

Peralta Community College District

Program Review Template 2012-13

Below please find the program review form, to be filled out by department chairs and program leaders. These will be reviewed at the college level and then forwarded to the district-wide planning and budgeting process. The information on this form is required for all resource requests – including faculty staffing requests – for the 2013-14 budget year.

I. Overview			
Date Submitted:	November 1, 2012	Administrator:	Linda Berry
BI Download:		Dept. Chairs:	Barbara DesRochers, Siraj Omar
Dept./Program(s): (List departments and programs, including all associate degrees and certificates and components of general education and basic skills)	<p>The Science Department at BCC includes:</p> <p>Physical Anthropology Biology Biotechnology, Programs:</p> <ul style="list-style-type: none"> • A.S. degree in Biotechnology • Certificate of Achievement <p>Chemistry Earth and Planetary Sciences: Astronomy, Geography, Geology, Oceanography Physics Physical Anthropology</p> <p>General Education Area 5 – Physical and Biological Sciences</p> <ul style="list-style-type: none"> • <i>Physical Sciences:</i> Astr 10, Chem 1A(L), 1B(L), 30A(L), 30B(L), Geog 1/1L, Geol 10, PhysSci 20, Physics 10 • <i>Biological Sciences:</i> Anthr 1/1L, Biol 1A(L), 1B(L), 3(L), 10(10), 13/13L, 25 		
Campus:	Berkeley City College		
Mission	<p>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 background in science, but who have been excited by the news and the potential of interesting jobs in biotechnology and other science related fields. A third goal of the science department is to provide the community with informative courses to enhance their understanding and appreciation of the world of science and these would include a monthly science seminar series, and innovative classes that address science topics with a broad appeal.</p>		
II. Goals and Outcomes (add lines as needed)			
II.a. Goals (for each one, cite Institutional Goal(s), Appendix II)			
<p>Institutional Learning Outcomes reflected in goals 1-9 are student access, success and equity (A.1, A.2, A.3) and build programs of distinction (C.1). Other ILOs (that are in parenthesis below) include create alternatively designed programs (C.2), engage and leverage partners (B.1), create a culture of innovation and collaboration (D.1); these ILOs appear in parenthesis.</p> <ol style="list-style-type: none"> 1) Develop AS-T in Biological Sciences 2) Develop AS-T in Chemistry 3) Develop AS-T in Physics 4) Develop AS-T in Geology 5) Develop AS-T in Geography 6) Offer courses in Organic Chemistry (Chem 12A, 12B) starting F2013 7) Offer courses in Transfer level Physics (Physics 4A, 4B; 3A, B) starting F2013 8) Rework Certificate of Proficiency in Biotechnology (C.2) 9) Update and expand offerings in Biotechnology (C.2, D.1) 10) Upgrade and expand equipment used in biotechnology courses (C.2 and D.2) 11) Oversee grant monies to improve success and equity and build partnerships (B.1) 12) Develop and engage an advisory board for STEM fields at BCC (B.1) 13) Hire 2 new faculties: biology and chemistry (A.1, A.2, A.3, C.1) 14) Hire new classified staff : Laboratory Coordinator and technicians for biology and chemistry (supports all ILOs) 			

II.b. Program Outcomes [for each one, cite ILO(s), Appendix I]

PROGRAM OUTCOMES (Mapped to Institutional Learning Outcomes, Appendix I): All program outcomes for biotechnology ensure student success in the workplace and allow students to successfully gain access to 4-year and in some cases graduate programs in science. Well-trained students in the workplace allow strong community partnerships to develop.

PROGRAMS: A.S. *Biotechnology* and *Certificate of Achievement Biotechnology* share the same learning outcomes as follows:

- 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

General Education component(s): Anthro 1, 1L; Astr 10; Bio 1A, 1B, 10, 13, 13L, 25; Chem 1A, 1B, 30A, 30B; Geog 1, 1L; Geol 10; Phys 10; PhysSci 10

Basic Skills component(s): None

III. Evidence

III.a. Institutional Data: (Note: For details by discipline see Appendix 1)

Enrollment	2009-10	2010-11	2011-12
Census Enrollment (duplicated)	1199	962	1660
Sections (master sections)	32	28	42*
Total FTES	206.15	180.08	258.4
Total FTEF	20.78	18	25.14
FTEF/FTEF	19.85	20	20.56
Retention			
Enrolled	1209	966	1678
Retained	918	755	1295
% Retained	75.9%	78.2%	77.2%
Success			
Total Graded	1123	911	1516
Success	815	669	1093
% Success	72.6%	73.4%	72.1%
Withdraw	205	151	278
% Withdraw	18.3%	16.6%	17.6%

*The science department has never had this many sections – closer to 32.

Faculty Data (ZZ assignments excluded)	
	Fall 2011
Contract FTEF	1.82
Hourly FTEF	10.16
Extra Service FTEF	0.39
Total FTEF	12.37
% Contract/Total	14.71

Faculty Data Comparables F2011 (ZZ assignments excluded)				
	Alameda	Berkeley	Laney	Merritt
Contract FTEF	4.99	1.82	10.12	8.04
Hourly FTEF	4.89	10.16	9.99	5.83
Extra Service FTEF	1.26	0.39	1.25	1.00
Total FTEF	11.14	12.37	21.36	14.87
% Contract/Total	44.79	14.71	47.38	54.07

Comment: the data indicate that BCC lags behind the other colleges!

III.b. External Evidence

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.*

The SF Bay Area and Boston, Massachusetts, collectively have the largest concentration of Biotech activity both in the U.S. and in the world. While biotechnology companies in Massachusetts are individually larger and mostly centered in drug discovery and biomanufacturing (pharmaceuticals), companies in the Bay Area are smaller and cover a broader range of innovative work in basic science and clinical research (exceptions are Genentech in South San Francisco and Bayer Pharmaceuticals in the East Bay that both have large manufacturing components). There is far more venture capital invested in the Bay Area than in Boston and this reflects the greater amount of innovative research in biotechnology and medical devices. The Bay Area hosts 240 biotechnology companies that employ 50,000 people, along with several of the world's top research institutions, Stanford University, and the Universities of California at Berkeley, San Francisco and Davis that are critical players both in basic research and in driving innovation in the private sector. (See *World's Largest Biotech Hubs: Boston and the San Francisco Bay*, by Paul Diehl, About.com Guide. Figures are based on Department of Labor Statistics, 2010).

