in various locations and is not user-friendly.</p>
<p>5. Improve course outcomes, particularly in beginning-level courses, and those taught by more than one instructor.</p>	<input checked="" type="checkbox"/> 1: Student Learning <input checked="" type="checkbox"/> 2: Student Progression and Completion <input type="checkbox"/> 3: Facilities <input type="checkbox"/> 4: Oversight and Accountability <input type="checkbox"/> 5: Leadership and Engagement	<input type="checkbox"/> Completed: _____ (Date) <input checked="" type="checkbox"/> Revised: new 2015-16 (Date) <input type="checkbox"/> Ongoing: _____ (Date)	<p>There are four pieces to this goal: 1) develop better outcomes assessment processes to get the type of data that we really need, 2) determine the “stumbling blocks” students face in the basic classes, and particularly in the courses they take the following semester, and then develop strategies to help students be successful and persist to the next semester, 3) Look at the differences in outcomes between instructors, first to see if there are significant differences, and then to see if there is a change needed in teaching methods, structure of course and lab work, or other improvements that would improve the student learning outcomes in those sections.</p>

B. List new or revised goals (if applicable)

New/Replacement Program Goal	Which institutional goals will be advanced upon completion of this goal? (select all that apply)	Anticipated Results
(See comment above the previous list of goals – section A.)	<input type="checkbox"/> 1: Student Learning <input type="checkbox"/> 2: Student Progression and Completion <input type="checkbox"/> 3: Facilities <input type="checkbox"/> 4: Oversight and Accountability <input type="checkbox"/> 5: Leadership and Engagement	See the sections above.

**III. Trend Data Analysis:**

Highlight *any significant changes* in the following metrics and discuss what such changes mean to your program.

A. Changes in student demographics (gender, age and ethnicity).

Female student enrollment in Electronics Technology has increased from 3% in 2009-10 to 4% in 2012-13, where it has held steady through 2014-15. This has corresponded with an increase in the number of CTE Educational Advisors and significant VTEA/Perkins expenditures to increase “non-traditional” enrollment. The effect of the significant expenditures means that less funding is available through VTEA/Perkins to expand instructional technology (through equipment purchases) for program updating. It should be noted that despite the majority of VTEA/Perkins funding directed for core indicator improvement, especially in recruiting non-traditional students, the net gain in female participation over the past five years in the EIT department averages only 1.18% (or 18 more females) compared with 2009-10. In fact, the percentage of female students in the Department has been 11% to 13% in the five year period from 2010-2015. The KCCD District Office (specifically John Means) continues to demand a significant portion of BC’s Perkins/VTEA funding is spent on personnel rather than on improving instructional technology. We estimate that more than 60% of the College’s VTEA funding was spent on personnel.

The age demographic changes annually, but enrollment approximately mirrors the department as a whole, and is between 0% and 4% different from the College as a whole. We do not see any significant impact on our program from this demographic distribution.

The ethnicity demographic is four percentage points above of the College as a whole, with the number of Hispanic/Latino students increasing 17% over the past five years, and the number of White students decreasing 15%. We assume this trend indicates an increase in the number of first generation college students in our program. The College is undertaking efforts to help our first generation students.

B. Changes in enrollment (headcount, sections, course enrollment and productivity).

Unduplicated headcount has risen from 275 in 2012-13 to 359 in 2014-15 (a 32% increase in one year!) Sections increased from 19 in 2012-13, to 26 in 2013-14, to 32 in 2014-15. FTEF increased from 6.4 in 2012-13 to 8.6 in 2013-14 to 10.8 in 2014-15. Adjunct FTEF increased from 22% in 2013-14 to 28% in 2014-15. Productivity increased from 10.9 in 2013-14 to 11.0 in 2014-15.

