**Peralta Community College District**

## Annual Program Update Template 2014-2015

## DISTRICT-WIDE DATA by Subject/Discipline Fall Semesters

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| Overview |
| BI Download: | 11/24/14 | Dept. Chair: |  Barbara des Rochers and Siraj Omar  |
| Subject/Discipline: | SCIENCE | Dean: |  Antonio Barreiro |
| Campus: | Berkeley City College |
| Mission Statement | The most important goal of the science department is to provide students with the knowledge and skills they will need in order to perform successfully in the next stage of their careers, whether that stage involves transfer to a 4-year institution, entering a professional program of study such as nursing, or entering the workplace in a specialized field such as biotechnology. Another important goal is to build stepping stones to science in order to make careers in science accessible to students who have little or no background in science and math but who have been excited by the news and the potential of interesting jobs in biotechnology and other science related fields.  |

1. Enrollment

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Astr | Biol  | Chem | Geog | Geol | Phys  | Physc | Totals |
| Census Enrollment F11 | 84 | 483 | 224 | 219 | 43 | 39 | 34 | 1126 |
| Census Enrollment F12 | 86 | 433 | 218 | 190 | 39 | 33 | 0 | 999 |
| Census Enrollment F13 | 117 | 469 | 269 | 179 | 33 | 126 | 42 | 1235 |
| Sections F11 | 1 | 13 | 6 | 5 | 1 | 1 | 1 | 28 |
| Sections F12 | 1 | 13 | 6 | 5 | 1 | 1 | 0 | 27 |
| Sections F13 | 2 | 13 | 9 | 5 | 1 | 3 | 1 | 34 |
| Total FTES F11 | 8.40 | 100.10 | 57.60 | 21.90 | 4.30 | 5.20 | 3.40 | 200.9 |
| Total FTES F12 | 8.60 | 86.21 | 55.70 | 19.00 | 3.90 | 4.40 | 0.00 | 177.81 |
| Total FTES F13 | 11.66 | 100.35 | 71.80 | 17.90 | 3.30 | 26.00 | 4.20 | 235.21 |
| Total FTEF F11 | 0.20 | 4.93 | 2.92 | 0.92 | 0.20 | 0.27 | 0.20 | 9.64 |
| Total FTEF F12 | 0.20 | 4.62 | 2.92 | 0.92 | 0.20 | 0.27 | 0.00 | 9.13 |
| Total FTEF F13 | 0.40 | 5.87 | 4.00 | 0.92 | 0.20 | 1.28 | 0.20 | 12.87 |
| FTES/FTEF F11 | 42.00 | 20.30 | 19.73 | 23.80 | 21.50 | 19.50 | 17.00 | 163.83 |
| FTES/FTEF F12 | 43.00 | 18.67 | 19.08 | 20.65 | 19.50 | 16.50 | 0.00 | 137.4 |
| FTES/FTEF F13 | 29.14 | 17.10 | 17.95 | 19.46 | 16.50 | 20.31 | 21.00 | 141.46 |
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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1. Student Success

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Astr | Biol  | Chem | Geog | Geol | Phys  | Physc | Totals |
| Total Graded F11 | 49 | 460 | 206 | 212 | 40 | 32 | 32 | 1031 |
| Total Graded F12 | 47 | 426 | 213 | 185 | 39 | 31 | 0 | 941 |
| Total Graded F13 | 50 | 470 | 270 | 180 | 34 | 128 | 42 | 1174 |
| Success F11 | 32 | 341 | 138 | 166 | 27 | 25 | 28 | 757 |
| Success F12 | 37 | 294 | 133 | 146 | 21 | 23 | 0 | 654 |
| Success F13 | 37 | 325 | 162 | 120 | 15 | 88 | 31 | 778 |
| % Success F11 | 0.65 | 0.74 | 0.67 | 0.78 | 0.68 | 0.78 | 0.88 | X=0.73 |
| % Success F12 | 0.79 | 0.69 | 0.62 | 0.79 | 0.54 | 0.74 | 0.00 | X=0.70 |
| % Success F13 | 0.74 | 0.69 | 0.60 | 0.67 | 0.44 | 0.69 | 0.74 | X=0.65 |
| Withdraw F11 | 9 | 75 | 60 | 38 | 7 | 5 | 1 | 195 |
| Withdraw F12 | 3 | 69 | 54 | 19 | 6 | 6 | 0 | 157 |
| Withdraw F13 | 11 | 98 | 86 | 44 | 10 | 32 | 8 | 289 |
| % Withdraw F11 | 0.18 | 0.16 | 0.29 | 0.18 | 0.18 | 0.16 | 0.03 | X=0.16 |
| % Withdraw F12 | 0.06 | 0.16 | 0.25 | 0.10 | 0.15 | 0.19 | 0.00 | X=0.15 |
| % Withdraw F13 | 0.22 | 0.21 | 0.32 | 0.24 | 0.29 | 0.25 | 0.19 | X=0.25 |

