

Bakersfield College

Program Review – Annual Update

I. Program Information:

Program Name: Engineering Technology

Program Type: Instructional Non-Instructional

Program Mission Statement:

Engineering Technology is an instructional program that strives to offer effective and student-centered instruction and training in the engineering technician discipline, being sensitive to the diversity of our students, their educational needs, and career goals.

Program Description: Describe how the program supports the [Bakersfield College Mission](#).

The Engineering Technology program supports the institutional mission by providing the academic coursework and technical training to prepare students for employment in engineering technician positions. Students are not only prepared for such support positions by completing transfer level mathematics, physics, chemistry, and general education courses, but also by developing technical skill sets through specific technology coursework such as AutoCAD, SolidWorks, manufacturing, and electronics.

Historically, this program was a transfer program to four year university Engineering Technology programs. However, with the discontinuation of many Engineering Technology programs in California public universities and the low transfer rate in the program, the Engineering and Industrial Technology (EIT) Department is currently modifying the degree program to better prepare students for engineering technician positions to meet local workforce need. As a result, fewer engineering and math courses along with more technology courses will be integrated into the degree program. In addition, this updated program will fit better with the efforts to establish a Baccalaureate degree in Industrial Automation.

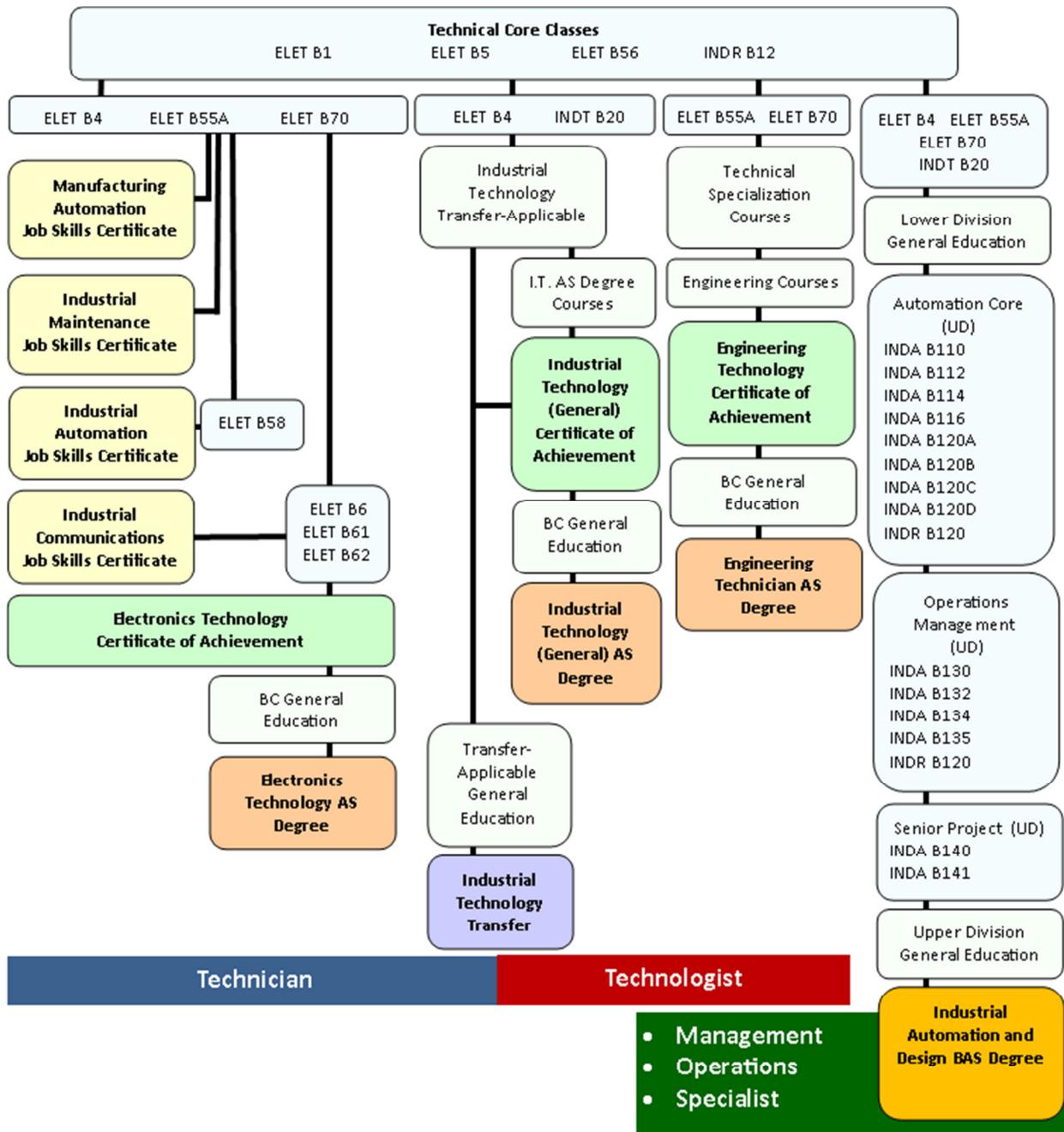
II. Program Assessment (focus on most recent year):