The unprecedented and record growth in enrollment has created opportunities for increased daytime sections and more frequent course offerings (each semester rather than once per year for a number of courses). It also has taxed our facilities and equipment as more students and sections utilize them. The

**Bachelor's of Science in Industrial Automation (BSIA) opportunity drew a surge in enrollment as the new program was publicized. This year, the enrollments and sections are increasing even more as more students become interested in the BSIA. As the number of sections offered increased, so did FTEF and the percentage of FTEF attributed to adjunct instructors.**

**Productivity for our courses is misleading, since our three unit courses are five hours per week, and our four unit courses are six hours per week. Additionally, our program offered two cohorts (four semesters) of sections for students in the C6 grant program. Because of cohort enrollment and the block schedule, the class size was smaller in most of those sections.**

**We were granted a new hire for the 2015-16 year to accommodate the growth from the BSIA, but have found serious obstacles in obtaining qualified candidates due to the current language for minimum qualifications. Due to the upper-division nature of the courses, a Master's Degree was required when we advertised the position. There will potentially be changes in Title 5 when the State Academic Senate convenes in November. The major problem is a person who has the automation background generally does not have a Master's Degree, since most employers do not require it. Hence, the new language requiring a Bachelor's Degree plus six years of industry experience is expected to provide a pool of qualified and desirable candidates.**

**Assuming we are able to hire the new full-time professor, we will be able to start the BSIA program in Fall 2016 with the junior-level coursework. We will probably need to hire the fifth full-time professor for the 2017-18 school year. Faculty requests will probably be accomplished through the BSIA program review, rather than the Electronics Technology program review.**

C. Success and retention for face-to-face, as well as online/distance courses.

**We do not offer distance-ed courses. Our success rate has fluctuated from 68% in 2009-10 to 72% last year. This has traditionally been 2%-3% higher than the College average. Our retention rate has fluctuated from 84% in 2009-10 to 87% last year. This has traditionally been within several percentage points from the College average (86% last year).**

**Our introductory classes (ELET B1 and ELET B5) continue to be the courses with the lowest success and retention rates. However, the results are fairly typical within our department. These are technically-intensive courses.**

D. Changes in the achievement gap and disproportionate impact (Equity).

**For retention and success rates of male versus female students, there is a -5% difference in female retention and only a -1% difference in female success.**

**For retention and success rates of younger students (19 and younger), both retention and success is 9% less than college-wide. This is not surprising to us, since we have noticed that the younger students have been more likely to struggle with adapting to collegiate expectations and possessing success strategies. Using the Habits of Mind resources and strategies to a greater extent in our beginning courses can help us address this. As we incorporate Habits of Mind strategies in our beginning courses, we expect to see the retention and success rates more closely resemble those of the older students.**

The retention rates when viewed by ethnicity is within 1% of the college average, except for African American students, which were 8% below the college average. The success rates when viewed by ethnicity is between 1% to 6% greater than college average, except for African American students, which were 7% below the college average. The total number of African American students were 13, which was 4% of program enrollment.

E. Other program-specific data that reflects significant changes (*please specify or attach*). All Student Affairs and Administrative Services should respond.

#### **IV. Program Assessment (focus on most recent year):**

A. How did your outcomes assessment results inform your program planning? Use bullet points to organize your response.

##### **1. Increasing "Completion" Rates**

- We decided that we needed to change the requirements for our Certificate of Achievement and our AS degree to make it more beneficial for students to get them if they are also working towards the Bachelor's of Science in Industrial Automation (BSIA). The current CA and AS degree major coursework is 32 units. For students working toward the BSIA, courses above the "core" lower-division technical coursework would not count towards the BSIA, and would put them well above the 120 unit target for the Bachelor's degree. We plan on reducing the required units to 24, of which 19 are the "core" lower division technical courses. The two additional required courses will be selected from among the remaining ELET courses, depending on the career focus of the student. We want to be able to capture the CA and AS "completions" for the BSIA students.
- We also want to have four CA options instead of just one. They will generally follow our Job Skills Certificates (JSC's). Therefore, a student can take the six "core" courses, and can choose additional specializations. Those students wanting to take the remaining ELET courses will therefore be able to earn multiple JSC's, and multiple CA's. Not only will this help our "completion" rates, we feel it will also help students better communicate their occupational areas within Electronics Technology. Currently, the one CA is titled "Electronics Technology," which is a very broad category. The new CA's will be titled by their specific occupational area, such as "Industrial Maintenance," "Telecommunications," "Automation," and "Industrial Electronics."
- We are working on brochures, handouts, and a wall display in our building to clearly communicate the career pathways for students. We will highlight specific job titles, including: Engineer, Engineering Technician, Automation Technician, Industrial Electronics Technician, Telecommunications Technician, Industrial Maintenance Technician, Control Systems Programmer, the career options for those who wish to transfer to a university offering a degree in Industrial Technology, and the various "technologist" careers for which the BSIA can prepare students. We will provide the occupational outlook, salary and work environment, type of employers who utilize those positions, a description of the typical responsibilities and activities of that job title, and the types of skills that are specific to that job title. Then, the process (including courses and SEP-type information) for obtaining the various levels of preparation (entry-level or university transfer preparation, full two-year program level, and university or baccalaureate level). Then, quotes from various former BC students who work in that job title will be used. There will be graphics in the form of flow charts so that students can clearly see the pathway from the beginning of their collegiate experience to the job title/career that they seek. Currently, we have simple lists of classes and the college catalog pages as our main course information. Armed with this detailed information, we hope that students will be motivated in a greater way to continue their progression through the various levels of preparation to a greater extent than we currently experience.