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1. Faculty

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Astr | Biol  | Chem | Geog | Geol | Phys  | Physc | Totals |
| Census Enrollment F11 | 0.00 | 1.07 | 0.75 | 0.00 | 0.00 | 0.00 | 0.00 | 1.82 |
| Census Enrollment F12 | 0.00 | 1.43 | 0.85 | 0.00 | 0.00 | 0.00 | 0.00 | 2.28 |
| Census Enrollment F13 | 0.00 | 2.45 | 1.83 | 0.00 | 0.00 | 0.00 | 0.00 | 4.28 |
| Sections F11 | 0.20 | 3.84 | 1.80 | 0.92 | 0.20 | 0.27 | 0.20 | 7.43 |
| Sections F12 | 0.20 | 3.15 | 1.80 | 0.92 | 0.20 | 0.27 | 0.00 | 6.54 |
| Sections F13 | 0.20 | 3.42 | 1.80 | 0.92 | 0.20 | 1.28 | 0.20 | 8.02 |
| Total FTES F11 | 0.00 | 0.02 | 0.37 | 0.00 | 0.00 | 0.00 | 0.00 | 0.39 |
| Total FTES F12 | 0.00 | 0.04 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 | 0.31 |
| Total FTES F13 | 0.00 | 0.00 | 0.37 | 0.00 | 0.00 | 0.00 | 0.00 | 0.37 |
| Total FTEF F11 | 0.20 | 4.93 | 2.92 | 0.92 | 0.20 | 0.27 | 0.20 | 9.64 |
| Total FTEF F12 | 0.20 | 4.62 | 2.92 | 0.92 | 0.20 | 0.27 | 0.00 | 9.13 |
| Total FTEF F13 | 0.20 | 5.87 | 4.00 | 0.92 | 0.20 | 1.28 | 0.20 | 12.87 |
| FTES/FTEF F11 | 0.00 | 0.22 | 0.26 | 0.00 | 0.00 | 0.00 | 0.00 | 0.48 |
| FTES/FTEF F12 | 0.00 | 0.31 | 0.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.60 |
| FTES/FTEF F13 | 0.00 | 0.42 | 0.46 | 0.00 | 0.00 | 0.00 | 0.00 | 8.88 |

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| V. Qualitative Assessments  |
| **CTE and Vocational**: Community and labor market relevance. Present evidence of community need based on Advisory Committee input, industry need data, McIntyre Environmental Scan, McKinsey Economic Report, licensure and job placement rates, etc.  | 1*.* ***The A.S. degree and Certificate Programs in Biotechnology***:  *See Appendix A, page 10, for Community and Labor Market Relevance in relation to Biotechnology.* BCC presently offers 2 programs in biotechnology. The A.S. degree and the General Certificate In Biotechnology include courses in general biology, microbiology, immunology, genetics, instrumentation, scientific literature, bioethics, inorganic and organic chemistry and physics. Graduates of the program have found employment in a range of specialties within the biotechnology industry including fermentation, manufacturing and quality assurance and quality control. Graduates have also been hired in research and clinical laboratories in both the public and private sector including the California Department of Health and Human Services, California Department of Justice (Forensics), the Lawrence Berkeley National Laboratory, the University of California at Berkeley and a number of local hospital laboratories.  A number of the students enrolled in the biotechnology program at BCC have prior college degrees, a trend that is seen in other similar programs throughout the State. Many students with degrees have strong STEM backgrounds, not necessarily in biology, however, and enter the program either to re-tool to biotechnology or to gain a deeper understanding and facility with the latest laboratory technologies. 2***. The A.S. Degree and Certificate Programs in* Chemistry** Starting Fall 2015 the science department will be offering an A.S. degree and Certificate of Achievement in Chemistry. Recruitment will begin in spring 2015. Both are two-year (4-semester) programs, during which students will complete all chemistry courses as well as other required electives offered at BCC. These programs are partly funded by the Federal TAACCCT Grant. Graduates of this program will have the knowledge and skills to work as entry level lab technicians or apply into an internship programs in any research and academic institutions, or transfer to 4-year colleges. |
| Transfer and Basic Skills: Describe how your course offerings address transfer, basic skills, and program completion.  | Almost all students enrolled in science classes at BCC are transfer students, mainly to 4-year colleges or universities. All transfer-level courses offered at BCC are taught at the same level of rigor as similar classes taught at those 4-year colleges and universities. This is to ensure that our students, once they transfer to any 4-year colleges or universities, are at a competitive edge with their classmates in those colleges or universities. There are evidences that show many of our science graduates have done very well in 4-year colleges and universities. |

