

Bakersfield College 2018-2019 Program Review – Annual Update

Program Name: Electronics Technology

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. There are several new and pending certificates and their associated AS degrees that utilize our courses.

Bakersfield College, as part of the California Community College system, provides CTE, transfer, and basic skills coursework. Additionally, our program provides a baccalaureate-level degree in Industrial Automation as a means of increasing baccalaureate degree attainment in our community. 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 (through 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.

Instructional Programs only:

- A. List the degrees and Certificates of Achievement the program offers
**Industrial Technology, Electronics Technology Option AS Degree
Electronics Technology Certificate of Achievement
Industrial Automation Certificate of Achievement (new)
Industrial Automation Associate of Science Degree (new)**

- B. If your program offers both an A.A. and an A.S. degree in the same subject, please explain the rationale for offering both.
We only offer a AS degrees; no AA degrees.

- C. If your program offers a local degree in addition to the ADT degree, please explain the rationale for offering both.
No ADT degree is available in our discipline.

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. Please provide an action plan for each goal that gives the steps to completing the goal and the timeline.

1. Program Goal:

Manage and support the various initiatives that target potential students, as well as students who are enrolled in related high school programs.

List the institutional goals from the Bakersfield College Strategic Plan that will be advanced upon completion of this goal?

Student Learning, Student Progression and Completion

Progress on goal achievement:

Years before the dual enrollment program, we helped Independence High School implement a Basic Electronics course for their Energy and Utilities Academy. Last year, we assisted Robert Kennedy High School in Delano in setting up a potential four course sequence that feeds both our lower-division Electronics Technology program, but are also courses required for the Industrial Automation baccalaureate degree. We also were very active partners with the KHSD Regional Occupational Center in starting a brand-new Industrial Automation ROC program. Both the RFK High School and the ROC are now direct "feeders" into our college programs. We also hosted RFK students on campus, and have done several events with ROC – as a means of outreach to our potential students.

Status Update – Action Plan and any link to Resource Requests:

We plan to continue supporting the programs we have been. No specific resource requests were submitted to support this goal

2. Program Goal:

Refine the curriculum and course delivery systems to provide the maximum flexibility for students to receive their educational levels of choice.

List the institutional goals from the Bakersfield College Strategic Plan that will be advanced upon completion of this goal?

Student Learning, Student Progression and Completion

Progress on goal achievement:

With the exception of our recent hires, our full-time faculty members have been trained on Canvas and related instructional technologies, with much of that training taking place during the previous school year. By the end of this school year, 7 out of 10 of the Electronics Technology (ELET) courses will be offered in hybrid format. All but the Graphics class in the baccalaureate will either be offered hybrid, or completely online. This allows us to offer more sections in the limited lab spaces we have. We also

completed the change of our remaining 4 unit ELET courses to 3 units, which also better utilizes our limited facilities. This also reduces the total units for our CA and AS degrees, bringing them closer in line with other program's total unit counts.

All our ELET courses were updated last year, allowing us to realign content among courses without sacrificing the depth and breadth of classes in a negative way. There was some duplication of content among our classes prior to this revision.

Status Update – Action Plan and link to Resource Requests

Because of switching to hybrid format, and changing the remaining 4 unit classes to 3 units, we have been able to schedule evening classes on only one night per week, and the daytime classes where there are three time blocks for classes to be offered. This has allowed us to increase the number of sections by seven last year (+18%) and this trend continues this year. Anecdotally, we are seeing positive results in the hybrid courses compared to our face-to-face courses. We hope for an increase in success and retention rates in those classes as well. We will continue to increase the implementation of hybrid courses to the fullest extent possible, and will also work on ways to help the traditional students that may have difficulties adjusting to the hybrid format.

B. List new or revised goals (if applicable)

Program Goal:

Due to the ever-changing technology found among the industry sectors we support with the Electronics Technology and Industrial Automation programs, we will take advantage of every opportunity to upgrade and expand our technological and instructional resources. This includes the areas of computer-aided manufacturing (CIM), automation and robotics, instrumentation and motion control, programmable controllers, mechanical systems and electronic communications. This goal will include staff development, training, and collaboration necessary to utilize our resources to their fullest extent.

