

**Annual Program Review Update Report**  
**Program: Mathematics Science and Engineering Division**  
**Academic Year Reviewed: 2010-2011**  
**Due October 31, 2011**

**Area 3 Curriculum – 3.5 and 3.6 updated annually**

**3.5 Are all Course Outlines of Record (CORs) current?**

**All science and engineering disciplines:**

By the end of the 2010-2011 academic year, all Course Outlines of Record (CORs) were current.

Numerous faculty are working to revise courses and have all CORs entered into the CurricuNET platform. This work is ongoing in the Fall 2011 semester.

**3.6 How does the program ensure that all faculty utilize CORs when designing course syllabi?**

**All disciplines:**

Faculty members match the Course Outline of Record (COR) with the material in the textbooks currently in use, section by section. Upon hiring, all faculty are provided with the CORs of their assigned courses. When updating CORs for the courses, input is obtained from multiple instructors.

The importance of including the CORs in syllabi has been a subject of professional development (FLEX) presentations.

Full-time faculty members perform peer evaluations of both full-time and adjunct faculty. During the evaluation process syllabi are reviewed to make sure they are within the parameters described in the COR. Finally, regular faculty workshops, cooperative development of and adherence to SLOs help ensure consistent utilization of CORs. All faculty are on a regular schedule of classroom observations and evaluations to ensure that class content is adequately covered.

**Area 5 Data Analysis and Environmental Scan – Updated annually**

**5.1 The program was provided with a substantial amount of data from the Office of Institutional Research and Planning. The self-study team should review and have a dialogue on the data and then identify major changes or enrollment trends expected to be of particular relevance to the program in the next four years. Consider WSCH/FTES, success, retention and persistence as applicable, and the number of degrees and certificates, if applicable. Consider data on gender, age, ethnicity, night vs. day, etc.**

- **Write about enrollment trends that the self-study team believes are important to the program's planning and resource needs. Why might these trends be occurring?**
- **Considering these trends, how well is the program doing in meeting the needs of the various learner populations attending the college?**

### **Biology:**

In the 2010-2011 academic year, 3094 students enrolled in biology courses. The vast majority (1626 students or 52.5%) were enrolled in BIOL 101, a course which satisfies the requirement for a laboratory course, needed for an Associate's Degree to be awarded.

With respect to gender, 69-75% of enrollees were female, demonstrating a threefold higher number of women enrolling and completing these courses. When compared with the 95% male enrollment in engineering, it might be suggested that the higher female statistics reflect the bias career wise towards nursing, a traditionally female career.

Ethnicity data indicate that white and Hispanic students enroll at roughly the same rates (around 16 -18% each) over the four academic sessions. Black student enrollment was similar in the summer and intersession but fell to an average of 7% during the spring and fall semesters. Whether this reflects seasonal trends or priority enrollment trends is not possible to decide from the data. Roughly 40% of those asked to provide ethnicity data either declined to do so or placed themselves in the ambiguous "other" category, rendering interpretations of any of these statistics unreliable at best.

Most biology students (average 37%) were between 20-24 years old. The next highest proportion were less than 20 years old; over the four sessions 876 students of this age group enrolled compared with 1190 in the 20-24 year age bracket. The younger age group showed low enrollment in the summer session but stronger numbers over the other three sessions. Students 25-29 years old were the next most numerous at around 12 -15% of enrollment each session. Students older than this were enrolled at differing proportions over the four sessions, with no particular clear trends being observed except that students over 50 years old are a very small percentage of the totals (1.5-4%)

Student success rates showed strong differences over the four sessions, one of the few data sets where it might be possible to suggest that instructor approaches and standards may play a difference in determining whether students pass or fail. Of particular interest are the summer and intersession, where numbers like 54% of BIOL 100 students succeeding can be contrasted with 80.5 % of BIOL 101 students being successful. Likewise, within the 200 level courses, the success rates for BIOL 204 may possibly be significantly higher than the success rates for BIOL 201 and BIOL 202. Without further analysis, it is not possible to conclude whether the variations are significant or not. In past years, this difference may have been attributed to the fact that by the time students reached BIOL 204, they had succeeded in BIOL 201 and 202, so that those enrolled in BIOL 204 represented a set of students with better achievement potential. However with the lack of resources to accommodate all those students wishing to take these classes in the recommended order (namely BIOL 201, BIOL 202 and then BIOL 204), a

significantly underprepared population of students enter BIOL 204 every semester. The construction of the new Health and Science Building with expanded capacity for BIOL 201 section offerings should allow this situation to be remedied to some extent. Biology majors courses show lower success rates than survey level courses like BIOL 100 and BIOL 101, reflecting the more rigorous approach provided when instruction is aimed at producing students who wish to graduate and attend four year universities.