1. **Student Learning Outcomes**

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| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Astr** | **Biol** | **Chem** | **+Geog** | **Geol** | **Phys** | **Physc** |
| No. active courses in discipline | 1 | 13 | 7 | 2 | 2 | 5 | 1 |
| No. courses with SLOs | 1 | 13 | 7 | 2 | 2 | 5 | 1 |
| %SLOs/active courses | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| No. courses assessed | 1 | 8 | 7 | 2 | 2 | 2 | 1 |
| % coursesassessed/SLOs | 100 | 61.5 | 100 | 100 | 100 | 40 | 100 |
| \*Assessment methods | M | M; O | M; O | O | M | M | M |
| Results of SLO progress | IP | IP | C | IP | IP | IP | IP |
| Comments on results |  | \*\* | \*\* |  |  |  |  |

\*M = minute paper; O=Other e.g. exam questions; IP = in Progress; C =complete

\*\* In microbiology, open laboratory sessions were instituted along with longer office hours

to allow students more time ask questions and assimilate the information; ‘biology boot camps’

and ‘biology study sessions’ were instituted to give students extra training in the basics to improve

student success in classes.

\*\* In chemistry, many students need a better explanation on concepts applicable to problem solving.

Students were given homework assignments that would help them get more practice with problems

+BCC only offers two classes at this time: Physical Geography and Physical Geography Lab

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| VII. Program Learning Outcomes and Assessment: Biotechnology |
|  | Fall 2014 |
| Number of degrees and certificates in your discipline |  3: A.S., C.A., C.P.  |
| Number with Program Learning Outcomes |  3 |
| Number assessed |  3 |
| % Assessed |  100 |
| Describe assessment methods you are using:1. Keeping track of students post graduation to see how many gain employment or proceed to a 4 year or graduate professional or academic program.
2. While still in classes, assessing ability of students to:
* Demonstrate a facility with laboratory mathematics and an ability to work aseptically, make solutions and buffers, follow scientific protocols, operate standard equipment, interpret and analyze results, trouble shoot, handle hazardous materials, and maintain a detailed laboratory notebook.

*ILOs: Communication, critical thinking, computational skills, information competency* * Demonstrate an ability to understand and interpret scientific research papers, use scientific databases, construct scientific research papers and use presentation software.

*ILOs: Communication, critical thinking, information competency* * Demonstrate general knowledge of key concepts and ethical issues, in the fields of biology, microbiology, immunology, molecular genetics and protein chemistry.

*ILOs: Communication, critical thinking, ethics and personal responsibility, information competency** Demonstrate ability to conduct scientific work as a member of a team and alone.