## 2. Determining and Addressing Academic Skill Deficits Early in the Program

- Since many of our students do not take the placement tests, there is a significant lack of understanding where each student is in terms of academic skills. Therefore, when a student is struggling in the beginning courses, it is often difficult for us to know if the issue is lack of academic skills, lack of effort in studying and learning course materials, due to a limited English proficiency, or an undisclosed learning disability. When we participated in the C6 program, all students were required to take a “Work Keys” assessment in math and reading comprehension. Those who scored lower than the minimum were required to obtain additional academic assistance and remediation.

As a result of this experience, we are working on a math skills assessment that we can administer on the first day of class. We also plan on assembling various video and written resources to be placed on a separate Moodle page. Students who test as deficient (or self-identify a need for remediation) can access this page for help. There will also be information on the various opportunities on campus for additional help.

Since our beginning classes tend to have more students in them, and since the pace of those classes does not allow other than a minimal review of math skills, we feel a significant portion of the attrition loss throughout the semester may be due to deficient academic skills.

## 3. Addressing Differences in Course Success Between Daytime and Evening Sections

- Typically, average test scores and grade distributions tend to show that the daytime sections (often predominately younger students or older students who are re-entering the workforce after a long time away from school) as a whole do not perform as well as evening sections in which a majority of students are older and who work full time. This holds true, except for evening students who are taking our courses 3-4 evenings per week in addition to working full time. Those students tend to spend less time on studying, and/or miss more class time due to absences.

As we are able to convert the traditional lecture instruction to an “active learning” model utilizing Moodle to deliver step-by-step instructional activities that students perform in a “learning team” with another classmate, we anticipate that our students will become actively engaged in the learning process in class, rather than in the passive method of lecture. In structuring the assignments on Moodle, students can work at their own pace, get additional content such as reviews and alternate explanations. Those students who work at a faster pace will be able to get enrichment content or can do further investigation online using linked websites.

## 4. Creating a Better System of Outcomes Assessment and Skills Demonstrations

- We have learned during the past several years that we really need to design our testing around outcomes assessment, so we can more readily compile relevant data. We also plan on revising our course SLO’s to allow for a more targeted assessment. As we revise our tests and class assessments, we will structure them to make it easier to obtain outcomes data.
- We have also realized that more of our students are performing sufficiently on the written tests we give, but are missing or are deficient in specific skills, such as using the multimeter or wiring a circuit with actual components using a schematic diagram. We are considering utilizing more practical

exams, and utilizing a grading rubric for the course grade that sets standards for both knowledge-based performance and skills-based performance. This may include replacing a portion of the written tests with a skills competency demonstration. This would make student performance in our courses more closely mirror the expectations of industry.

B. How did your outcomes assessment results inform your resource requests? The results should support and justify resource requests.

In the past five years, we have seen an overall increase in student success. When we consider the changes that have taken place during this time, we can see that there are five different possible causes (which in most cases are a continuing trend from last year's APR):

1. We again increased our stock of equipment and new, relevant technology throughout our program's courses. This allowed a smaller student-per-machine/equipment ratio.
2. We utilized the C6 "guiding principles" and made use of resources available to students and our own instructional methods, including the professional development each of us received. This will be a lasting benefit to our program, even though C6 funding is over.
3. We offered more sections of classes, and were able to offer more daytime classes as well. We were able to add a third full-time faculty member to our program two years ago, and as soon as we can find a suitable candidate, we will add a fourth full-time faculty member to assist with the Bachelors' of Science in Industrial Automation program.
4. We maximized the use of our facilities, and changed course content to move from 4-unit, two days per week classes for all courses to mostly 3-unit, one day per week courses. One more 4 unit course will change to 3 units for next fall.
5. Moodle is used for all our classes to deliver instructional resources to our students. We have received countless student comments praising the use of Moodle in our courses.