A. How did your outcomes assessment results inform your program planning?

Within the last 5 years, only one A.S. degree in Engineering Technology was awarded and no transfers in Engineering Technology took place. Industry partners have indicated there is an increased need for technicians with stronger science and math backgrounds who could be employed in engineering support positions. Thus, the EIT department began the process of modifying the degree to better fit the local workforce needs.

According to the California Community Colleges Chancellor's Office, Engineering Technology must include at least trigonometry in the program. Currently, the degree program requires two semesters of calculus and numerous engineering courses. There will be a reduction in the number and type of engineering courses and the highest math course required will be Math B1b, the pre-calculus course containing trigonometry.

The Engineering and Industrial Technology department is supporting the college's application for a Baccalaureate of Applied Science (BAS) in Industrial Automation pilot degree program. The integrated planning of the Electronics Technology and Engineering Technology programs along with the BAS in Industrial Automation is illustrated in the diagram listed on the next page.



The A.S. degree in Engineering Technology will be interdisciplinary with the existing electronics technology programs which support the highly technical workforce skills needed by industry.

B. How did your outcomes assessment results inform your resource requests?

The EIT department is not making any resource requests at this time that directly relate to the engineering technology program.

C. Instructional Programs only: How do course level student learning outcomes align with program learning outcomes?

Currently, the engineering core courses for the A.S. degree in Engineering Technology provide the theoretical base for upper division work at the university. Most of these courses require projects that result in a design and development of a product and all of these courses require significant problem solving methodologies. Thus, all the student learning outcomes in the engineering courses required for this degree align with the third program learning outcome (Students will demonstrate a deep understanding of the core material required for transfer to a four year university degree program in engineering technology) and the second program learning outcome (Students will demonstrate problem solving skills used in engineering technology design and product development).

ENGR B47 (Introduction to Engineering and Design) and ENGR B45 (Properties of Materials) include lab components which require safety training in addition to training on the use of equipment typically used in industry. ENGR B24 (Engineering Graphics) and ENGR B19c (Programming in Science and Engineering with C/C++) include training in software commonly used in the engineering field. Thus, the student learning outcomes in these courses align with the first program learning outcome (Students will demonstrate proficiency in technical skills and safety principles required for employment as an engineering technologist).

Part of the process of updating the A.S. degree in Engineering Technology will include editing the program learning outcomes and aligning these with the course SLOs.

D. How do the program learning outcomes align with [Institutional Learning Outcomes](#)?

The emphasis on problem solving in the second program learning outcome (Students will demonstrate problem solving skills used in engineering technology design and product development) aligns with the first institutional learning outcome (Pursue knowledge and evaluate its consequences). The third program learning outcome (Students will demonstrate a deep understanding of the core material required for transfer to a four year university degree program in engineering technology) aligns with the third institutional learning outcome (Demonstrate knowledge and abilities in a chosen area of study).