*ILOs: Communication, ethics and personal responsibility, self-awareness and interpersonal skills* |
| Describe results of assessment. Describe how assessment of program-level student learning outcomes led to certificate/degree program improvements.*All students graduating with an A.S., C.A. or C.P. from BCC has either located employment in industry or academic laboratories, continued to 4 year schools for B.S. degrees or gained admission to graduate or professional school*s. *All lecture and laboratory courses are are continually upgraded.*  |

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| VIII. Strategic Planning Goals |
| Check all that apply.☐X 1. Advance Student Access, Success & Equity☐X 2. Engage our Communities & Partners☐X 3. Build Programs of Distinction☐X 4. Create a Culture of Innovation & Collaboration☐X 5. Develop Resources to Advance & Sustain Mission | Describe how goal applies to your program.1. Students graduate, get jobs or proceed to 4 yr and graduate programs
2. Engage with local industry and labs
3. Biotechnology and Chemistry
4. Collaborate w/ industries, medical and public health labs and Universities and research centers (UCB, UCSF, CHORI)
5. Develop grant proposals and receive grant monies

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| IX. College Strategic Plan Relevance |
| Check all that apply X New program under development: Analytical Chemistry, Physics, AS-T Biotechnology X Program that is integral to your college’s overall strategy: All science programsX Program that is essential for transfer: All science AS-T and AS degreesX Program that serves a community niche: Biotechnology – see Appendix A☐Programs where student enrollment or success has been demonstrably affected by extraordinary external factors, such as barriers due to housing, employment, childcare etc.☐Other  |

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| X. Action Plan |
| Please describe your plan for responding to the above data (quantitative, qualitative, and data specifically from course and program learning outcomes assessment). Consider curriculum, pedagogy/instructional, scheduling, and marketing strategies. Also, please reference any cross district collaboration with the same discipline at other Peralta colleges. Include overall plans/goals and specific action steps.Summary of Goals for the Coming YearComplete hire of full time Laboratory CoordinatorComplete hire of full time Physics InstructorRequest a full time Geography Instructor position1. Request full time technician for chemistry

Complete update of all courses and course outlines in CurricuNetComplete curriculum assessment for all courses Complete program assessments for Biotechnology programs Put together an Advisory Board for the STEM fieldsOrder equipment to upgrade existing and new laboratories1. Establish much needed maintenance contracts for certain equipment items
2. Continue to participate in grant opportunities for the department to support instructional needs and student success.

Summary of Needs for the Science Dept1. Full time faculty, Geography
2. Full time technician, Chemistry
3. Marketing: BCC needs a full time Marketing Specialist if any of the specialty programs are to survive. For example, in Northern California there are many biotechnology programs a student can select to attend – there are several in the Peralta District alone (PCCD is the only multi-college district in the State of California where this exists). The faculty cannot carry the burden of developing the programs, coursework, maintaining their disciplines, upgrading experiments, counseling students, assisting students locate jobs AND advertising.
4. Increase in Release Times: The Director of the Biotechnology Program teaches courses, overseas grants, and runs a program with 10% release time. This is not adequate. The Chairs of the Science Department teach challenging courses, oversee 7 disciplines, most with adjuncts that turnover, oversee laboratories with student workers and instructional aides, handle most of the decision making regarding purchases of equipment and supplies, maintenance requests, problems with broken or faulty equipment, student complaints and advising and faculty concerns, administrative matters on behalf of the department – for 15% release time each. This is not adequate.
5. Tutoring Space: Need for more space/rooms for tutoring and office hours with white boards.
6. Office Space: More desk space and up-to-date computers are needed for the science department.
7. Professional Development: For the sciences this means sabbaticals to work in research areas that contribute to updating knowledge and understanding of latest technologies – which translates into improved and updated information passed on to students and student success in the workplace.
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| XI. Needs |
| Please describe and prioritize any **faculty, classified, and student assistant** needs.**A. BIOLOGICAL SCIENCES** * Student workers: 60 hrs/wk x 35 wks @ 10.16/hr = $21,336/yr\*
* One 500 hr employee@15.26 = $7,630/yr

**B. CHEMISTRY (GENERAL and ORGANIC):** * Student workers: 36 hrs/wk x 35 wks @ 10.16/hr = $12,802/yr
* One 500 hr employee @15.26 = $7,630/yr
* 1 full-time classified staff Chemistry Technician = $70,673/yr