One of the important changes in our program has been the Bachelor's of Science in Industrial Automation (BSIA) program. We will add to our 11 lower-division Electronics courses another 17 upper-division Industrial Automation courses. In addition to more than doubling the number of courses in the next several years, we will potentially increase our full-time faculty members from 3 in 2014-15 to 7 in 2017-18.

The main challenge outside of handling the logistical and professional changes that will take place is to ensure that both our lower-division classes and the new upper-division classes continue to have adequate learning outcome performance. Not only is this the best thing for our students, but a successful pilot program at the State level for the Baccalaureate is needed to allow the pilot to continue and for additional programs to be added in the future.

The key for this performance will be in developing curriculum that incorporates the needs of the BSIA program and also allows for BSIA courses to be offered in a manner that allows full-time technical employees to complete upper-division coursework without taking days off to attend morning and

afternoon courses. This will absolutely require courses to be offered using “active learning” instruction (as a “hybrid” course) and to offer some classes online in addition to face-to-face.

Since the College is being forced to run a more aggressive 50% law compliance, the use of release time for curriculum development is strongly discouraged. In our technical program, it is not possible to purchase packaged curriculum to accomplish this. A significant development time of between 3.5 to 6 FTEF in a two year time span appears to be an almost insurmountable issue. Curriculum development is a process that not all program faculty members have current abilities to perform. Those who do will undoubtedly need to work thousands of hours per year on top of their teaching obligations. The special compensation formula in the faculty contract is insufficient to cover the scope of work needed for these courses. If fair and adequate compensation, along with a reasonable accommodation to faculty load are not allowed, the implementation of the BSIA program curriculum will be severely limited.

- C. How do course level student learning outcomes align with program learning outcomes? How do the program learning outcomes align with Institutional Learning Outcomes?

Our current course level student learning outcomes were actually written before the PLO’s and the ILO’s. This has made it more challenging for a cohesive pattern of connections between each level of outcome to be seen. However, as was explained previously, we are in the process of updating both the PLO’s and the individual course SLO’s as we update our COR’s this year. While we also add course objectives, this is an opportune time to make these changes.

Since ILO’s and PLO’s have not changed from last year to this year, we will provide last year’s response:

The Institutional Learning Outcomes for BC were only recently developed; years after our Program Learning Outcomes were developed. Our ILO’s are:

1. Think critically and evaluate sources and information for validity and usefulness.
2. Communicate effectively in both written and oral forms.
3. Demonstrate competency in a field of knowledge or with job-related skills.
4. Engage productively in all levels of society—interpersonal, community, the state and nation, and the world.

Our program’s PLO’s are:

1. Students will demonstrate proficiency in technical skills and safety principles required for industrial employment.
2. Students will demonstrate problem solving skills used in industrial design and product development.
3. Students will demonstrate a deep understanding of the core material required for transfer to a four year university degree program or for certification in the department programs.

Note that PLO #2 has been revised since it was originally written, but we are under the impression that we cannot change it now that it has been stated. Our PLO #2 could be re-written as “Students will demonstrate problem solving skills that are desirable for technical employees in the industries in which we train students.”

BC ILO #1 corresponds in some way to all three PLO's, since problem-solving and critical thinking is woven through our courses.

BC ILO #2 is developed in courses specific to written and oral communication, but in some of our courses, there are written and orally-communicated projects assigned.

BC ILO #3 corresponds in some way to all three PLO's, especially once the SLO's for the individual courses in the program are examined.

BC ILO #4, to us in a CTE program, is intended to create an employable, productive member of society. Each of our PLO's are meant to emphasize the overall skill areas for employment in the industry sectors for which we prepare students.

**Institutional Learning Outcomes:**

Think: Think critically and evaluate sources and information for validity and usefulness.

Communicate: Communicate effectively in both written and oral forms.

Demonstrate: Demonstrate competency in a field of knowledge or with job-related skills.

Engage: Engage productively in all levels of society – interpersonal, community, the state and the nation, and the world.