Retention levels in all biology courses are 65% or higher. Courses which might be described as “gateway” types, such as BIOL 201, the first biology course of rigor for those wishing to explore the possibility of the pre-nursing course series will naturally reflect lower retention rates as students discover whether they are suited to pursue this career path. Again, some seasonal variation in retention rates may be explained by instructor differences where data from the very few classes offered in winter and summer can be examined. From Fall 2010 to Spring 2011, the number of degree/certificated conferred in the biological sciences doubled, (from 7 to 15). While these are small numbers, this is an encouraging trend although it may reflect seasonal course offerings. Offerings of BIOL 110 and BIOL 120 on a year round basis once the new Health and Science Building is completed may level out this observed fluctuation.

CRN counts from Fall 2010 to 2011 showed a modest increase, possibly reflecting the increased budgetary planning the college has engaged in to allocate more even numbers of courses over the two major semesters. These numbers are significantly lower than the number of CRNs offered in past years due to restrictions imposed by the present state budget crisis. Uncertainty remains a key factor in future planning.

The ratio of full time to part time instructors within biology course offerings has consistently been higher than the recommended 2:1 ratio. This demonstrates the need to fill the vacant full-time biology position.

### **Chemistry:**

The chemistry student population distributions showed little to slight changes in 2010-2011 from previous semesters. The population continues to be diverse in terms of ethnicity with the largest group being “other” (41.4%) and the largest two “specific” groups being Hispanic (19.1%) and White, non-Hispanic (16.7%). The gender distribution in chemistry classes remains about 63% female. More than 70% of students are 24 years old or younger.

The overall number of students taking chemistry courses increased proportionally with the section offerings. Enrollment in 2010-2011 was 1273, an increase of about 9% from 2009-10. This increase reflects the restoration of chemistry classes (3 sections of 101, one of 120 and 1 of 210) that were cut due to the budget in 2009-2010.

### **Drafting and Engineering:**

In 2009-2010 and 2010-2011 the number of sections offered in these areas was identical. Demographic statistics are similar also. In general, more than 85% of students in these courses are male.

The number of courses taught through the year represents 6.0 FTEF, yet there is no full-time faculty in this discipline.

Three degrees and two certificates were earned by students in the drafting and engineering technology programs. A full-time instructor, who would be aware of degree requirements, could increase the number of awards in this area.

### **Geosciences:**

Overall enrollment of students taking geosciences courses has increased from 1648 for the 2009-2010 academic year to 1934 for the 2010-2011 academic year. The number of course offerings increased by two, totaling 58 taught in the 2010-2011 year. This continues the trend discussed in the last report.

The trend of having slightly more female students than male continued. Ethnic/racial demographics did apparently change, with most geosciences students labeling themselves as “other” (33% in Earth Science, 39% in Geography, and 42% in Geology). It is unlikely that this would jump this rapidly (up from 14% total in the last report) and may have more to do with either the data collection or an increased awareness of the nuance of such categories.

The student retention and success rates rose since the last report, though the rates still vary depending on the courses. Overall the geosciences courses taught in the 2010-2011 academic year had a 90.5% average retention rate with a range of 63.6% to 100%. The average success rate for geosciences courses rose to 72.1% with a range of 37.5% to 93.8%.

While some of these statistics can vary depending on the students enrolling in the classes, one reoccurring obstacle to attracting more students and creating more student success is the technical issues that are still plaguing the GIS courses. No GIS certificates were awarded during the 2010-2011 academic year. The main reason has been that the true potential of the GIS software has been diminished due to network errors and the failure of ITS to address software issues in a timely manner.

From summer 2010 through Spring 2011, geoscience courses have accounted for 11.7 FTEF. Only 38% of this is from regular full time faculty. Adjunct and overload account for a full 62% of this amount of teaching. This underscores the need for an additional full time instructor to be hired in this area.

### **Physical Sciences (Astronomy, Physics, and Physical Science):**

In astronomy classes, a significant increase in student success was seen from Fall 2010 (65.7%) to Spring 2011 (78.2%). Additionally, retention rates went up in the same time period from 83.6% to 89.5%. Results from SLOs in the past year data have guided faculty to make adjustments to teaching methods and added areas of emphasis and clarity

to the subject matter. These changes have been implemented recently and are very likely the cause for the increase in success and retention rates.