**C. GEOGRAPHY and GEOLOGY*** Student workers: 9 hrs/wk x 35 wks @ 10.16 = $3200/yr

**D. PHYSICS*** Student workers: 9 hrs/wk x 35 wks @ 10.16 = $3200/yr

**TOTAL ESTIMATED COST: $55,798 + Full time chemistry technician position** ***\* 60 hrs/wk is in addition to the 8 hrs/wk that can be offered by the biology technician.***   |
| Please describe and prioritize any **equipment, material, and supply** needs.**A. BIOLOGICAL SCIENCES**  *EQUIPMENT** Microscopes upgrade ($35k)
* DNA Sequencer ($80)

*INSTRUCTIONAL SUPPLIES:** Chemicals ($5k)
* Consumables ($5k)

*MAINTENANCE CONTRACTS** Fume hoods, autoclave, microscopes, pipetman ($10k)

**B. CHEMISTRY***EQUIPMENT** NMR ($130k)
* FT-IR Spectrophotometer ($30k)
* One desktop computer for analytical equipment ($1k)
* Printer for instrument room ($0.8k)
* Organic chemistry kits and replacement parts ($5k)
* Helium gas tank regulator ($.45k)
* Gas tank rentals (0.6k)

*INSTRUCTIONAL SUPPLIES** Chemicals & Consumables ($20k)

*MAINTENANCE CONTRACTS** Fume Hoods ($2k)

**C.** **GEOGRAPHY/GEOLOGY** *INSTRUCTIONAL SUPPLIES* * Kits and demos($1k)

 **D. PHYSICS** *EQUIPMENT** Equipment for Physics 4C($25)

**SCIENCE OFFFICE:**Printer cartridges HP B/W ($0.2k)Desk top Computers (2) ($5k)Advisory Board for the STEM fields ($1000) **TOTAL ESTIMATED COST: $357,050****Comments regarding costs:**The new organic chemistry lab is still not fully equipped. While many essential equipment have been purchased, other critical analytical instruments, e.g. NMR and FT-IR spectrophotometer are still needed in order to offer our students an up to date organic chemistry series. The advanced biotechnology class, Bio 50C (formerly Bio 230C) will offer training in advanced DNA sequencing technology and bioinformatics and it will be critical to make available a DNA sequencer for the students.The Science Department office has made room for extra desks for faculty. It is critical to get computers at these desks. |
| Please describe and prioritize any **facilities** needs. 1. Science department is badly in need of additional office spaces to accommodate both existing adjunct and future full-time contract faculties.2. An additional space is also needed to serve as tutoring center. |

**Appendix A: Qualitative Assessments: Community and Labor Market Relevance**

1. **Evidence of local interest, community support, and employer demand**

Northern California, and in particular the San Francisco Bay Area region, are home to significant economic investments and success in the bioscience industry. In 2013, this industrial commitment to the Bay Area led to exceptional outcomes: "of the more than 30 new types of drugs that the Food and Drug Administration approved...roughly a third of those came from Northern California"1. This investment has led to the San Francisco Bay Area being named a US Hot Spot for Biotech Jobs.2 The East Bay “is one of the nation’s major strongholds for Biotechnology and Clean energy and there are few signs of the area losing its edge in these industries in the near future” receiving significant economic investment and venture capital (5% of the US total)3, and housing multiple bioscience leaders, including Bayer, Metabolex, Zyomyx, and the BP Energy Biosciences Institute at UC Berkeley4.

Evidence of local interest, community support and employer demand for the Biotechnology program at Berkeley City College is reflected in the many collaborations between BCC and various community organizations, industries, federal and state and research laboratories, and the grants and awards bestowed on BCCs stem programs, notably the biotechnology program. Among the awards and collaborations are the following:

**California Institute of Regenerative Medicine (CIRM) Bridges Training Award.** BCC Biotechnology Program has been awarded a $3.4 million CIRM award that allows up to 10 students/year paid internships in research labs in Selected laboratories at UC San Francisco, UC Berkeley, and Children’s Hospital Oakland, to name a few. There were 15 colleges awarded CIRM grants, 12 CSUs and 3 community colleges. BCC is the smallest college to receive this award. Students completing the CIRM internships proceed with their education and depending upon their accomplishments transfer to 4-yr schools or graduate and professional schools. A number of the interns find full time positions as laboratory technicians in academic and industrial laboratories.