D. Describe *any significant changes* in your program's strengths since last year.

- Our President encouraged us to incorporate “Drone Technology” into our curriculum. A significant amount of faculty research time and equipment purchases were funded through the STEM grant, the Wonderful Company (Paramount Farms), and Project Lead the Way (Chevron) funding. We were able to offer a robotics camp this summer focused on the agricultural applications of Drones and special vision software to show middle school students (through the second year of the Paramount Academy Ag Camp) those applications. Students who participated in the program provided very complimentary feedback on the value of the activities. Middle school students in a different set of schools participated in a robotics camp featuring the Drone Technology in an outreach effort this summer as well. Again, we received positive comments from participants and teachers alike. Finally, we used the Drones again during a MESA Week Zero activity for incoming BC freshman Engineering students. The Drone Technology is a durable resource that will provide opportunities for students and outreach efforts for years to come.
- A student tutor for Electronics courses, especially the introductory courses of ELET B1 (Basic Electronics), ELET B5 (Programmable Logic Controllers), and ELET B70 (Mechanical Systems) where students most need assistance for successful completion of the courses, and for a greater potential for persistence and completion. Last year, C6 funded the tutors. This year, supplemental instruction funding is being pursued to continue this program. An estimated 92% of students who received tutoring assistance last year were able to complete the course(s) with a C or better, and most persisted to the following semester's coursework in Electronics.
- Approximately \$75,000 of Proposition 39 funding was used to purchase additional Motors and Controls training equipment, and to purchase supplies to build additional training equipment for the program.

- Our Computer-Integrated Manufacturing (CIM) lab again received significant funding from the STEM grant, further increasing the ability for students to receive current technology and relevant activities. This continued the trend of maintaining the BC CIM lab as a model environment for CIM instruction. We believe this lab is an exception among California facilities and rivals other CIM instruction throughout the nation.
- We completed two cohorts of C6 students in the spring. One of the students in the second C6 cohort participated in a paid internship for Linn Energy this summer – the first such internship offered by the company. Her success in the internship has created a willingness by Linn to offer other internships in the future.
- Due to our four new Job Skills Certificates: Manufacturing Automation, Industrial Maintenance, Industrial Automation, and Industrial Communications, we increased the number of certificates awarded more than three-fold since 2013-14 and ten-fold since 2011-12.
- Our faculty members worked many hundreds of hours unpaid on building instructional equipment, writing lab manuals and activities, curriculum work beyond what the average faculty member is expected to do, visiting industry sites, and other program improvement efforts.

E. Describe *any significant changes* in your program’s weaknesses since last year.

- **Facilities:** When we completed the application for the Bachelor of Science in Industrial Automation (BSIA) degree program, we determined that we could alter scheduling (Friday night and Saturday sections) assuming that there were two additional resources available: 1) An additional Automation lab, and 2) Availability of lecture space during the day and evening. It appears that the Aera Energy donation to establish a STEM Success Center in the space currently occupied by skilled trades (M&O) will allow the MESA Center to relocate from its room in Science and Engineering, opening that facility up for remodeling and repurposing into an Automation lab shared by Electronics Technology, Industrial Automation, and Engineering. However, room IT201 is used during the day by the Nursing Program. If this classroom were to be regained by our department, or if a suitable alternate location is gained, we can expand the program offerings by scheduling the lecture portion of the courses to an alternate location, instead of using the labs for lecture as well.
- **Staffing:** Last year, we offered 32 sections of Electronics classes. The previous year (2013-14), we only offered 26 sections. We are now up to three full-time faculty members (soon to be four once the BSIA position is filled), and up to five adjunct instructors. We are now seeing even stronger enrollment since we started publicizing the BSIA program, including several students who moved to Bakersfield to participate in this program.
- **Curriculum Development:** It has become very clear that our desire to change our lecture portion of our courses to an “active learning” (“flipped classroom”) instructional method will provide significant benefits to student learning outcomes. However, with the extensive amount of time the BSIA required, and the lack of curriculum development resources (release time or availability of “outside of work hours” that could be compensated), progress on this type of curriculum development was almost non-existent last year. We know what needs to be done, and have researched the best practices for developing this type of curriculum. We just need the time available to perform the development work.