Conversely, the success rate in physical science continues a downward trend from 2009-2010 with retention of 95% dropping to 93.8% in Fall 2010 and 85.7% in Spring 2011. Success dropped from 87.9% in Spring 2010 to 83.3% in Fall 2010 and 74% in Spring 2011. This data supports the finding from SLO #1.

Students struggle in PSCI because they are lacking math skills. Faculty is working to incorporate more math problems into the curriculum and help students with simple algebra equations and graphing problems in order to better prepare them for the inquiry-based curriculum.

Retention and success rates for PHYS101 remain lower than for other physics classes. In 2010-2011, the average retention rate for PHYS101 is 69.4% and success is 45%. For other physics classes, retention ranges from 83% to 100%, while success ranges from 70% to 100%.

Faculty usually argues that the reason for low retention and success in PHYS101 is that appropriate prerequisites (e.g. algebra and trigonometry) are not in place. The argument against installation of such prerequisites is that validation studies performed by the Office of Institutional Effectiveness, Research and Planning do not demonstrate a greater success rate among those who have taken the recommended courses than among those who have not. However, it may be that these studies are flawed. There is a consensus among faculty that knowledge of trigonometry and algebra are absolutely necessary. Discussions to resolve this disagreement will continue. An effort is in place to review trigonometry just preceding the topics of PHYS101 in which applications are required. This is insufficient however due to time constraints. Moreover, some of the students are also weak in other areas such as algebra, which is necessary throughout the course.

No major changes have occurred to any of the astronomy, physics or physical science courses with reference to enrollment, gender, age or ethnicity demographics.

#### **Water Distribution and Treatment Operations:**

Students in these courses are predominantly male (~ 90%). This disproportion corresponds generally to the profile in industry. Currently, water treatment and distribution jobs tend to be physically demanding. Addition of chemistry-related water courses will likely appeal to more female students as descriptions for jobs related to water analysis do not include physical strength requirements.

The average age of students in the water program is generally higher. In fact, more than 15% of students are above the age of 50. This is attributed to the fact that many enrollees are already working in the field and are now trying to expand their knowledge, or are unemployed and retraining into this field.

Classes are offered at night to accommodate working students. It has been suggested that

offering courses two nights a week for one and a half hours rather than one night for three hours, could improve student learning. In 2010-2011, retention ranged from 77 to 94% while success ranged from 32% to 89%.

It has been noted that licensing exams for water treatment are offered before the end of fall and spring semesters. Instructors are investigating the feasibility of offering the courses on a timeline that is different from the 16-week semester in order to better prepare students for these tests, which are only offered twice per year.

**5.2 Report on the progress of recommendations and accomplishment of goals identified in the program's last program review. Reflect on the strengths, weaknesses, and improvements of the program. Clearly state the performance/quality indicators used by the program.**

**All Science Disciplines:** Several goals in Section 9 are dependent on opening of the Health Sciences Building. Construction is on schedule with expected completion in time for classes in Fall 2012.

**Biology:** Significant progress has been made towards developing course offerings focused on environmental biology and ecology, a new mandated teaching area for community colleges. Paperwork for developing these new courses is in progress but inevitable delays are being experienced. These mandated curriculum changes, driven by Senate Bill 1440, continue to reach community colleges but the policies governing which courses will be taught are as yet in a state of ongoing revision and development.

In addition, laboratory safety has taken greater priority and students are being educated with minimized usage of toxic chemicals. This is a benefit to both our student population and to the environment.

Regarding BIOL 204, a September 2011 purchase of a comprehensive set of microscope slides of selected fungal phyla will assist in enriching the student experience of eukaryotic microbial diversity. In addition a video/DVD library has been established, available to all biology instructors. Topics range from epidemiological investigations to biotechnological and environmental issues of the day. Progress is also underway to digitize a set of 35mm slides covering medical microbiological specimens. These efforts are progress towards accomplishing Biology Goal 4 in Section 9.

Biology faculty have applied for and received grant money for equipment needed in improving course laboratory needs, such as Biology 100 and Biology 204.

**Chemistry:** Program learning outcomes for the AS degree in Physical Sciences were submitted to the SLO committee in Sept 2011. Discussion during the development of these made it evident that this degree should be revised or replaced in the near future. The chemistry faculty has decided to prioritize the goal of establishing an AS degree in Chemistry. Chem 205, which was developed a few years ago, has not been taught, but will be an integral part of this program. This course would also be a cornerstone of a

chemistry technician program. Assuming that the budget will allow its addition, this course should be offered when the Health Sciences Building, with its dedicated instrument room, is opened.