The Biotechnology Programs at BCC were developed with the understanding that the majority of employment opportunities are in the small biotechnology companies described above, the State and Federal research laboratories that serve the region, and the research laboratories in academic institutions. From the beginning there was the realization that (1) the SF Bay Area was not host to a large biomanufacturing base and (2) in order to be competitive in research labs, students would have to be leave with a strong academic foundation in addition to solid laboratory skills in the latest technologies. Lecture and laboratory courses were developed that emphasized concepts, experimentation, and trouble shooting. Graduates and students completing the science offerings in the program have all had success either proceeding on to higher education in the field or gaining employment in the biotechnology industry. For those seeking positions in the workforce, 100% have been successful. A brief look at each of the programs follows.

a. A.S. degree and Certificate Programs in 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 have found employment in a range of small biotechnology companies engaged in research,

and larger biomanufacturing companies that offer work in fermentation, manufacturing, quality assurance and quality control. Graduates also have been hired in State and Federal research and clinical laboratories including the California Department of Health and Human Services, California Department of Justice (Forensics), the Lawrence Berkeley National Laboratory and the Department of Food and Agriculture. A number of graduates have found employment in academic research laboratories at the University of California at Berkeley, San Francisco and San Diego, Stanford University, and teaching institutions in other states. Finally, a few graduates of BCCs programs have found employment in hospital laboratories.

b. Certificate of Proficiency in Biotechnology:

This program is presently undergoing reconstruction. It was initially developed in conjunction with Rubicon, a non-profit organization dedicated to helping individuals with challenging life histories, e.g. incarceration, homelessness and drug abuse, obtain employment in local industries. Introductory classes in science readings and laboratory work were developed in combination with courses in basic skills, e.g. reading, writing and mathematics, and the use of computers. Following the development of this program Rubicon fell into a period of administrative disarray. At a later time, the Peralta District Administration engaged them to consider having their students enroll in a new Biomanufacturing program they were launching at Laney College. The proficiency program as presently designed has not been attractive to students interested in studying science at BCC and thus has not had any graduates at this time. However, there is still a need for young high school graduates and other students with some background in math and science to get started, so a second attempt will be made to create a program that funnels into the more advanced programs at BCC.

STEM at BCC

Presently, the demand for STEM coursework at BCC far outstrips the college's current capacity, as can be seen by the heavy impaction of key science courses. In addition, BCC is not able at this time to offer Biology or Chemistry degree programs due to a lack of appropriate laboratory space which will be addressed by Fall 2013 with the addition of 3 new laboratories: Biology, Organic Chemistry and Physics. Student support for the creation of STEM degree programs is strong. In 2009 a student survey that garnered responses from 79 Biology, Chemistry, and Math students, and indicated that 64% of those surveyed had an educational goal of a Bachelor's or Associate's degree in a STEM field. In addition, several students noted that they were preparing for graduate-level work in science. When asked about the obstacles they faced to achieving their educational goals at BCC, students noted a wide variety of challenges. Several students described the need for more STEM course availability, stating: "There are not enough of the classes I need for my transfer." "[There are] too few science courses offered at BCC." "Math and physics classes filled up too quickly which set me back a semester to transfer."

It is critical that BCC expand its capacity to serve STEM students, increase access to courses, and ensure that students receive the support necessary to succeed, enabling the college to not only serve its own students, but also support the world-renowned biotechnology research and industry located in the SF Bay Area.

Program Review Narrative:

Overview: The science department at BCC offers an average of 32 sections each semester. Most of the sections are in courses filled with non-majors meeting IGETC or A.A. requirements (PACE). Transfer level science classes offered each semester include 3 sections of chemistry and 2 sections of biology that are filled with majors in STEM fields, 5 sections each of anthropology and geography that are filled mostly with non-majors, and 1 section (w/ 2 lab sections) of microbiology composed of students aiming for careers in allied health fields, most of whom have completed 4-year degrees. The remaining few classes are part of the biotechnology program. The addition of 3 new laboratories in Biology, Organic Chemistry and Physics, and less budget restrictions from the State, will hopefully change this picture.

Both the federal government and State government have data reflecting the dire need for more graduates in the sciences and technology in the next 10 years. BCC, situated within blocks of one the world's most renowned universities, in a region that boasts the world's center of biotechnology and other high tech industries, is in a unique position to participate in the training and education of future science majors. And the interest exists in the student body – science classes are among the first to fill and close each semester and the science seminars regularly fill the auditorium.

A. Primary goals and objectives of the Science Department

1. Provide Students with the Knowledge and Skills for Future Success

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. To meet this goal, the science department offers several sections throughout the day and week in both introductory, transfer level and vocational courses in biotechnology, biology, chemistry, physics, geography and geology, physics, and physical sciences.

2. Build Stepping Stones to Science

Another important goal of the science department is to make careers in science accessible to students who are recent graduates of high schools or who are entering the workforce for the first time and have been excited by the news and the potential of interesting jobs in biotechnology and other science related fields. Many students that could enter the science fields and be successful do not do so as they are put off by the difficulty of the coursework and the amount of time one must spend in school. English and Math departments typically offer a series of courses that enable students to start from scratch and work through to advanced level coursework and with these models in mind, the biotechnology program experimented with designing a Certificate of Proficiency for beginners. Unfortunately, the results of this program have not met expectations and we are presently in the process of re-designing it. We detail the problems in another part of this report.

3. Create links with the Community

A third goal of the science department is to provide the community with informative courses to enhance their understanding and appreciation of the world of science.

Monthly Science Seminar Series: The BCC Science Department and the BCC Science Club launched a monthly seminar beginning spring, 2012. Thus far, the speakers have included renowned scientists from Lawrence Berkeley National Laboratory, University of California, Berkeley, UCSF, California Academy of Sciences, Children's Hospital Oakland Research Institute and the Exploratorium. Topics have included global warming, use of cord blood stem cells to tackle leukemia in children, the secret life of spiders, the science of the Maya apocalypse, neuroscience and consciousness and the limits of space. The seminars have been broadly advertised and between 75-160 students and interested members of the community attend.

Seminar-Style courses taught by local scientists and scientific laboratories: BCC used to offer a 2-unit course in “Weather in Outer Space” in conjunction with the Space Sciences Laboratory. Given the proximity of BCC to the University of California at Berkeley, Lawrence Berkeley National Laboratory, and local high tech industries, other seminar-style courses that would generate interest in scientific knowledge to the general public can also be developed at BCC.

General Interest Courses: Presently, a course entitled “*Medicine and Science in the 21st Century*” is being developed as part of a generous grant from the California Institute of Regenerative Medicine. The aim of the course is to generate both enthusiasm and understanding of the latest discoveries and technologies in medicine, along with a look at ethical issues. Each division within the science department could generate one or more courses geared to a broader audience. For example, courses entitled “Violent Earth”, “History of Life”, “Biology of the San Francisco Bay and Delta”, and “Pollution Solutions” would be informative and would encourage more people to consider careers in STEM fields.