List the institutional goals from the Bakersfield College Strategic Plan that will be advanced upon completion of this goal?

(Student Learning, Student Progression and Completion)

Progress on goal achievement:

Our program, including the baccalaureate degree, has received well in excess of \$300,000 in recent years towards equipment purchases. Several years ago, we were given an additional lab facility (our robotics lab in SE46) that included facilities improvements. These purchases were made possible through baccalaureate funds, Strong Workforce funds, several private donations, and some VTEA/Perkins funding. Automation faculty members received specialized on-site and manufacturer-based training in the new technologies that have been implemented. Strong Workforce funding, as well as several other grants are

forthcoming for this year. Our Lab Technician, as well as M&O has also performed work to install, upgrade, and maintain equipment and facilities.

We wish to emphasize that setting up this equipment and implementing it during instruction is very time-consuming in itself. Hundreds of hours of uncompensated work have been performed by faculty members outside of contractual obligations.

Status Update – Action Plan and link to Resource Requests:

In this year's resource requests, we have projected all the possible enhancements to our courses with equipment and instructional technology. There have been grants and initiatives that have remaining funds, so we wanted to show the needs for the basic funding, as well as any unspent funds that could be redirected to our program's needs.

Our professors have been training on new technologies, and there has been a significant amount of communication to local employers. This training and feedback helps us identify our needs for technology updating, and therefore, the equipment needed to accomplish this. This has been a regular process each year, and we will continue it in the future.

Program Analysis:

Take a look at your trend data (all programs should have some form of data that is used to look at changes over time). *All programs will answer the following questions unless otherwise indicated.*

1. Please report on any unexpected changes or challenges that your program encountered this cycle:

Institutional data shows the following trends:

Unduplicated headcount in the program was down last year by **21** students out of the previous year's 392 students. Compared with 2013-14, the enrollment increased by 36% (**98** students). This does not include baccalaureate degree students taking upper-division classes. We also wonder if the two courses with a different six-digit TOP code were included in the calculation, as this change in TOP code was a recent change. The number of female students increased from **12** in '13-'14 to **45** last year! The number of younger students (under 20) increased 9% in the past five years, which was the greatest demographic change for our program. The number of sections offered increased from **26** in '13-'14 to **45** last year. Student success increased slightly, as did retention during the past five years, but the difference between program and college indicators remained within a few percent. AS degrees and CA's increased slightly, and Job Skills Certificates increased significantly.

There have not been any substantial negative changes or challenges this past year for our program. We are not sure of the reason for having 21 less students participating in our program last year, but we are encouraged that enrollment has not decreased in our CTE program during this time of a good economy to the extent it has done so in the past. We are keeping an eye on the enrollment trends, though.

2. How does your trend data (or other data your area collects) impact your decision making process for your program?

We have monitored the institutional data and our labor market data annually, since program review became an annual cycle years back. We are encouraged, for example, that younger student participation in our program has increased, and that the number of women in our program has increased almost 400% in the past five years. We can see that outreach efforts and the “draw” of the baccalaureate degree has helped bring in younger students. That also means that we schedule more daytime classes for those students in order to help them with access to the recommended 15 units per semester. The increase in women is welcome by our local employers who would like a more gender-diverse workforce.

Several key pieces of data that would be helpful but are not available are: 1) the number of our students who are “full-time” students compared to “part time”, 2) the number of students who are considered “skill builders” but who do not reflect on our traditional “completions” of certificates and degrees, and 3) the difference in grade distribution of our classes previously taught face-to-face in comparison to those that are now in hybrid format. We could make the following determinations if that data was available: 1) are our students taking the advice to enroll in 15+ units to aid in timely completion, 2) a quantified benefit that our program is providing to our local employers, and 3) how is grade attainment different between face-to-face and hybrid sections of the same course – to have real data instead of anecdotal student comments.

The main data sources that have the most impact on our program are the labor market data, and to a greater extent, the assessment data for our courses. Both data sources have changed the course content, the types of certificates and degrees we offer, and how we teach and assess course content.

3. Evidence of Department Dialog of data

- If you have had time to review and discuss your program’s data with members of your department, attach documentation of your discussion. Documentation can come in the form of minutes from meetings or retreats, email dialog or any other ways that show substantive discussion.

