Abstract

California State University, Bakersfield enrolls over 8700 undergraduates, 53% of whom are Hispanic. CSUB is the only four-year degree granting campus within a 100 mile radius of its service area which has one of the fastest-growing and most economically depressed populations in California. CSUB’s mission today is shaped by the enormous STEM education needs of service area residents and local industry.

The university received a $4.3M five-year (October 2011-September 2016) grant from the US Department of Education to implement a general engineering program to address the needs of the local population and industry partners.

The program has been very successful in attracting students both Hispanic and non-Hispanic.

Introduction

We spent AY 2011-2012 designing a general engineering program which would be flexible enough to change with student needs and other stakeholder demands.

We secured approval of the new program in Spring 2012, and started accepting students in Fall 2012. The first cohort of students graduated two years later, in 2012, and started accepting students in Fall 2012. The UD electives can be taken from across the offerings, or in particular patterns which lead to formal emphases (23 quarter units).

• Engineering Management
• Biosystematic and Agricultural Engineering
• Petroleum Engineering

Results

We developed a program leading to the BS in Engineering Sciences.

We partnered with Chevron and the Fab Lab Foundation to bring a Fab Lab to CSUB

The curriculum has a Mechanical Engineering core of courses with significant room for Upper-Division electives.

The UD electives can be taken from across the offerings, or in particular patterns which lead to formal emphases (23 quarter units).

• Engineering Management
• Biosystematic and Agricultural Engineering
• Petroleum Engineering

We acknowledge the support of the US Department of Education, Chevron Corp.

Performance Measures:

1a. To triple the number of engineering pathway students to 294 by the end of the project. We are already at 323.

1b. Hispanic students will be equally represented relative to total enrollment: Hispanics in Engineering Sciences = 51%; Hispanics at CSUB = 53%

2a. 40% six-year graduation rate by end of project. Too soon to tell – our number of graduates is still small.

2b. 0% equity gap between Hispanic and white students. Too soon to tell – but last year 3 out of 4 graduates were Hispanic.

Discussion

ABET accreditation is a major concern for potential employers, students, and their parents.

The most severe problem is the difficulty in securing space for the program. This is needed for instruction, faculty/student research, student projects: freshman design class (to increase retention), and meaningful capstone projects

Our main challenges are:
• Enrollment management
• Continued ability to provide hands-on experiences for a much-larger-than-anticipated number of students, especially in the freshman design class (to increase retention), and meaningful capstone projects
• Mathematics preparation of students

The community is very eager for us to attain ABET accreditation.

Participants

• Yiannis Ampatzidis, Assistant Professor of Engineering (Agricultural Engineer)
• Luis Cabrales, Assistant Professor of Engineering (Plant and Soil Science)
• Anne Houtman, Dean of the School of Natural Sciences, Mathematics, and Engineering (Biologist)
• Dayanand Saini, Assistant Professor of Engineering (Petroleum Engineer)
• Jorge Talamantes, Project Director (Physicist)

Limitations

The most severe problem is the difficulty in securing space for the program. This is needed for instruction, faculty/students research, student projects: freshman design class, capstone design.

Funding

US Department of Education, Chevron Corp.

Acknowledgements

We acknowledge the support of the US Department of Education under grant P041C10026, as well as the generous support of Chevron Corp.

Contact Information

Jorge Talamantes, Department of Physics & Engineering
jtalamantes@csub.edu
(661) 652-2335

Conclusion

The program has met success far beyond expectations, as measured by number of students.

The main reason is likely the huge unmet need in engineering education prior to the establishing of the engineering programs at CSUB.

The flexibility of the curriculum has shown to be very popular with students and widely accepted by potential local employers.

Identifying local niches for our graduates has attracted many students and much attention in the community.

We are already at 323.

Actual number of students:

<table>
<thead>
<tr>
<th>Level</th>
<th>AY 2012</th>
<th>AY 2013</th>
<th>AY 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshman</td>
<td>15</td>
<td>76</td>
<td>144</td>
</tr>
<tr>
<td>Sophomore</td>
<td>4</td>
<td>28</td>
<td>54</td>
</tr>
<tr>
<td>Junior</td>
<td>4</td>
<td>28</td>
<td>69</td>
</tr>
<tr>
<td>Senior</td>
<td>5</td>
<td>22</td>
<td>54</td>
</tr>
<tr>
<td>Total All Academic Levels</td>
<td>27</td>
<td>159</td>
<td>320</td>
</tr>
</tbody>
</table>

Number of graduates:

| AY 2013-14 | 9 (3 Hispanic) |
| AY 2014-15 | 13 (Projected) |
| AY 2015-16 | 34 (Projected) |