B. Science Department Offerings, Unique Programs, Challenges and Action Plans

The Science Department at BCC offers courses in Physical Anthropology, Astronomy, Biology, Biotechnology, Geography, Geology, Physics and Physical Science. They are presented below in alphabetical order, with the exception of astronomy and physical science (oceanography) that are discussed together under the heading “Earth Sciences”.

I. Physical Anthropology

BCC presently offers 3 lecture and 2 labs classes in Physical Anthropology. These courses were originally offered through the Social Science department, but were moved to the Science department in spring 2010 to give the Science department more sections. At that time this brought the science offerings to 28 classes – with anthropology accounting for 25% of the offerings! Anthropology 1/L meets IGETC requirements for a biological science with lab and as such these sections are mostly filled with non-majors. Following the hire of a new anthropology instructor to replace a retired instructor, physical anthropology will be moved back to the Social Sciences.

II. Biological Sciences

BCC presently offers 3 transfer level biology classes for majors each semester (Bio 1A, Bio 1B and Bio 3), 6 non major biology classes (Bio 10, 4 classes, and one each of Bio 13/L and Bio 25) and 2–3 biotechnology classes (Bio 32, 34, 230A in the Fall and Bio 33, 230B in the Spring).

Biology is required for many STEM majors and all allied health majors, thus there is always a demand for these classes. Following the completion of the build out and the availability of new laboratory rooms in biology, organic chemistry and physics, BCC will be able to increase its offerings of non-major biology classes and launch an A.S.-T in Biological Sciences. Biology Students enrolled in Bio10 mostly fall into 2 groups, the largest being those students fulfilling GE requirements, but it is hoped that some of the students will become interested in pursuing a career in science. The evening classes in Biology 10 have more students aiming for careers in the allied health fields. Biology 13/L is designed for the PACE students. Biology 1A and 1B fill quickly each semester and many students are turned away at the start of the semester due to lack of space in the lab room. Students enrolled in these classes are planning to transfer to 4-year schools, in particular the University of California, Berkeley, and major in some aspect of biology and biotechnology. Due to the interest in Bio 1A and 1B and the near completion of organic chemistry and physics laboratories, an A.S. in Biological Sciences will be developed.

Action Plans for Biological Sciences

1. Develop A.S.-T in Biological Sciences starting Spring 2014.
2. Hire full time classified staff (Biology technician) that can serve both biology and biotechnology.

III. **Biotechnology**

A.S. Biotechnology and Certificate of Achievement, Biotechnology

BCC presently offers 2 programs in biotechnology, the A.S. degree in Biotechnology and the Certificate of Achievement in Biotechnology. Coursework for both of these programs includes general biology, microbiology, immunology, genetics, instrumentation, scientific literature, bioethics, inorganic and organic chemistry, mathematics and physics. This is a rigorous program that offers students both a strong academic foundation and a solid training in basic laboratory manipulations, along with exposure and work with some of the more advanced technologies commonly used in research labs. Students develop strong laboratory math and thinking skills. Laboratory exercises are truly experimental and emphasize the need to think critically through the design and implementation of a series of protocols, analyze results, identify problem areas and re-adjust experimental components when needed.

Students enrolling in these programs generally have strong backgrounds in math and science, many with previous college degrees (not necessarily in the sciences). Most of the students have strong study skills, expect to put in long hours to master the material, and are willing to come into the lab outside of lab hours to work on experiments. Recently, retention rates in the specialty classes have been high, above 80%. Students who drop out generally do so because of conflicts with work or family, and they return at a later date. The majority of students are older (mid-twenties to early forties) and, among this group, there are those who are re-tooling or changing their direction in life. Recently, we have seen students enrolling and completing the degree or certificate who have completed 4-year degrees in science but feel 'lost' or have attempted to find jobs in the industry and research labs only to realize that they lack critical laboratory skills. For this group, the program seems to serve as a "post baccalaureate" training program. There are a few talented recent high school graduates that enter the program and upon completion matriculate to 4-year schools and major in Biology-based programs, usually molecular cell biology.

Last year 15 students graduated with either the A.S. or the Certificate of Achievement and this year will see about the same number completing the programs. These graduation numbers are the highest in years and indicate not only an increase in interest, but that the biotechnology program at BCC is recuperating from past challenges that included two moves to new locations in a 3 year period and the initiation of similar programs in other colleges within the same district.

As mentioned previously in this report, all graduates either move on to 4-year or graduate and professional schools or find employment in a range of small biotechnology companies engaged in research, as well as in larger biomanufacturing companies that offer work in fermentation, manufacturing, quality assurance and quality control. Graduates also have been hired in State and Federal research and clinical laboratories including the California Department of Health and Human Services, California Department of Justice (Forensics), the Lawrence Berkeley National Laboratory and the Department of Food and Agriculture. A number of graduates have found employment in academic research laboratories at the University of California at Berkeley, San Francisco and San Diego, Stanford University, and teaching institutions in other states. Finally, a few graduates of BCC's programs have found employment in hospital laboratories.

Certificate of Proficiency in Biotechnology

This program is presently undergoing reconstruction. As mentioned previously it was initially developed in conjunction with Rubicon, a non-profit organization based in Richmond, CA, and dedicated to helping individuals with challenging life histories obtain employment in local industries. Introductory classes in science readings and laboratory work were developed in combination with courses in basic skills, e.g. reading, writing and mathematics, and the use of computers. Following the development of this program Rubicon fell into a period of administrative disarray. Shortly thereafter, the Peralta District Administration engaged them to consider having their students enroll in a new Biomanufacturing program that they were launching at Laney College.

For a number of years following the loss of the Rubicon students, the Certificate of Proficiency was a program without takers – it was not attractive to science students at BCC. However, we do see students who would benefit from a series of classes that would allow them to develop their skills at a

slower pace. In an initial attempt to revive the Certificate of Proficiency we decided to restructure the “beginning” scientific instrumentation class (Bio 230A) in an attempt to attract and retain interested students with little or no background in math and science. We developed short readings and homework exercises and put together a series of basic experiments that we thought would allow students to build their lab math skills and gain confidence in their ability to work efficiently at the bench. We put in extra tutors and doubled up on faculty (paid by grant monies) to work with students in small groups and we had weekly meetings and discussions to go over best methods of teaching key topics. The outcome of our efforts was disastrous. Students who were capable of greater challenges and who would have been capable of completing an A.S. in Biotechnology (and who we encouraged to enroll as some techniques must be learned before moving on to advanced classes) – dropped the class, while students with weak math and English skills were never able to get above D grades. This forced us to re-think the content of Bio 230A and the role this class should serve the Biotechnology program. This past year we re-vamped Bio 230A to be a solid introductory laboratory class with the assumption that students have a facility with arithmetic and algebra and it has proven successful. Retention rates are once again high and we can see many students progressing to the A.S. degree in Biotechnology.