4. Were there any changes to student demographics (age, gender, or ethnicity) for the past cycle?

Yes, an increase in younger students (under 20) and female students. See above for details.

5. Were there any changes to student success and retention rates for face-to-face and online courses? (instructional only)

Yes, we have had slight changes from year to year in success and retention rates, but the change has been several percentage points. There is not enough of a variation to show a significant trend over time. We have only recently offered courses in “hybrid” format. We are not sure if “hybrid” courses are counted in face-to-face or online statistics.

6. Equity gaps

- Please look for large differences, or gaps, between top performing groups and others. Consider how you could identify the reasons behind these gaps, and if there changes that could be made to reduce them. For in depth review of equity issues, and on changes that are being made campus-wide, please refer to the current [Bakersfield College Student Equity Plan](#).

Interestingly, female student success and retention rates are 5-7% higher than male students in our program, which we interpret to mean that female students are actually faring better in our classes. We are really proud of this! Younger students have the lowest success and retention rates among the age groups, which is concerning. We are seeing external forces (not used to college-level expectations, poor study habits and less motivation to complete and submit homework by the deadlines) not addressed by their previous educational environment. We have spent more time on our initial course orientation and reminders to students, and have been using early alert and now “Starfish” to help with this issue.

Regarding ethnicity, our success and retention data as compared to collegewide is within several percentage points. We hope that college-wide efforts that are part of our equity plan can address the disparities between the various ethnic groups.

7. Please describe any recent achievements of your department, including but not limited to faculty who have won awards or distinctions, new projects your department has implemented, professional development work, professional conference presentations or recently published work.

Several of our faculty members have been trained in advanced automation and robotics, supporting the automation classes and allowing our program to award training certificates for specific manufacturers and technologies. We have revised all our courses last year, and have made instructional improvements (particularly in the implementation of “hybrid” courses) to make our courses more accessible to our students and provide them with many more resources than they could access in the past.

There have been significant facilities improvements and equipment improvements as well. The instrumentation area in the INDT 6 lab was rebuilt and improved to allow the new “trainers” that are being college-built to have adequate space and infrastructure. The CIM lab (INDT 7a) has been fitted with a very comprehensive “CIM Cell” which is a fully-automated (miniature) simulated industrial process environment. It goes through the processes of raw material storage, blending, packaging, and placement into an automated storage and retrieval system (ASRS), which along with the instrumentation and motors/controls classes cover the entire production cycle and its theoretical background.

Our program and some of our faculty members continue to offer the baccalaureate coursework, with a full two years of upper-division courses offered last year and continuing as long as the pilot program continues. We had seven graduates last year, with all of them either working in industry, doing internships or further education, and one of our graduates is being trained to serve as an adjunct faculty member. We are anticipating at least 14 students on target for graduation at the end of the semester, and several dozen upper-division students completing coursework in anticipation of graduating next year.

We continue to maintain the record enrollment trend that started in 2014-15. We offer more sections than ever, and we have expanded summer section offerings as well.

8. The college has embarked on significant efforts such as **Guided Pathways, affinity groups** and **completion coaching communities** to improve the success and completion rates of our students. Please describe what your program/department/office is doing to contribute to these efforts.

We have participated in the activities that we've been requested to include among our responsibilities. We are converting our Job Skills Certificates to Certificates of Achievement this year to help increase our completion rates. When those changes are approved, we will update our course sequence documents and create a graphic handout to show students a road map to achieving multiple certificates as they take courses in our program. We also have participated in the communication plan to encourage student completion, taking 15+ units, completing their education plan early in their time at the college, seeing their Counselor or Academic Advisor, and other issues.

9. Explain your role if you are involved in Dual Enrollment, Inmate Education, or Rural Initiatives.

We are involved with dual enrollment classes at RFK HS in Delano and at the KHSD ROC. Past participation in dual enrollment occurred through Independence HS.

Analysis of Received Resources from Previous Cycle

Discuss the type of resources you received and their Impact on program effectiveness?

Facilities:

If your program received a building remodel or renovation, additional furniture or beyond routine maintenance, please explain how this request or requests impacts your program and helps contribute to student success.

As mentioned above, our INDT 6 lab had assistance from M&O to reconfigure and build infrastructure to safely provide the needs for the instrumentation equipment ("trainers") in the lab.