Although there are no program learning outcomes that directly link to the second and fourth institutional learning outcomes, there are student learning outcomes in ENGR B47 (Introduction to Engineering and Design) that align to these ILOs. In particular, the student learning outcomes “Document and present technical material by writing memos, reports and a resume in addition to participating with a team on oral presentations” and “Discuss ethical issues in engineering” align with the second and fourth institutional learning outcomes (“Communicate clearly and effectively in both written and oral forms” and “Appreciate their civic responsibilities”).

Part of the process of updating the A.S. degree in Engineering Technology will include editing the program learning outcomes and aligning these with the Institutional Learning Outcomes.

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

Last year the program was taught by a combination of adjunct instructors and overload for full-time instructors. Despite this challenge the program saw an increase in students – 361 on census day versus 352 in 2012-13. This continues a positive growth trend that began in 2010-11. A full-time instructor was recently hired to teach and provide leadership for the engineering program which also impacts the engineering technology program.

Curricular Changes: State C-IDs were vetted for numerous engineering courses, two of which are included in the current engineering technology degree program. Engineering faculty aligned these two engineering courses to the state C-IDs and submitted them for curricular approval. Additionally, faculty are in the process of developing a significant curricular change to the Engineering Technology A.S. degree shifting it from a transfer degree to a technician training program.

Articulation with High Schools: The EIT department continued creating a strong pathway program with Project Lead the Way (PLTW), obtaining funding through Chevron to offer a summer PLTW program for middle school students.

Student Support Services: Supplemental Instruction in the STEM program has expanded significantly with the addition of services located in the library and MS-3/4 in addition to the MESA Center (SE-46). The college will build a STEM Center this year using a \$500,000 donation from Aera Energy. With the addition of this center, student support services will be centralized for STEM students and it is expected that supplemental instruction will improve operationally. This should positively impact the engineering technology program even upon modification of the degree program since the resulting degree will still include some engineering courses.

F. Describe *any significant changes* in your program's weaknesses since last year.

Due to the discontinuation of four-year university engineering technology programs in the state and reduced subsequent employment for B.S. Engineering Technology graduates, engineering technology majors at Bakersfield College has diminished. There is an element of confusion on the benefit of a transfer program in engineering technology; thus the decision to revise the degree program to include better preparation for engineering technician positions which only require an A.S. degree.

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

The full-time engineering instructor served as interim dean for 2013-2014 and accepted the position of permanent dean in July, 2014. This left the engineering courses that support the program staffed with adjunct faculty for 2013-2014 and no full-time faculty leadership for the program which adversely affected program planning. However, with the addition of an EIT faculty chair with engineering technology degrees, it is expected that the engineering technology degree program will be successfully revised and structured for improved student success to meet workforce needs.

III. Resource Analysis:

A. Human Resources

1. If you are requesting any additional positions, explain briefly how the additional positions will contribute to increased student success. ([Faculty Request form](#); [Classified Request form](#)) **none**

2. Professional Development ([Professional Development form](#))

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

The 3D printing and laser cutting FLEX training workshop supported faculty training utilized in the technology courses that are part of the degree program.

b. Provide rationale for future professional development opportunities and contributions that your program can make.

B. Facilities (M&O requests can be submitted by completing the [M&O request form.](#))

Has your area received any facilities maintenance, repair or updating in this cycle? **none**

1. If yes, how has the outcome contributed to student success?

2. If no, how will your facilities request contribute to student success?
- C. Technology (Technology requests can be made by filling out the [ISIT Request form.](#))
1. Has your program received new or repurposed technology in this cycle? **none**
 - a. If yes, how has this technology contributed to student success?
 - b. If no, how will your new or repurposed technology request contribute to student success?
 2. Do you need new or repurposed classroom technology to support student success and/or new office technology to support faculty/staff success? Justify your request. **none**
- D. Budget (Changes to the budget allocation can be requested using the [Budget Change Request Form](#)).
If you are requesting any additional funding, explain briefly how it will contribute to increased student success. **none**

IV. 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).

Age and gender distributions in engineering have remained consistently similar over the last 5 years. However, the percentage of Hispanic students enrolled in engineering courses has increased 12% over the last five years, now equal to the 62% Hispanic enrollment college-wide.