**Obtaining current, relevant curriculum for our program, particularly for the upper-division specialized technical courses continues to be a challenge. For example, we are utilizing many pieces of training equipment that we have built ourselves, because commercially-available units do not exist for those particular technical skills. Likewise, even our commercially-available units have curriculum that differs significantly between companies. We have had to write our own curriculum or adapt the curriculum that came with the piece of training equipment. In comparison to all other Engineering and Industrial Technology programs, we perform far more curriculum development on our own.**

F. If applicable, describe any unplanned events that affected your program.

**The Bachelor's of Science in Industrial Automation (BSIA) was approved by the Chancellor's Office. We were anticipating this, but the additional workload (and an enrollment surge) provided additional challenges.**

**V. Assess Your Program's Resource Needs:** To request resources (staff, faculty, technology, equipment, budget, and facilities), please fill out the appropriate form. <https://committees.kccd.edu/bc/committee/programreview>

A. Human Resources and Professional Development:

If you are requesting any additional positions, explain briefly how the additional positions will contribute to increased student success. Include upcoming retirements or open positions that need to be filled.

The Electronics Technology program, for the Bachelor's of Science in Industrial Automation (BSIA) will begin offering upper-division Industrial Automation (INDA) courses beginning next fall with the Junior-level coursework, and in fall 2017 with the Senior-level coursework. An estimate of the anticipated enrollment in the program - which will include 17 new upper-division technical classes – shows a need for 4 more full-time faculty members in the program by the time it reaches full capacity. For details of the projected enrollment, please see the BSIA application.

The specific justification for the position beyond the anticipated BSIA enrollment is as follows:

- The non-duplicated headcount for the Electronics Technology program (ELET) is steadily increasing:  
From 273 in 2013-14 to 359 in 2014-15 (+32% increase)
- The FTES for the ELET program has also steadily increased:  
From 78.6 in 2012-13 to 93.5 in 2013-14 (+19%) to 119.1 in 2014-15 (+ 27%)
- The number of ELET sections has also steadily increased:  
From 19 in 2012-13 to 26 in 2013-14 (+36%) to 32 in 2014-15 (+23%) If the same section increase occurs next year, we would have to add three additional sections (approximately 1.0 load) each semester to handle the increased demand that is occurring, not including additional sections for the BSIA and the other sources of program growth (such as the Engineering Technology degree, classes at the Delano Center, and dual-enrollment classes at rural high schools).
- Yearly FTEF last year was as follows: 5.7 full-time (53%), 1.3 overload (12%), 3.0 adjunct (28%) and 0.7 in summer (7%).
- It has been difficult to find qualified adjunct instructors in our discipline, particularly for daytime courses. We currently have five adjunct instructors and three full-time professors. We anticipate most of the sections for the BSIA program will be daytime courses at least during the beginning.
- One of our faculty members recently became qualified to teach Engineering courses last year, and has taken on a lab section of ENGR as overload. Sharing this faculty member with ENGR will most likely continue in the near future.

- A revised program, Engineering Technology, has several ELET courses required, with others as electives. Once this program is publicized and enrollment gains ground, additional sections of the required ELET courses will add to the demand for program classes on top of the two-year students and the BSIA students.
- As part of the “rural schools initiative,” it is expected that Arvin and Delano students (and possibly more cities) have in place dual-enrollment ELET classes that lead to the BSIA or a program in Logistics (in Arvin). Electronics is not taught at those high schools, making it appear that we will have to provide faculty members to teach those dual-enrollment courses. Finding qualified credentialed high school teachers for Electronics has been nearly impossible.

2. Professional Development:

a. Describe briefly the effectiveness of the professional development your program has been engaged in (either providing or attending) during the last year, focusing on how it contributed to student success.

**We have participated in specialized training in “embedded remediation” through our C6 grant. Several faculty members have received industry-related training as well. Both of these have the potential to contribute to student success in the areas of instructional methods and technical skills updating.**

**In the spring of 2015, all three full-time Electronics faculty members attended the Allen Bradley/Rockwell Automation Fair in Anaheim. This was covered by the VTEA grant, and included hands-on training, seminars, and an extensive trade show featuring the latest automation technology.**

**For 2015-16, as we start dividing up responsibility for the BSIA upper-division technical classes, the faculty members teaching those programs will need to get specific training in the technical areas that those courses cover.**

a. What professional development opportunities and contributions can your program make to the college in the future?