**Design It! Build it! Ship it! High Impact Pathways Institutes:** Originally established by Department of Labor TAACCCT funds, BCC bioscience faculty and staff are recipients of $600,000 in TAACCCT funding in this robust regional (Napa to Hayward) community devoted to regional alignment of bioscience training with industry needs and developing pathways for student success. <http://www.careerladdersproject.org/initiatives-programs/hip/>

**Gateways East Bay STEM Network:** BCC faculty and staff are active participants in the Gateways East Bay STEM Network, one component of a larger Gateways initiative, that serves as a leadership hub for regional stakeholders who are working together to improve educational outcomes in STEM (science, technology, engineering and mathematics) across Alameda and Contra Costa counties. Most recently, BCC partnered with the Network to draft a proposal to create a pathway from K-12 to the CSUs via the BCC biotechnology program. <http://www.eastbaystem.net/wp/mission/>

**BayBio Life Science Association:** BCC bioscience faculty and staff participate in Northern California’s regional bioscience community association that works collaboratively to nourish regional bioscience success. Members include organizations engaged in research, development and commercialization of life science technologies. <http://baybio.org/about/>

**East Bay Career Pathways Consortium:** BCC faculty and staff, particularly in the area of Health and Bioscience, are partnered with 11 school districts, one charter school organization, six community colleges, a collaboration of four Workforce Investment Boards, two Regional Occupation Programs, the Alameda County Office of Education, business partners, and state-of-the-art technical assistance and professional development providers to reshape the East Bay K-14 educational system around four career pathways. The consortium’s goal is to create a seamless transition from K-12 to community college that includes clear career and college pathways and work-based learning experiences with employer partners. <http://web.peralta.edu/ccpt/>

**Biotech Partners:** Established in 1993 as part of a development agreement between Bayer HealthCare and The City of Berkeley, Biotech Partners’ work today involves over 35 corporate, government, education and Industry partners. The program is expanding throughout the Bay Area and is currently at Berkeley High School, Oakland Technical High School, and the Peralta Community College District. <http://www.biotechpartners.org/>

**Industry and Academic Partners:** BCCs partners that support our STEM programs include Bayer Healthcare, UCSF Children’s Hospital, Oakland, University of California San Francisco, U.C. Berkeley and California State University, East Bay.

*1San Francisco Business Times, Biotech: Retooling to keep Bay Area Lead, 1/4/13* <http://www.bizjournals.com/sanfrancisco/print-edition/2013/01/04/biotech-retooling-to-keep->bay-area-lead.html?page=all

*2Genetic Engineering and Biotechnology News, U.S. Hot Spots for Biotech Jobs, 2014 Edition,* (<http://www.genengnews.com/insight-and-intelligence/u-s-hot-spots-for-biotech-jobs-2014-edition/77900293/>)

*3Bay Economic Development Alliance, East Bay Economic Outlook 2014-15, page 9,*

<http://www.eastbayeda.org/ebeda-assets/reports/2014/EDA-Outlook-2014-2015.pdf>

*4Bay Economic Development Alliance, East Bay Economic Outlook 2014-15, page 15,*

<http://www.eastbayeda.org/ebeda-assets/reports/2014/EDA-Outlook-2014-2015.pdf>

1. **Labor Market and Employer demand**

According to the latest statistics from the State of California Employment Development

Department (EDD), demand will increase in professional, scientific and technical services, a category that includes biotechnology and related fields. Depending on the sector, demand will increase from 12.9 % to 57.4% (Table 1). For example, as of 2010 it was estimated that 118,300 people were employed in scientific research and development services. The number of employed in this area is expected to rise to 140,100 by 2020, an increase 18.4%. In the area of

management, scientific and technical consulting services, there were 161,300 employed in 2010 and this number is expected to rise to 253,900, an increase of 57.4% (Table 1).



The most recent data for the regional labor market in the San Francisco Bay Area shows a prediction for a steady rise in all jobs related to biotechnology between 2013 and 2016, ranging from 3.4% to 8.8% (Table 2a). A closer look at the life sciences indicates that in 2012 there were 9000 jobs, but this will rise to 10,100 jobs by 2022, an increase of 12% (Table 2b). These tables indicate that the Bachelor’s degree is the preferred degree in many positions in biotechnology.