In place of Bio 230A we will design a new class “Lab Basics” for the Certificate of Proficiency. We will also re-structure the certificate to make it attractive to recent high school graduates with math and English skills and adults returning to the workplace following a long absence who need a longer time to process information. Thus, a second attempt to re-structure this certificate will be made in the next two years with the assistance of a recent grant from the Department of Labor.

Grants supporting the Biotechnology Program at BCC

A number of small grants have been received over the years, most awarded by the State Chancellor's office in Sacramento. Recently, Berkeley City College has received a total of \$2.4 million from the California Institute of Regenerative Medicine (CIRM) to support student internships in laboratories conducting research in stem cell biology and regenerative medicine. Between 2010 and 2016 a total of 52 students will have completed nine and ten-month paid internships in research laboratories at Children's Hospital Oakland Research Institute (CHORI), the University of California, Berkeley (UCB), and the University of California, San Francisco (UCSF), Stanford University, and a number of private industries in the San Francisco Bay Area. Thus far, the majority of students have selected laboratories at UCSF.

Fourteen colleges in California were awarded CIRM grants, most are 4-year institutions and of the 3 community colleges, two are very large (City College of San Francisco and Glendale Community College). BCC is the smallest program to receive the award. Colleges awarded these grants all have one thing in common: solid biotechnology programs that combine strong academic coursework with rigorous laboratory training. The work in research labs of this nature is fast paced and students selected must be capable of handling the stress and independent work, although their research is guided by scientists.

Not all students are interested in working in research labs, so we are presently looking at grants that will afford our students paid internships in industry and clinical laboratories.

Challenges facing the Biotechnology Program

1. The most critical challenge facing the Biotechnology Program at BCC is the lack of faculty, adequate staffing and sufficient release time for the Coordinator of the program. To date, there is no trained dedicated technician and only one full time faculty at a release time of 0.1 overseeing the program. Prior to this year, this faculty taught most of the specialty lectures and labs in the program, along with the microbiology class which serves students in majoring in biotechnology and allied health, and also serves as co-chair of the department. The CIRM award has offered some relief as it has provided monies for part time trained technical assistance and support for postdoctoral researchers to participate in teaching, particularly in the laboratory. (CIRM monies have also allowed for the purchase of costly, but much needed, supplies to allow for the upgrade of laboratory experiments critical for student success).

Solutions: The hire of a new biology faculty this coming spring with expertise in one or more of the fields in biotechnology will help to advance the program and ease the stress on the present faculty. Also, the replacement of the recently vacated biology technician position with someone with experience in working in advanced molecular based laboratories will fill the need of the dedicated technician. When more monies become available to the college, the amount of release time afforded the coordinator's position needs to be revisited.

2. Another challenge for BCCs biotechnology program has been the development of a number of smaller biotechnology/genomic certificates. Laney College developed a bio-manufacturing program that differs mainly in name from what Berkeley City College had developed over the years, although there are a few differences. As a result of the launching of this program, BCC saw declines in enrollment that, at the time, were exaggerated by the move of the BCC science department to a location inaccessible to most students. Since this time, enrollments at BCC have slowly climbed back with much effort expended on outreach and coordination between the program coordinators of each college (see solutions below).

Likewise, Merritt College launched a genomics program offering courses that overlap considerably with BCCs biotechnology program, albeit in a different format. Merritt chose to develop small united classes (0.5 – 2 units) and develop a new category Bioscience rather than Biology. The major complication arises when students who have completed a certificate or a series of “advanced courses” at Merritt enroll in BCCs advanced biotechnology courses in an attempt to build their portfolios. They enroll with the assumption that their previous coursework has prepared them well – but it has not. Because the courses are structured and taught differently at Merritt, with more emphasis placed on the use of advanced specialty equipment, students from Merritt are surprised to learn that they are not prepared to tackle challenging experimental protocols – they lack the critical thinking skills and facility with laboratory mathematics that only comes with extensive exposure to experimental bench work. This latter situation has proven frustrating both for student and faculty (who must spend countless extra hours attempting to fill in the gaps for the student).

Solutions: Laney College and BCC have collaborated to ensure that the course content presented in Biomanufacturing 82 matches fairly closely that of Bio 230A, thus allowing students with stronger academic backgrounds, and capable of taking the more rigorous courses offered in an A.S. degree in Biotechnology, to funnel into BCCs program. The coordinators are also working together to develop a basic laboratory class as both institutions are having difficulty handling students in need of more assistance at the beginning of their training. This basic laboratory class will be part of BCCs Certificate of Proficiency, but shared by both institutions.

BCC designed a 2 year professional training program in Biotechnology – not unlike programs designed in other professional fields such as nursing. Courses, both lecture and laboratory, are continually tweaked, re-vamped and upgraded to meet the demands of both the marketplace and the 4-year schools, and the experimental material is carefully woven together. With this in mind, students should not assume they can ‘jump in’ to the program midway and be successful. It will be critical to detail the differences between each college’s programs so that students are clear about the outcomes and do not become misled to think that one program necessarily prepares for another.

Action Plans for Biotechnology

1. Re-work the Certificate of Proficiency to attract recent high school graduates and other interested students who need to start at a more basic level. This will involve developing one basic lab class with Laney College.
2. For the A.S. and Certificate of Achievement courses:
 - Upgrade laboratory experiments to keep abreast of new knowledge and changes in technologies
 - Replace broken and older equipment and purchase more advanced equipment
 - Hire a new faculty member capable of teaching some of the advanced classes

- Hire a new biology technician to set up experiments for the biotechnology classes

3. Work with Laney College to develop a Laboratory Basics course similar to what exists at City College of San Francisco called "Jump Start Biotech"

IV. Chemistry: General Chemistry and Organic Chemistry

BCC presently offers 6 chemistry classes each semester: Chemistry 1A (2), Chemistry 1B (1), Chemistry 30 A (2) and Chemistry 30B (2). All students aiming for careers in the sciences, and in the professional allied health fields, much take classes in chemistry. Given the demand for chemistry by students in so many disciplines, and not to mention the location of BCC, this number of classes has been woefully inadequate. Furthermore, the lack of transfer level organic chemistry has prevented BCC from launching A.S. and A.S.-T degrees in biology, chemistry, physics and the earth sciences. Almost all of the students enrolled in Biotechnology at BCC complete their chemistry requirement in another institution.