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

Enrollment has remained stable due to the number of limited sections offered in the engineering program. Over the last five years, FTES have varied slightly. Last year FTES increased by 0.8 to 51.5, 1.0 less than the high in 2009 of 52.5. FTEF increased by about 2%, but productivity has decreased slightly by 1.4%.

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

Over the last 5 years, retention rates have remained fairly constant averaging between 86% and 92%. During 2013-2014 the retention rate was 90% which was slightly higher than the college-wide retention rate of 87% (only face-to-face). Success rates have also remained fairly constant averaging between 73% and 81%. During 2013-2014 the success rate was 78%, higher than the college-wide success rate of 70% (only face-to-face). Most engineering courses can be very challenging and a retention rate of 90% and success rate of 78% are positive indicators of a strong program.

D. Other program-specific data that reflects significant changes (*please specify or attach*).

The percentage of engineering students with completed Student Educational Plans (SEPs) increased roughly 10% over the last five years and remains high at 93% compared to 64% college-wide. However, the percentage of declared engineering technology majors decreased about 8% from 2012-13 to 2013-14.

V. 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.

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 (if applicable)
1. Establish a Creative Design Center and develop a cohort program with basic skills to engage students in technological skills.	<input checked="" type="checkbox"/> 1: Student Success <input type="checkbox"/> 2: Communication <input type="checkbox"/> 3: Facilities & Infrastructure <input type="checkbox"/> 4: Oversight & Accountability <input type="checkbox"/> 5: Integration <input type="checkbox"/> 6: Professional Development	<input type="checkbox"/> Completed: _____ (Date) <input checked="" type="checkbox"/> Revised: <u>9/17/2014</u> (Date) <input checked="" type="checkbox"/> Ongoing: _____ (Date)	<i>Progress on Goal:</i> The Creative Design Center is completed. Specific training for inter-disciplinary faculty took place during FLEX week in August 2014. With the addition of specific student success initiatives within the Basic Skills area, development of a cohort program with the Creative Design Center will need to be re-evaluated.
2. Continue to address the gaps in core indicators, particularly the gap in female enrollment.	<input checked="" type="checkbox"/> 1: Student Success <input type="checkbox"/> 2: Communication <input type="checkbox"/> 3: Facilities & Infrastructure <input type="checkbox"/> 4: Oversight & Accountability <input type="checkbox"/> 5: Integration <input checked="" type="checkbox"/> 6: Professional Development	<input type="checkbox"/> Completed: _____ (Date) <input checked="" type="checkbox"/> Revised: <u>9/17/2014</u> (Date) <input checked="" type="checkbox"/> Ongoing: _____ (Date)	<i>Progress on Goal:</i> Much work still needs to be completed on this goal. Faculty are investigating webinars on female recruitment in technology disciplines.

B. New or revised goals (if applicable)

New/Replacement Program Goal	Which institutional goals from the Bakersfield College Strategic Plan will be advanced upon completion of this goal? (select all that apply)	Anticipated Results
1. Revise the engineering technology A.S. degree program to a technician oriented degree.	<input checked="" type="checkbox"/> 1: Student Success <input checked="" type="checkbox"/> 2: Communication <input type="checkbox"/> 3: Facilities & Infrastructure <input type="checkbox"/> 4: Oversight & Accountability <input type="checkbox"/> 5: Integration <input type="checkbox"/> 6: Professional Development	Better alignment to the needs of the local workforce.
2. Develop a collaborative summer research program with CSUB	<input checked="" type="checkbox"/> 1: Student Success <input type="checkbox"/> 2: Communication	Increased rigor and challenge in the program with more engaged engineering technician students. Increased communication and program articulation between engineering and technician

for students preparing to become engineering technicians .	<input type="checkbox"/> 3: Facilities & Infrastructure <input type="checkbox"/> 4: Oversight & Accountability <input checked="" type="checkbox"/> 5: Integration <input type="checkbox"/> 6: Professional Development	faculty at BC and CSUB.
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VI. Curricular Review (Instructional Programs only):