**Our program is not one that usually is called upon to provide training for other areas. However, should anyone want our help, we are glad to assist.**

B. Facilities:

How have facilities’ maintenance, repair or updating affected your program in the past year as it relates to student success?

**We have received maintenance and repair assistance through our M&O department, and from our Department’s maintenance person. These were normal maintenance issues, since we have three labs and hundreds of thousands of dollars of equipment in those labs. The impact on student success was through the ability to have a functioning facility and equipment fabricated and repaired in order for students to perform the scheduled hands-on lab activities.**

How will your Facilities Request for next year contribute to student success?

**Currently, our labs are overflowing with equipment and our storage capacity in the labs and our assigned storage areas are full to capacity. In addition, we have used hallways and portions of other labs (such as INDT 7) to store items.**

**It is clear that the District and College administration strongly support initiatives to increase student access in northern Kern County by expanding course offerings at the Delano Center. Additionally, since we are limited in the number of Electronics sections we can offer on the main campus due to limited facilities, our growth opportunities (increasing student access) will need to take place at locations other than the main campus.**

**We will need whatever classroom space is to be used for Electronics at the Delano Center or at neighboring RFK High School to be wired and equipped for the equipment and lab work we will be doing there. At this point, the location has not been determined, but we are awaiting a meeting with Richard McCrow to discuss our options.**

**We are talking with the Delano High School District on the design of a new high school in Earlimart which will offer 4 of the 6 lower-division technical courses for the Bachelor of Science in Industrial Automation (BSIA). This school will not open until the 2018-19 school year, so this resource is far in the future. However, dual-enrollment classes will be possible, and evening sections also possible to relieve the need to add additional lab space to the Delano Center**

**We are still requesting another storage location for equipment we use in our labs. As CTE faculty will know, a lab-based program requires specialized equipment. Due to the variety of courses we offer, the expansion of learning activities cannot be accomplished without either removing student workspace (lowering the number of students served) or obtaining another lab location (which does not seem possible considering the extensive facilities use on campus.) Not adding current technology or curtailing the lab work students can perform are the two possible impacts on student success if we cannot receive the additional storage space.**

**The Bachelors of Science in Industrial Automation (BSIA) program will require the addition of seven new lab-type classes, with additional equipment and supplies. Our current facilities are not able to accommodate these additional resources without at least one additional storage area in which to place the equipment when it is not being used for lab that day.**

**C. Technology and Equipment:**

- 1. Understanding that some programs teach in multiple classrooms, how has new, repurposed or existing technology or equipment affected your program in the past year as it relates to student success?**

**This past year, we did not receive any new or replacement instructional technology funded through College or District accounts. New lab equipment that we received was covered elsewhere on this program review form.**

- 2. How will your new or repurposed classroom, office technology and/or equipment request contribute to student success?**

**Replacing the computers in the CIM lab is essential – since those computers are over 10 years old. The current software we need to run (which we have access to) cannot be utilized to the extent needed due to the fact that the old computers do not have enough memory and high enough processor speeds to handle the new software. Students receive less benefit than they could be receiving with the software limitations that currently exist.**

3. Discuss the effectiveness of technology used in your area to meet college strategic goals.

**Computers and Technology:** We still have needs for computer upgrades and additional laptops for our lab. The computers in our CIM lab have not been upgraded in years. The software used for PLC programming and the CIM cell has been problematic at times because of the age of the computers. In addition, we only have one printer that is shared between three labs. This printer is at least five years old, and its mate has already broken down. We made a request through ISIT for printers last year, but did not receive them.

The equipment needs are for several reasons. First, in expanding to Delano, we need to equip the facility with a standard stock of equipment. We also have equipment that is wearing out due to consistent use. This equipment cannot be purchased from VTEA funds because this is considered “supplanting” the College budget, and that is not allowed. The final reason is that for our Radio and Telecommunications courses, we were able to borrow the more extensive test equipment from the employer of the adjunct faculty member teaching those courses. Two years ago, we hired him as a full-time faculty member. Since he is not employed by that company any more, they are not willing to loan the equipment. Requests to other local employers have been declined, since those local companies do not have spare equipment that is not used regularly by their employees.

**Additional equipment needs are based on lab requirements for the BSIA program, which may be covered on that program’s APR.**

- D. Budget: Explain how your budget justifications will contribute to increased student success for your program.