The completion of the organic chemistry laboratory, the addition of Chem 12A and 12B, and the addition of a second full time chemistry instructor will allow BCC to expand its offerings in chemistry and better meet student demand.

Development of Certificate in Environmental Chemistry and TAACCC Grant

BCC was recently awarded a Department of Labor grant (TAACCC) that will fund the development of a new certificate program in Environmental Chemistry. This program will necessitate the development of 2 new classes: Environmental Chemistry and Quantitative Analysis. A Certificate in Environmental Chemistry will allow students to find work in a number of different industries, including the new "Green Industries". Also, coursework in quantitative analysis will strengthen the skills of students who transfer to 4 year schools to major in STEM fields.

Action Plans for Chemistry

1. Develop A.S.-T in Chemistry
2. Hire new faculty with specialty in organic chemistry
3. Hire full time classified staff as a chemistry technician
4. Offer Organic Chemistry, CHEM 12A and 12B starting Fall 2013
5. Develop Certificate in Environmental Chemistry by Fall 2014

V. Earth and Planetary Sciences

BCC presently offers 3 lecture and 2 lab classes each semester in Geography (Geog 1, 1L), one introductory class in geology (Geol 10), one introductory class in Astronomy and one physical science course in oceanography designed for the PACE students. All of these classes have been favorites for non-majors seeking to complete IGETC requirements and indeed, all classes close shortly after enrollment begins.

Recently, a lab class in Geology 10 was submitted for approval that will be available for students majoring in education starting Fall Semester 2013. The earth and planetary science faculty would love to offer more courses for the general public, but budget cuts have prevented this from happening. As mentioned previously, courses entitled "Violent Earth", "History of Life", "Biology of the San Francisco Bay and Delta", and "Pollution Solutions" would be informative and would encourage more people to consider careers in STEM fields. BCC once offered a 2-unit course in "Weather in Outer Space" in conjunction with the Space Sciences Laboratory, U.C. Berkeley, but this class was canceled due to budget cuts.

Eventually it will be critical to hire a full time faculty in one of the specialties to start developing this very critical, and often overlooked, STEM endeavor.

Action Plans for Earth and Planetary Sciences

1. Develop A.S.-T in Geography and Geology
2. Locate dedicated laboratory room for the earth sciences

VI. Physics

BCC presently offers one introductory physics class each semester. Every week the co-chairs of the department receive calls from frustrated science students unable to find the listings for Physics in the class schedule. Needless to say they are shocked to learn that we do not offer this critical subject needed by all STEM majors!

Several years ago, BCC purchased equipment and supplies for Physics 4A, 4B and 4C. However, with the exception of a few semesters of 4A and 4B, and one semester of 3A (for biology majors), we have not offered transfer level physics and the supplies are in storage. This will soon change with the completion of the physics laboratory room.

Action Plans for Physics

1. Develop A.S.-T in Physics by Fall 2014
2. Hire New Faculty in Physics

C. Curriculum, Student Learning Outcomes and Assessment

Curriculum Currency and Effectiveness

The science faculty takes great care to keep the information in their respective lectures up to date with the latest discoveries and interpretations of scientific phenomena. A number of the faculty are engaged in research and share the results of their work with their students. The science faculty also takes time to attend meetings and keep abreast of research through scientific journals specializing in their respective fields. Likewise, laboratory experiments are continually updated or changed to incorporate new technologies as they arise.

The effectiveness of the lectures and laboratories offered at BCC is demonstrated in a number of ways. Biotechnology graduates compete effectively with graduates from other programs, including 4-year institutions, for positions in the biotechnology workplace. Biotechnology students also prove successful employees through their progression to higher-level positions and through their supervisors asking BCC faculty whether there are other graduating students available for employment. Students who have completed transfer level courses often stay in touch with faculty members as they progress through their 4-year institutions - thanking them for the excellent training they received at BCC. And a number of biology and chemistry students have received impressive academic and monetary awards upon graduation from BCC.

All course syllabi are methodically updated each semester. Course outlines that have been recently updated include most of course offerings in biology, chemistry and physics. However, there are course outlines that need to be reviewed and these will be completed by early January, 2013. Changes to these outlines will be minimal and will not require approval by CIPD.

Integration of Student Learning Outcomes and Assessment

All courses in the science department have Student Learning Outcomes in place. Assessment for a number of courses in biology, e.g. Biology 1A, 1B and 10, has been completed and assessment has almost been completed for Chemistry 30A and 1A and 1B. Assessment for all remaining classes, along with the Biotechnology Program, will be completed by early January 2013.

Persistence Rates in the Sciences

An analysis of persistence rates of students enrolled in science courses at BCC is higher than seen for the college as well as the average for the entire district. Data from F10 – S11 and F11 – S12 show 79% and 77% persistence rates, respectively, for the BCC science department compared to 66% and 68% persistent rates for the college. The persistence rate for the Peralta Community College District was 64% for each of those years.

D. Successful Student Pathways

Many students in the science classes successfully transfer to 4-year schools to pursue careers in STEM fields. The faculty spends considerable time in counseling and mentoring these students and writing their recommendations. All of the students in microbiology are aiming for careers in the allied health fields and judging by the number of recommendations written and the reports back from students (both when they are accepted and when they complete their programs) many of these students are successful.

The Biotechnology program has successfully placed students in positions in research and clinical labs in the industry, academia and federal and state agencies. A number of graduates have progressed to 4-year, graduate and professional schools. Several students finish the laboratory classes and fail to complete the A.S. degree or Certificate each year due to the need to find employment – which they do successfully. All students heading to the workplace have found employment – and the majority in well paid positions.

The development of A.S.-T programs in Biological Sciences, Chemistry, Geography, Geology and Physics will offer students an array of STEM fields to pursue. The development of a Certificate in Environmental Chemistry likewise will offer students a pathway to new jobs.

E. Action Plan for Science Department

1. Complete update of all course outlines
2. Complete Curriculum Assessment for courses and programs
3. Complete Program Assessment
4. Put together an Advisory Board for the STEM fields
5. Hire Full Time Laboratory Coordinator
6. Order equipment to upgrade existing and new laboratories
7. Locate office space for science students for tutoring sessions

III.c. Program Outcome Assessments (add rows as needed)	Findings	Action Plans
PROGRAM 1: A.S. Biotechnology and Certificate of Achievement, Biotechnology	TBD	TBD
PROGRAM 2:		
General education component:		
Basic skills component:	None	None

III.d. PCCD Institutional Goals -- Narrative

1. Advance Student Access, Success & Equity

Effective and innovative teaching strategies

All of the science courses are taught using a lecture style presentation of the materials. This does not imply, however, that students are not actively engaged and encouraged to participate with questions, answers and observations. Many of the science department faculties have developed their own websites and posted lecture outlines or highlights, links to support materials, slides and other demos presented during the lecture, and information regarding course mechanics. In the process of lecturing, the science faculty varies in the preferred style of presentation but most use a combination of white board, overhead projectors, power point and Internet as needed. The majority of chemistry and physics instructors prefer to use the white board when working on problems, while the majority of the biology instructors prefer to use prepared overhead transparencies or power point.