Faculty also concluded that a chemistry technician certificate program, another goal, should emphasize clinical laboratory work to prepare students for a broader range of career options.

**Drafting and Engineering:** Months of collaboration resulted in a course sequence for students to complete two years at AVC or Cerro Coso College in Ridgecrest, then transfer to CSULB to complete a Bachelor of Science degree in either mechanical or electrical engineering. Because CSULB will offer the classes for these degrees at the Lancaster University Center, students have the option to earn these degrees locally. The first cohort of engineering students will start the CSULB portion of the degree in Fall 2011.

This local engineering degree program pathway will be supported by a \$1.19 million grant awarded by the Department of Education under the Hispanic-Serving Institutions Science, Technology, Engineering, and Mathematics (STEM) and Articulation Programs. Funds will enhance facilities at the Lancaster University Center for the upper degree engineering courses, purchase equipment for AVC's new Health and Science Building, and work to increase the number of students pursuing degrees in engineering.

The Work Experience 199 program with TYBRIN Corporation continues to benefit students and the host company. This partnership is a model for other organizations to follow.

The Intermediate and Advanced Drafting Classes are integrating SolidWorks into their curriculum. This is the new standard in industry.

Because there is no full-time faculty member in this program, the bulk of these efforts were handled by the MSE dean. A full-time faculty member is desperately needed to interface with the students in these programs, the collaborative partners, and the community. It is unrealistic to have the dean, who has equal responsibility for all of the programs in his division, to be the sole representative for the active and essential drafting and engineering programs.

**Geosciences:** Two of the goals from the last program review have been or are nearing completion. The first was the rebuilding of the GIS advisory committee, which met and discussed curriculum, internship possibilities, and the future of the certificate program. The other goal was to create a World Regional Geography course. This course will be one of the core courses for a new geography degree. The course has been submitted to AP&P and is undergoing review.

Unfortunately, the GIS program continues to struggle with inadequate support from ITS, though the new director of ITS has opened a dialogue to try to put an end to this.

**Physical Sciences:**

Towards the goal of increasing the number of students pursuing transfer in STEM majors, especially engineering, PHYS 120 was added in fall 2011 and PHYS 110 in spring 2011. These schedule additions will be sustained if the budget permits.

The goal to pursue external funding for curricular reform was met with the award of two STEM related grants from the Department of Education.

**Water Distribution and Treatment Operations:**

The program is on track to achieve its goals within the specified time frames. There are no changes to the Goals listed in Section 9.

**Area 6 Student and Program Learning Outcomes Assessment – Updated annually****6.1 Briefly review program outcomes assessment activities over the past four years and assess in some detail the effectiveness of those methods in documenting and improving student learning.****Student Learning Outcomes**

**Biology:** Since 2008, faculty have entered and assessed SLOs for all biology courses offered. Documentation has been updated recently in the 2009-2010 cycle to include labs as part of the whole course assessment, since they were listed as a separate entity and were not included in the 2008-2009 cycle. Most courses have complete data series for the 2010-2011 cycle. Discussions between all faculty who teach the same course have been strongly encouraged, with Professional Development activities being designed and offered at times convenient to all teaching faculty.

Other than comments on WEAVE regarding assessment of particular SLOs, more documentation may be needed for decisions taken by faculty on actions for improving student learning. Training programs assisting faculty members in using WEAVE software are available and SLO workshops are also available for interested faculty to attend.

As discussions among faculty groups incorporate and utilize SLO data, it is anticipated that variations in SLO data may allow individual faculty to more accurately assess their subject emphases with the goal of standardizing topic coverage as listed in CORs.

**Chemistry:** CHEM 101 assessment has now been standardized. In previous cycles, data was collected but with so many different assessment methods that it was impossible to draw conclusions. The first set of standardized data should be reported in Fall 2011.

Most chemistry classes no longer give a pretest because in the several cycles of data collection thus far, no student has come close to succeeding on the pretest.

For CHEM 120, revisions were made in the pre/post test due to unbelievably low



achievement on certain questions. If success on these SLOs is still abysmal in the next assessment cycle, the instructors will look to revise the curriculum or teaching methods.