The impact on our program is that our students can utilize the equipment safely and in the best location. We are building several new trainers that can be used in that location without further needs for expansion or reconfiguring the lab. This new equipment is part of our ongoing effort to offer as many hands-on activities from the topics in the textbook/reading materials/lecture as possible. When we can augment the lecture and reading materials with hands-on activities, students will learn and retain the knowledge and skills much better than when only covered in lecture and readings.

There were also improvements to the CIM lab (INDT 7a) that were made by faculty members with the assistance of M&O and our Lab Technician (who has been valuable in helping us set up the facilities needs and equipment).

Technology:

If your program received technology (audio/visual – projectors, TV's, document cameras) and computers, how does the technology impact your program and help contribute to student success?

We did not receive any instructional technology this past year. We have requested replacement computers and LCD projectors during this year's program review.

Other Equipment

If your program received equipment that is not considered audio/visual or computer equipment technology, please explain how these resources impact your program and help contribute to student success.

Last year, we received several hundreds of thousands of dollars worth of technical training equipment for our labs, and this has definitely improved instruction by providing industry-current experiences for our students. The courses receiving equipment have been in the automation/process control, motors and motion control, and industrial networks and communications.

One of the most common remarks by business and industry visitors to our program's facilities is how much equipment we have that is the same as they have at their facilities. The equipment has been vital in maintaining the current technology used in industry, being able to provide upper-division technical classes that have the depth of knowledge and academic rigor that is expected in a baccalaureate program, and it also has met the requested technical needs that were identified by our local employers and industry advisors.

Our stock of equipment has evolved from the "basics" of hands-on experiences for a technical employee to a much broader set of relevant experiences. We are finding (anecdotally) from recently-hired students and technical managers that the quality of instruction and training our students receive has been evident and appreciated.

Conclusion:

Present any conclusions and findings about the program. This is an opportunity to provide a brief abstract or synopsis of your program's current circumstances and needs. Consider this a snapshot of your program if someone were to only read this portion of your annual program review.

The Electronics Technology program at Bakersfield College is on its 92nd year, beginning in the 1926-27 school year. We are the fastest growing program in the combined "Engineering and Systems" and "Industrial Technology" departments, with an increase in enrollment of 41% over the past five years. Almost 200 students each semester take our courses for one or more of the following reasons: "skills builders" (those needing a few classes to advance in their jobs), those interested in long-term and/or short-term certificates, those seeking an AS degree and/or are interested in our Industrial Automation Bachelor of Science Degree, or those in other technical disciplines who take our classes for relevant knowledge in their career pursuits.

All our faculty members have industry experience to some degree, with two of our faculty members having also served in management positions while in industry. Our facilities are among the best in the state – among community colleges and most Industrial Technology CSU campuses. Through grants, state and federal funding systems, and workforce development funds (including Strong Workforce) we have over 1 million dollars of purchased and school-built training equipment. We have advanced-level equipment covering: motion control, instrumentation and process control, computer integrated manufacturing, automation, and robotics.

Although enrollment has flattened out for the past two years, our Industrial Automation baccalaureate program has a steadily increasing enrollment. The graduation rate this year should be twice the previous year (which was the first graduating class for the baccalaureate). Dual enrollment programs at the Kern High School District Regional Occupational Center and Robert F. Kennedy High School in Delano will continue to feed our lower-division and baccalaureate programs.

We have been highly supported by our administration, with sufficient full-time staffing that has increased from 2 FT faculty members 10 years ago to six last year (including faculty for the baccalaureate). Our department budget is sufficient to support and maintain our program. We've had additional financial support from the local chapter of the International Society for Automation (ISA) of over \$45,000 since 2007 that has been used for various purposes, including scholarships, equipment building supplies, a paid student internship, book loans, and for our student ISA activities on campus.

In past years, when the economy is strong as it is now, enrollment usually drops in CTE programs. However, our enrollment continues to be strong and our industry commitment is high (especially in terms of participating in and providing the baccalaureate senior project and internship sites). We look forward to placing even more of our students than ever into well-paying and secure industry positions. And we look forward to continued curriculum development, industry training, course and program enhancement, and student success.