All laboratory classes, by their nature, engage the students and demand their participation. Laboratory exercises in biology, microbiology and biotechnology are continually revised to incorporate and make

use of the latest technologies available to the classroom.

In an effort to improve student success and access in Chemistry 1A, a gateway class to most STEM majors, the Chemistry faculty in the district is presently conducting a 3-year experiment to see if poor or failing scores on a pre-test offered at the start of the semester is reflected in drop rates and non-passing grades. The problem is high attrition rates in Chemistry 1A that are due mainly to a lack of student preparedness. The intent is to institutionalize a Chemistry Assessment Test that all students must take if they have not taken a recent lower level chemistry class. Such assessment tests are in place in most other college districts and save much time and money. At BCC many students who would succeed in Chem 1A are turned away the first day of class due to lack of space, space that becomes available after the last day to add as weaker students drop. The pre-test scores are presently tallied and one faculty is maintaining a database for analysis.

In an effort to keep biotechnology students on the cutting edge of technology, field trips to the University of California, Berkeley and San Francisco, are arranged so that students can become familiarized with some of the latest technologies used to solve biological questions. Postdoctoral researchers are invited to be guest lecturers during these experiments so that they can devise manageable experiments for the students to conduct during their visits. BCC plans to purchase a few 'high tech' equipment items as they become smaller and more accessible in cost.

Course outlines and Laboratory Manuals continually updated to meet the needs of transfer level programs and the workplace.

Integrity and consistency of academic standards within the discipline to guarantee success

The biology and chemistry faculty, both full time and adjunct, meet on a regular basis to discuss laboratory experiments, exam questions and methods, and matters pertaining to academic standards and integrity. Regular science department meetings during professional days also allows for the discussion of academic matters among all of the faculty teaching in the sciences. Faculties also meet with faculty in other colleges during professional days to share ideas and concerns.

Science faculty at BCC have taught at 4 year schools including UC Berkeley, UC Davis and SFSU and thus are familiar with the degree of scholarship expected of students entering upper division level work. Students transferring to 4-year schools from BCC have kept in touch with their instructors at BCC and let them know that the training they received at BCC was excellent and prepared them well!

Scheduling that meets student needs

The courses in the biotechnology program are scheduled mainly in the evening to accommodate students who must work during the day. When there is more than one section of a class (e.g. Chemistry 30A, Biology 10) classes are scheduled on alternate days (e.g. MW or TR) and in different time frames (e.g. morning and afternoon or evening).

2. Increase Transfer and Program Completion Rates

Development of A.S.-T programs to guarantee transfer to 4-year Schools

By Fall 2014, BCC should have established A.S.-T programs in the following STEM majors: Biological Sciences, Chemistry, Physics, Geography and Geology. The institutionalization of these programs must await the completion of the "build out" that will provide laboratories in organic chemistry and physics as well as and hiring of faculty to develop the lectures and laboratory experiments.

Additional Sections to ensure students can complete coursework at BCC

It will be critical to offer more class sections at different times in Biology 1A, 1B, Chemistry 1A, 1B and Physics and Organic chemistry when monies become available. Presently, many students cannot complete their lower division coursework in science at BCC due to the lack of offerings. Biotechnology students must carefully plan their schedules so that they can enroll in specialty classes that are offered only one time/year. Most biotechnology students complete coursework in chemistry, biology, physics and mathematics at other institutions as BCC does not have enough sections in these divisions to

accommodate the need.

3. Engage our Communities & Partners

Science Seminar Series

BCC launched a seminar series last spring that is available and open to members of the community. Each seminar attracts 75 – 150 guests of which at least one-third and maybe more are community members.

Connections with industry and local state and federal laboratories

The biotechnology program at BCC was created with the input of local industry scientists. Scientists associated with the industry regularly give lectures in the biotechnology courses. Also, the industry gives the BCC science department supplies and equipment they no longer need. In the 17 years of its existence, the Science Department at BCC has been the recipient of close to \$300,000 worth of goods including a DNA sequencer, floor centrifuge, thermocyclers, microplate readers, specialty microscopes, spectrophotometers, hand-held pipetting devices to name a few of the larger priced items. Assorted supplies come in almost weekly, e.g. the State of California Public Health Department regularly sends over unused media items and specialty kits they can no longer use (legally) due to expiration dates. Were it not for the generosity of the industry and state and federal laboratories the biotechnology program at BCC would not be able to offer the students the use of cutting edge technology.

Graduates of BCC's biotechnology programs are employed in local industries: Bayer, Chiron/Novartis, BioRad, Berlex, and Genentech to name a few. Graduates are also employed at the California Department of Health and Human Services (CDH&HS, a.k.a. State Health Lab), California Department of Justice (DOJ), Forensics Division, the Lawrence Berkeley National Laboratory (LBNL), United States Department of Agriculture (USDA), U.C. Berkeley (various research assistant and associate positions), U.C. Davis (plant genomics), Stanford Research Institute and the School of Optometry at UC Berkeley, to name a few positions.

Connections with public and private research laboratories

The receipt of a large grant from the California Institute of Regenerative Medicine (CIRM) allows students to have 9 and 10 month paid internships in research labs throughout the Bay Area including Children's Hospital Oakland Research Institute (CHORI), the University of California, Berkeley (UCB), UC San Francisco, UC Davis, Stanford University and selected private industries depending upon student interest. Program Investigators (PIs) in these laboratories regularly communicate with the Program Director of the CIRM grant on the progress of the student intern. Without exception, PIs have been most complementary of their adopted 'students' and some have hired students following their internships as full time technicians.

Advisory Board reflects academic and industry partners

The Biotechnology program continually seeks input from industry, clinical and research scientists and technicians in an effort to determine where and when to update course materials and include new technologies in the laboratories. The biotechnology program has a dedicated Advisory Board composed of representative scientists and technicians from industry, state and federal laboratories and public and private research labs. The faculty is in the process of recruiting new members for the board as many of the members have moved to other jobs outside of the Bay Area. Among other things, advisory board members serve as guest lecturers and assist students with entry into the workplace.

The science department at BCC plans to create a STEM advisory board to advise the development of new programs and assist with the acquisition of monies for student internships and new equipment items.