**An anticipated increase in budget for instructional supplies, maintenance, and equipment replacement was written into the Bachelor’s of Science in Industrial Automation (BSIA) proposal, and unit plan. This will be important to handle the increase in sections, additional courses, and upper-division changes in course delivery and structure.**

#### **VI. Conclusions and Findings:**

Present any conclusions and findings about the program. This is an opportunity to provide a brief abstract/synopsis of your program’s current circumstances and needs.

- **The BC Electronics Technology program has been building and improving for many years, most notably:**
  - **Unduplicated headcount has increased from 229 in 2011-12 to 359 in 2014-15 (almost 57%). Likewise, the number of sections has increased 88% in the same time period.**
  - **Our selection to be one of the 15 colleges in the baccalaureate pilot program has brought an unprecedented growth opportunity: adding an additional 17 upper-division technical classes within the Industrial Automation (INDA) discipline (which will be the upper-division extension of Electronics Technology (ELET), add three upper-division general education courses to the campus, more than double our full-time faculty in the program (from three currently to seven by approximately 2018-19), create additional requirements to expand our equipment, improve our facilities, and get dedicated staff (such as a dedicated counselor) as a result of the administrative re-structuring that supported the addition of the BSIA program.**
  - **Recent and current grant and corporate donations have and will allow us to add another one-half million dollars or more in equipment and instructional resources. This will supplement the current stock of equipment that has a replacement value of well over one million dollars.**

- **Bakersfield College will be the only educational institution in the country with a Bachelor’s degree program specifically in Industrial Automation, and only one of a few educational institutions that address automation as a central focus.**
  
- **We have been strongly focused on making sure we are adequately preparing students for technical employment (through continual feedback from advisory committee members and the leadership of local industrial companies within the industry sectors we serve), are examining available outcomes and labor market data to make sure that our students have met the expectations of industry, and will find a robust employment environment once they are ready to enter their career choice, and are applying the same troubleshooting and problem-solving processes we used as industry employees prior to our BC employment to solve challenges in the course success, retention, persistence, completion, and employment indicators.**
  
- **We are updating existing courses, our Certificate of Achievement and Associate of Science degree, and adding additional CA’s in order to ensure a greater level of completion for our students.**
  
- **We are pro-active on taking advantage of grant funding, working to establish connections with corporate donors (such as Chevron), and connecting with various local professional organizations, such as International Society of Automation (ISA) and the Institute of Electrical and Electronics Engineers (IEEE) in order to utilize their resources and secure funding for program support and student scholarships and activities.**
  
- **It cannot be emphasized strongly enough the differences in the amount of work required to set up and maintain our highly-technical equipment, and to be supported with release time and special compensation to develop curriculum for instruction and lab activities due to the lack of quality curriculum that is commercially available and the highly-specialized nature of the course content we have. Developing this curriculum is far more time-consuming than in probably most other disciplines on campus, and requires significant technical writing and curriculum development experience that is not part of the skills-sets of the average CTE faculty member. The curriculum must meet collegiate-level expectations, particularly in the upper-division courses, so they cannot be of a general/generic level that is typical of most commercially-available products. It will be an almost insurmountable obstacle to implementing the entire upper-division technical coursework (17 courses) within a time frame of only 24 months! When program faculty are required to teach at least a full load each semester, there are not enough hours outside of the instructional obligations to develop the curriculum. We suspect that most faculty members on campus, and most administrators as well do not realize the extent of this challenge! Unless we are able to utilize partial or full release time for curriculum development, our implementation of the BSIA degree may not meet the required deadlines, and our ability to deliver on our commitments to the legislature, State Chancellor’s Office, and particularly our students may be threatened.**

**VII. Forms Checklist (place a checkmark beside the forms listed below that are submitted as part of the Annual Update):**

- Best Practices Form **(Required)**
  - Curricular Review Form **(Instructional Programs Required)**
  - Certificate Form **(CTE Programs Required)**
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- |  |  |  |
|--|--|--|
| <input checked="" type="checkbox"/> Faculty Request Form | <input type="checkbox"/> Classified Request Form | <input type="checkbox"/> Budget Form                                     |
| <input type="checkbox"/> Professional Development Form   | <input checked="" type="checkbox"/> ISIT Form    | <input checked="" type="checkbox"/> Facilities Form (Includes Equipment) |

Other: \_\_\_\_\_