A. Review of Course Information:

- Column A list all of the courses associated with the degree.
- Column B list the Fall term the review process will be started for ongoing compliance.
- Column C list the compliance due date.
- Column D list any changes to courses with regard to distance education.
- Column E list corresponding C-ID descriptors if available. <http://www.c-id.net/>

****Dates listed should reflect a five year cycle allowing for one year of review to maintain ongoing compliance.****

A. Course	B. Fall Term Review will be Submitted	C. Compliance Due Date	D. Distance Education Changes	E. C-ID Descriptors Available
ENGR B19C	2018	12/1/2019	None	
ENGR B24	2014	11/1/2017	None	ENGR 150
ENGR B45	2014	2/1/2019	None	ENGR 140
ENGR B47	2015	5/1/2019	Will be adding hybrid option	
CHEM B2A	2018	2019	None	CHEM 101
MATH B6A	2017	11/1/2018	None	MATH 210
MATH B6B	2017	10/1/2018	None	MATH 220
PHYS B2A	2020	2021	None	PHYS 105
PHYS B2B	2020	2021	None	PHYS 110
INDR B12	2020	2021	None	

B. Review of Program Information:

Is the program information housed in CurricUNET accurate? (Considerations: changes in course(s) names and/or suffixes as well as additions/deletions of courses). If not, then a program modification needs to be started in CurricUNET to reflect the necessary changes. Explain the requested changes below.

CurricUNET information is correct

Is the program and course listing information in the current catalog accurate? If not, list the requested changes below. Catalog information should reflect what is in CurricUNET.

Catalog information is correct

C. Student Education Plan (SEP) Pathway(s) uploaded to “Attached Files” in CurricUNET.

Completion of CSU Breadth and/or IGETC is not recommended for engineering transfer students.

If applicable, SEP Pathway with CSU Breadth indicated? Yes or No

If applicable, SEP Pathway with IGETC indicated? Yes or No

If applicable, SEP Pathway with BC General Education indicated? Yes or No

****Please ensure that the information housed in CurricUNET and the current catalog match. ****

D. If applicable, provide a description of the program’s future adoption of C-ID descriptors and Associate Degree for Transfer (ADT) or Model Curricula.

All engineering courses will be aligned to C-ID descriptors as they are finalized.

VII. Conclusions and Findings:

The Engineering Technology Program at Bakersfield College is in a state of transition from a transfer program to four year universities to preparation for engineering technician positions in local industry. The modification of this degree program should provide increased student success and a better fit to local workforce needs.

VIII. Attachments (place a checkmark beside the forms listed below that are attached):

- | | | |
|--|--|--|
| <input type="checkbox"/> Faculty Request Form | <input type="checkbox"/> Classified Request Form | <input checked="" type="checkbox"/> Budget Change Request Form |
| <input type="checkbox"/> Professional Development | <input checked="" type="checkbox"/> ISIT Form | <input type="checkbox"/> M & O Form |
| <input checked="" type="checkbox"/> Best Practices Form (Required) | | <input type="checkbox"/> Other: _____ |

IX. Certificates of Achievement:

Programs with stackable certificates fill out the following form.

Stand alone certificates fill out the entire Annual Update.

Certificate Form

Annual Update 2014-15

Name of Program: _____

Certificate Name	JSC	CA	Is the certificate stackable?	Is the certificate a stand alone program?

Please discuss the following questions regarding all area Certificates of Achievement (CA):

1. List certificates that are proposed for *addition*.
2. List certificates that are proposed for *deletion*.
3. For this CA, what are the SOC codes (Occupational Titles and codes) that students who complete the CA will be able to obtain entry-level employment in, and what are the projected annual openings and median salary for each occupational title? You can use your latest Program Review data for your response.
4. For this CA, what process was followed to ensure the required and possible elective courses were adequate for entry level employment (such as advisory committee input, surveys, industry feedback, licensing or accreditation agencies)? How often do/will you re-examine the effectiveness of certificate requirements?
5. What is your annual completion target (number of certificates awarded) for this CA? What was the number of awards in this CA for each of the past three years? Based on your results, what changes could you make in your program to meet or continue to exceed your target (such as course content, scheduling/sequence, outreach, instructional strategies)?