4. Build Programs of Distinction

Biotechnology Programs

It is the aim of the Science Department to develop many programs of distinction – but most will have to

await the completion of the build out and the addition of much needed curricula. BCC does have one program that has received recognition by the State of California, namely the Biotechnology program. BCC's program was recently awarded a \$2.4 million grant to give graduates paid internships in research labs through the California Institute of Regenerative Medicine (CIRM), and has received a number of smaller awards in the past for the development of innovative coursework. The biotechnology program at BCC is well known in the community and to other academic institutions in the Bay Area and is considered a thorough and rigorous program that prepares students well for positions in the industry and research labs as well as for transfer to other academic and professional institutions.

5. Create a Culture of Innovation & Collaboration

Contributions of Postdoctoral Researchers

Postdoctoral researchers and other scientists in the community are regularly hired to either give a guest lecture or design a set of laboratory experiments, or to co-teach the lecture and laboratory biotechnology courses. This has allowed BCC to offer up-to-date and innovative classes that ensure student success and access to competitive positions and academic programs.

6. Develop Resources to Advance & Sustain Mission

Grants and Other Funding Sources

The Science faculty has sought and received funding from grants to help advance and develop the programs we offer. Along with the \$2.4 million CIRM grant, we have just received a \$0.6 million Department of Labor Grant that will support the revamping of the Certificate of Proficiency and the development of new certificate programs in Environmental Chemistry and Computer Science (housed in a different department). Other granting agencies are being investigated at this time in an effort to fund student internship in industry and State and Federal clinical laboratories. *STEM Advisory Board:* As noted above the development of an Advisory Board to oversee the STEM fields at BCC will help us to locate monies and equipment resources so that we can continue to upgrade and develop our offerings.

IV. Action Plans

Please describe your plan for responding to the above data. Consider program learning outcomes, institutional goals, external evidence, and BI data. Also, please reference any cross district collaboration with the same discipline at other Peralta colleges.

Include overall plans/goals and specific action steps. Add rows as needed.

Action Item	Steps/Timeline	Person(s) Responsible	Supporting Data Source (check all that apply)
Develop A.S.-T Biological Sciences	June 15, 2013	Pieter de Haan and Barbara Des Rochers	<input type="checkbox"/> Assessment Findings <input type="checkbox"/> BI Data <input checked="" type="checkbox"/> Institutional Goals <input type="checkbox"/> Other
Re-work Certificate of Proficiency	June 15, 2013	Barbara Des Rochers	<input type="checkbox"/> Assessment Findings <input type="checkbox"/> BI Data <input checked="" type="checkbox"/> Institutional Goals <input type="checkbox"/> Other

Upgrade Biotechnology program	June 15, 2013	Barbara Des Rochers in conjunction with Leslie Blackie, Laney College	__ Assessment Findings __ BI Data _X_ Institutional Goals __ Other
Hire new Biology Faculty	June 15, 2013	Barbara Des Rochers, Pieter de Haan, Siraj Omar	__ Assessment Findings __ BI Data __ Institutional Goals _X_ Other
Hire New Biology Classified Staff	January 15, 2013	Barbara Des Rochers, Pieter de Haan, Siraj Omar	__ Assessment Findings __ BI Data _X_ Institutional Goals __ Other
Develop a Lab Basics class with Laney College	June 15, 2013	Barbara Des Rochers, Leslie Blackie	_X_ Assessment Findings __ BI Data __ Institutional Goals __ Other
Develop A.S.-T Chemistry	June 15, 2013	Siraj Omar, Pieter de Haan, Barbara Des Rochers	__ Assessment Findings __ BI Data _X_ Institutional Goals __ Other
Hire New Chemistry faculty with specialty in organic chemistry	June 15, 2013	Siraj Omar, Pieter de Haan, Barbara Des Rochers	__ Assessment Findings __ BI Data _X_ Institutional Goals __ Other
Develop Chem 12A and Chem 12B laboratory exercises and lecture materials	August 15, 2013	New Chemistry Faculty	__ Assessment Findings __ BI Data _X_ Institutional Goals __ Other
Hire New Chemistry Classified Staff	Fall 2013	Siraj Omar, New Chemistry Faculty	__ Assessment Findings __ BI Data _X_ Institutional Goals __ Other
Develop Certificate in Environmental Chemistry	Fall 2014	Siraj Omar, New Chemistry Faculty	__ Assessment Findings __ BI Data _X_ Institutional Goals __ Other
Develop AS-T Geography, And Geology	June 15, 2013	Rita Haberlin, Elena Givental, Don Woodrow, Siraj Omar, Pieter de Haan, Barbara Des Rochers	__ Assessment Findings __ BI Data _X_ Institutional Goals __ Other

Locate new laboratory space for Geography, geology, oceanography to replace lost lab due to build out	TBD	Administration	__ Assessment Findings __ BI Data __ Institutional Goals <input checked="" type="checkbox"/> Other
Develop A.S.-T Physics	June 15, 2013	Siraj Omar, Pieter de Haan, Barbara Des Rochers with assistance from Laney Faculty	__ Assessment Findings __ BI Data <input checked="" type="checkbox"/> Institutional Goals __ Other
Hire New Physics Faculty	TBD	Siraj Omar, Pieter de Haan, Barbara Des Rochers, with help from Laney Faculty	__ Assessment Findings __ BI Data <input checked="" type="checkbox"/> Institutional Goals __ Other
Complete course curriculum update and assessment and Program Assessment	January 15, 2013	Siraj Omar, Pieter de Haan, Barbara Des Rochers	__ Assessment Findings __ BI Data <input checked="" type="checkbox"/> Institutional Goals __ Other
Complete Program Outcomes Assessment	December 15, 2012	Barbara Des Rochers	__ Assessment Findings __ BI Data <input checked="" type="checkbox"/> Institutional Goals __ Other
Develop Advisory Board for Science Department	June 15, 2013	Siraj Omar, Pieter de Haan, Barbara Des Rochers, Paramsothy Thananjeyan and others	__ Assessment Findings __ BI Data <input checked="" type="checkbox"/> Institutional Goals __ Other
Hire Laboratory Coordinator to oversee Ordering, repairs, returns, databases, organization	TBD	Siraj Omar, Pieter de Haan, Barbara Des Rochers	__ Assessment Findings __ BI Data <input checked="" type="checkbox"/> Institutional Goals __ Other
Order equipment to upgrade existing and new laboratories	March 15, 2013	Siraj Omar, Pieter de Haan, Barbara Des Rochers,	__ Assessment Findings __ BI Data <input checked="" type="checkbox"/> Institutional Goals __ Other
Locate an office to handle tutoring for science students	TBD	Administration	__ Assessment Findings __ BI Data __ Institutional Goals <input checked="" type="checkbox"/> Other

V. Resource Needs

- A. Please describe and prioritize any faculty, classified, and student assistant needs.

