Bakersfield College 2018-2019
Comprehensive Program Review

Program Name: **Engineering**

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

Program Mission Statement:

The Engineering Program strives to prepare students for transfer to BS-granting programs across the state of California and beyond. While the study of Engineering does help generate basic skills (computer-drafting, spreadsheet competency, public speaking skills, report-writing competency) and foster critical thinking (complex problem-solving, analyzing assumptions, eliminating ambiguity) its primary purpose is to provide coursework that makes its students appealing transfer candidates to BS-grating programs. While most of the coursework has rigorous limitations on enrollment (pre-requisites set by state C-ID criteria) it is the goal of the faculty and staff to use counseling and outreach to make this program accessible to all interested students, regardless of age, socioeconomic status, gender, ethnicity or previous educational background.

Describe how the program supports the Bakersfield College Mission:

The Engineering program supports the BC mission through preparation for transfer. A Baccalaureate in an engineering discipline is a valuable asset nationally and across economic sectors while an Associate degree opens very few pathways into the work force, thus few BC students obtain an AS on the way to their BS. The Engineering curriculum is designed to provide multiple pathways for transfer, rather than being a "feeder" to a particular university. This is accomplished by aligning its courses to match statewide C-ID descriptors, improving the odds of successful transfer to BS-granting programs after 2-3 years of general education and engineering-specific course work at BC.

Instructional Programs only:

A. List the degrees and Certificates of Achievement the program offers
   Engineering (AS)
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 and the difference between the two.
   N/A
C. If your program offers a local degree in addition to the ADT degree, please explain the rationale for offering both.
   N/A

Progress on Program Goals, Future Goals, and Action Plans:

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: Continue to address the gaps in core indicators, particularly the gap in female enrollment.**

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, Facilities, Leadership and Engagement)
Leadership and Engagement

Progress on goal achievement: **Over the past five years, female enrollment has increased five percentage points (from 13% to 18%). For an imbalance with many cultural and demographic factors, this improvement is promising. The national average for female enrollment in Engineering is 21% (source) and an "ideal" gender balance is likely beyond even that so there is much work yet to be done. Working with student organizations like HOPES and WISE (Hispanic Organization Promoting Engineering and Science and Women in Science and Engineering), support programs like MESA and outreach opportunities (like SPE's *Engineering Day* and the STEM Pathway's *Pi Day*) are likely contributors to this slow, but steady uptick.**

Status Update – Action Plan and any link to Resource Requests: **With the expansion of full-time faculty in the past four years (from one position to three) there is more time and attention to be spread among the student organizations and more opportunities for visits to high schools and outreach programs. The ENGR faculty intends to continue its work in these effective outlets.**

2. **Program Goal:** **Improve clearly communicated pathways for engineering students by strengthening communication with Project Lead the Way (PLTW) programs at the high schools and middle schools.**

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, Facilities, Leadership and Engagement)
Student Progress and Completion and Leadership and Engagement

Progress on goal achievement: **Two sections of PLTW courses at Frontier HS were visited and feedback given on research plans and preliminary designs. Ongoing work by the *STEM Completion Coaching* group to clarify and advertise the "STEM Pathway" to incoming freshman is performed by the STEM Pathway committee. Engineering faculty and the Program Manager visited over a dozen local high schools for outreach and set up a table the Career Expo as well.**

Status Update – Action Plan and link to Resource Requests: **The college-wide focus on Pathways and Completion Coaching goes hand-in-hand with the outreach to PLTW students at local high schools. Continued work on both fronts will ensure a steady stream of new entrants into the program, as well as keeping ENGR majors on track to complete AS degrees and transfers to 4-year universities to complete their BS.**

B. List the program's goals for the next three years. Ensure that stated goals are specific and measurable. State how each program goal supports the College's strategic goals. Each program must include an action plan.

1. **Future Program Goal:**
Increase faculty presence in minority-oriented student organizations.

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, Facilities, Leadership and Engagement)
Leadership and Engagement

Action plan: **Turnover among the ENGR faculty over the last five years has led to intermittent involvement in two of the most active engineering-related student organizations on campus (WISE and HOPES). With the expansion to three, full-time instructors, these organizations can receive official ENGR faculty advising, lightening the burden on the current advisors from MESA, MATH and INDR.**

Lead person for this goal: **Travis Steele & Maryam Farahani**

2. **Future Program Goal:**

   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, Facilities, Leadership and Engagement)

   Action plan:

   Lead person for this goal:

3 Year Program Analysis: (All programs will answer the following questions unless otherwise indicated)
Take a look at your trend data. Provide an analysis of program data throughout the last three years (all programs should have some form of data that is used to look at changes over time) and report:

1. Changes in student demographics (gender, age and ethnicity). **There were no *major* shifts in demographics, but a slight uptick in female enrollment (from a steady 13-15% over the last several years to 18% last year) is promising. However, this is still far below the female enrollment college-wide (53%). In terms of age, the ENGR program continues to get younger, with the *19 & younger* category growing from 40% to 45% in the last year. This is an over-representation compared to college-wide numbers. In terms of ethnicity, a small growth in Hispanic enrollment (65% to 70%) came with a drop in White enrollment (23% to 18%) but both are close to college-wide numbers.**
2. Changes in enrollment (headcount, sections, course enrollment, and productivity). *Instructional only* **The number of sections offered in AY17-18 held at 25, the same as in AY16-17. First day enrollment was up slightly 5.1% from the previous year while Census Day enrollment was down 2.5%. After a long stretch of enrollment growth, this is the first sign of a plateau. For productivity, the trend is, unfortunately, downward. The almost 15% drop coincides the increase in ENGR B47 (*Intro to Engineering*) offerings which have smaller class sizes due to lab constraints. Previous years had been more lecture-heavy, keeping productivity higher.**
3. Changes in achievement gap and disproportionate impact.
   - 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.
     While retention and success in ENGR are above college-wide numbers in every ethnicity category, it is still disconcerting that there is a sizeable gap between success in the top-performing group (Asian/Filipino/Pac. Islander - 87%) and the lowest (African American - 58%). With the low unduplicated headcount for African American students (currently 6) these numbers can change drastically from year to year.

4. Success and retention for face-to-face as well as online/distance courses. *Instructional only* **As stated previously, success and retention numbers are above collegewide numbers in all ethnicity categories. All sections are currently offered face-to-face.**
5. Any unplanned events that affected your program/. **A relatively sudden departure by a faculty member last fall led to an increased workload for others. Luckily the workload could be spread across multiple full-time and adjunct faculty and a replacement was hired for AY17-18.**
6. Degrees and certificates awarded (three-year trend data for each degree and/or certificate awarded). *Instructional only* **Engineering (AS), Engineering Technology (AS)**
7. Reflect on any changes you would like to see in your program in the next 3 years. **Traditionally, ENGR B36 had only been offered in fall and ENGR B17 in spring, meaning that a student dropping or failing a single course could delay transfer by up to a year. Recent changes in the timing of calculus courses in the MATH department and calculus-based physics courses (PHYS) may allow changes in the timing of these ENGR offerings. With these changes, as well as the expansion of the ENGR faculty, fall *and* spring offerings of these courses is being planned to better serve ENGR majors and, hopefully, continue the growth of the program. Additionally, an expansion of course offerings to include ENGR B20 (a MATLAB alternative to the C++ programming course) and the addition of a hybrid offering of ENGR B24 will improve accessibility for students with timing or travel restrictions.**
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 planning/doing to contribute to these efforts. **Faculty involvement in the completion coaching meetings, as well as participation in STEM outreach events (like *Pi Day*) ensure ENGR representation in STEM Pathway planning and implementation.**

9. Explain your role if you are involved in Dual Enrollment, Inmate Education, or Rural Initiatives. **Currently the ENGR program is not involved in these initiatives.**

10. List degrees and certificates awarded (three-year trend data for each degree and certificate awarded). Include targets (goal numbers) for the next three years. *Instructional only*

Full Name of Degree or Certificate	2015- 2016	2016- 2017	2017- 2018	2018- 2019	2019- 2020	2020- 2021
Engineering, General AS	**0**	**0**	**0**	**0**	**0**	**0**
Engineering Technology AS	**5**	**2**	**11**	**12**	**13**	**14**

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.

1: Space Allocation
2: Renovation
3: Furniture
4: Other
5: Beyond Routine Maintenance

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?

1: Replacement Technology **Funding was received (through Strong Workforce) to renovate MS12 in Spring or Summer 2019. This will include replacing the current low-resolution projector with two 80" LCD televisions, moving the whiteboard to a different wall in order to make room for the TVs, installing a high-resolution document camera and installing the equipment to allow the two screens to display the instructor's computer screen, the document camera, or one TV on each. This remodel and new equipment will allow students to better see fine details in technical drawings from every workstation in the classroom. This will also allow instructors to have examples on one screen while showing their drawings through the document camera.**

2: New Technology

3: Software

4: Other_____

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.

Conclusions:

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 Comprehensive Review.

Thanks to the investments (both monetary and intellectual) from previous administrators and faculty, the program has enjoyed great resources and strong enrollment. But, in the words of a wise department chair, "engineering is weird". In many ways it is lab-driven, requiring extensive investment in equipment and software, making it similar to some CTE programs in the department. However, there is a sequence of lecture-based courses that rely on PHYS perquisites, which themselves have MATH prerequisites. This leads to a balancing act that is sometimes difficult to navigate. For example, ENGR course offerings are, in most cases, depend on the timing and frequency of PHYS and MATH offerings. But, PHYS and MATH offerings are, in many ways, driven by ENGR majors (currently 58 students majoring in PHYS and 220 in MATH vs 600 in ENGR). If ENGR enrollment is indeed at a plateau, it will take careful planning to make sure students currently "in the pipeline" have access to all the courses they need for transfer while possibly moving ENGR faculty attention from courses with rigorous prerequisites (B17, B36, B45) to those with fewer perquisites (B47, B24, B19).

Complicating this dynamic is the fact that the three, full-time instructors have a combined five years of experience under their collective belt. While having a "fresh" trio of faculty is advantageous in terms of energy and dynamism, it does mean the program is lacking a deep well of experience to draw from that other, larger programs currently enjoy. Reliance on experienced adjuncts and administrators will be key as course revisions, accreditation and changes in the funding model are all looming on the horizon.