Immediate Faculty Needs:

1. A full-time contract faculty to teach organic chemistry (12A & 12B) beginning fall 2013 (following the completion of Phase-3 build-out project).
2. An additional full-time contract faculty for biology/biotechnology beginning fall 2013.

Future Faculty Needs

1. A full-time contract faculty to teach Physics 4A,4B, 3A,3B)
2. A full-time contract faculty for the earth and planetary sciences (geography, geology, marine sciences, astronomy, space sciences)
3. An additional full time contract faculty for biology/biotechnology

Classified Staffing Needs

1. **A full-time lab coordinator to oversee the management, purchasing (of chemicals and equipment) and the maintenance of equipment in the science department.**

There 8 disciplines w/ labs housed under the umbrella of "science department". Lab classes run 8:00 a.m. to 10:00 p.m. Mon - Fri and most weekends until 5:00 p.m. In order for labs to run smoothly, equipment must be in working order, supplies ordered and replenished in a timely manner, a database with locations of various equipment/supplies must be maintained, new vendors need to be set up, etc. A lab coordinator would handle these responsibilities along with mentoring student workers, overseeing the storage, handling and disposal of hazardous materials and working with the campus engineers when mechanical problems arise in the labs and prep areas.

2. **A full-time technician chemistry starting fall 2013 to oversee the preparation of all chemistry laboratory classes and prepare chemical and equipment inventories for chemistry.**

Chemistry technicians are needed to preparation all materials ahead of each lab, set up the various stations in the lab, participate in database management.

3. **A full-time technician in biology with experience with molecular biology to replace the technician who recently left.**

This position would replace a vacated position and serve to provide the biotechnology courses with a knowledgeable technician.

4. **110 equivalent hours per week of instructional aide/student worker services to help instructors and students in all lab classes in the science department.**

Each lab class must have qualified student workers and instructional aides assisting during the laboratory time for the safety of students and to success, access and equity in training. Instructional student aides can also participate in tutoring students.

Link to Action Plans

**Hire 2 new faculty:
Biology and Chemistry**

Hire Classified Staff

B. Please describe and prioritize any **equipment, material, and supply** needs.

Equipment

Most of the Science Department equipment needs can be purchased through Measure A funds; a detailed list with quotes, vendors and estimated costs will be submitted later to the Tech Committee. A list of organic chemistry needs already been submitted to the Build Out committee. Equipment items below are prioritized and annotated to reflect the problem or reason for purchase: S = stolen; B = broken beyond repair; C = greater capacity needed; U= upgrade due to aging/old equipment; N = new equipment needed to ensure student access/success in workplace, or to fill needs of the new labs.

I. General Equipment - used by all labs (\$20k)

1. Ice Machine, (flaker), replace, B
2. **Floor Centrifuge: donated (never worked), replace w/ parts for desktop centrifuge to accommodate present needs, B**
3. **Refrigerators, need two, B/C**

II. Biology/Biotechnology (\$150k)

1. Microplate reader, replace, S
2. Thermocycler: replace, B
3. Ultra Low Freezer, replace B and C
4. Liquid nitrogen capacity, N
5. Microscopes: N - new laboratory
6. qPCR: N -for biotechnology
7. FACS: N - biotechnology
8. UV Spectrophotometer, U

III. Chemistry/Organic Chemistry (\$250k)

1. Centrifuges, bench top (3): U
2. Barometer, replace B
3. Vernier LabQuest kits w/ probes (12 minimum): N
4. Organic Chemistry Lab. Most costly items include:
 - a. UV-Visible Spectrophotometer (\$30k)
 - b. HPLC (\$45k)
 - c. FT-IR Spectrophotometer (\$20k)
 - d. NMR (\$100k)
 - e. Gas Chromatography (\$9k)

IV. Geography/Geology: Storage cabinets for maps

Supplies:

Annual costs listed below are based on purchasing records combined with estimates for additional lab sections following the phase 3 build out. Grant monies and donations contribute to each of the categories below. General Supplies = chemicals and consumables used by all departments including anthropology, geography, geology and physics.

- | | |
|--|--------------|
| I. General Supplies: | \$15k |
| II. Biology/Biotechnology: | \$30k |
| III. Chemistry/Organic Chemistry: | \$15k |
| TOTAL: | \$60k |

Order equipment to upgrade existing and new laboratories

Upgrade equipment for biotechnology classes to include the latest technologies

Upgrade equipment and set up new organic chemistry laboratory

<p>C. Please describe and prioritize any facilities needs.</p> <p>1. Additional laboratory spaces (both wet and dry labs) are urgently needed for the science department. The Phase-3 build-out for three new science laboratories has begun and hopefully all the lab rooms will be ready by fall 2013.</p> <p>No comments</p> <p>2. The present build out does not accommodate much needed dry lab space for anthropology, geography, geology, and physical sciences (marine science).</p> <p>With the build out we lost room 513 which served as the physical sciences lecture/lab room. Additionally, geography needs access to computers for a number of their laboratory classes. Geography lab classes could be scheduled in computer labs, or ideally, there could be 12 portable lap tops housed in IT and delivered to classrooms when needed.</p> <p>3. Science department is in critical need of additional office space to accommodate both existing adjunct and future full-time contract faculties and classified staff.</p> <p>Science faculty, including adjunct faculty, spend many more hours at the college than regular faculty due to the need to design and set up laboratories. Presently the Science department office is designed for 4 faculties with computers and small desks set up for 2 more faculty. Every day, however, up to 15 faculties are seated at the 2 round tables trying to work. Between students looking for faculty or support staff needing guidance to discuss a lab set up, it is impossible to find quiet time to think through lectures, design new labs, complete administrative duties, oversee grants or grade exams. With the addition of 2 new full time faculties we will be hard pressed to find a spot for them – so we need another room and preferable on the 5th floor near our labs.</p> <p>4. Additional space (office) is also needed to serve as tutoring center for the science students.</p> <p>There is a need for a tutoring room for the science students. Presently, when students want to review material with the instructor or make up an exam we begin by searching the labs, prep rooms, hallways, etc. for quiet space. Chemistry office hours are held mostly downstairs in the learning center, but sometimes there are too many students and not enough space.</p> <p>5. Office needs: flatbed scanner, color printer, fax machine</p> <p>6. Lab Prep area needs: computer for quick reference access during preps + inventory</p>	<p>.</p> <p>Locate new laboratory space for Geography, geology, oceanography</p> <p>Hire 2 new faculty and new classified staff</p> <p>Locate an office to handle tutoring for science students</p>
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