**Geosciences:**

SLOs were developed for all courses and most have been assessed in multiple sections of each course. The PLOs for the GIS certificate program have been developed and are being assessed in the 2011-2012 academic year.

**Physical Sciences:**

SLO data from the last year have guided faculty in astronomy to identify areas in class that require a better conceptual understanding. Clearer conceptual examples presented in class have led, according to the research data, to increases in both success and retention in the last year.

SLO data for the physical sciences indicate the need for better math preparation for students.

In physics, SLO assessment is complicated by different teaching methods. Instructors have been successful in correlating results from different assessment tools.

**Water Treatment and Distribution Operations:** Student Learning Outcomes were developed for all water courses. The assessment plans have been revised to look at individual SLOs. The first set of data will be available in Fall 2011.

**Program Learning Outcomes**

In 2010-2011, program learning outcomes were established for the AS in Biological Sciences and the GIS certificate. PLOs for the AS in Physical Sciences are being drawn up in Fall 2011. Other programs within the division need PLOs to be written.

There is consternation about how to assess PLOs. In most cases, faculty do not know which students are completing the degree or certificate programs. Because the outcomes for these programs may be drawn from several courses within the program, multiple instructors would have to keep tests, projects, etc pertaining to each outcome for every student who might one day complete the program. Discussion is ongoing for how to make an efficient, effective assessment system.

**6.2 How have adjunct faculty and/or part time staff in your program been made aware of the need to assess SLOs and PLOs and been included in assessment activities?**

In biology, adjunct faculty have participated in gathering SLOs for Biology 101 in the past cycles. They have been informed about the importance of the SLOs through e-mails and personal contacts, as well as departmental meetings for those who attended. They are considered an important component of the SLO gathering process. However, not all

adjunct faculty have actively participated all the time. Adjunct faculty have not taught any of the other biology courses in the past two years.

In the geosciences, fulltime faculty have spearheaded assessment and collection of SLOs. Adjuncts are encouraged to suggest their own test questions or other methods of evaluation in order to make the process relevant to them.

In drafting, engineering, and water distribution and treatment operations, there are no full-time faculty. The dean and science chair have occasionally met with and regularly communicate via email and phone with adjunct faculty in these areas to discuss SLOs and PLO development. Two adjunct instructors are being trained as WEAVE facilitators for these areas.

The Welcome Back Day workshop on SLO action plans was particularly useful for adjunct faculty who attended.

**6.3 What specific plans have been made for assessing student learning over the next four years? Programs should provide a timeline for defining and assessing all SLOs and PLOs.**

**All disciplines:**

The goal for the next four years is to have 100% compliance for SLO reporting. SLOs for all courses offered for each academic year will be assessed every annual cycle, with data coming from faculty, both full time and adjunct.

SLO assessment is still in its infancy and the programs are trying to find the best ways to actually measure student comprehension as well as how to correct any pedagogical deficiencies that affect student learning.

The PLOs for the GIS certificate and AS in Biological Sciences will be assessed in the 2011-2012 cycle. Program learning outcomes for the AS degree in Physical Sciences were submitted to the SLO committee in Sept 2011. The goal for the remaining programs is to establish PLOs before the end of 2011-2012.

**6.4 If the program SLO and PLO assessment results make it clear that particular professional development resources or student services are needed to more effectively serve students, describe the need. List items in order (rank) of importance.**

**All disciplines:**

There is concern that the lack of tutoring services in 2011-2012 and perhaps beyond will decrease student retention and success. This resource is crucial to many students.

Results of some SLOs indicate the need for additional or improved equipment. The new Health and Science Building construction has also provided a welcome opportunity to

modernize infrastructure and equipment. New equipment still desired to enhance certain course offerings is listed in Area 10.2

Textbooks for Water Distribution and Treatment courses are not available at the Marauder Bookstore because the bookstore has not been able to work smoothly with the publisher, American Water Works Association. This creates the problem that students do not have textbooks until several weeks into the semester. In the past, the bookstore ordered the books but then returned leftovers to the Association, incurring a high cost for the division, rather than holding the books until they could be sold in the subsequent semester. Resolution of this problem would have immediate impact on student success.

### **Area 9 Goals and Objectives – Updated annually**

**List the goals and objectives the program has for the next four years.**

**Goal: A specific action.**

**Objectives: Significant steps or actions needed to achieve the goal.**

**Time Frame: Period of time the goal and objectives will be addresses.**

**Justification: How does the goal support the mission of the college? How does the goal meet the needs of the community?**

**Biology:** (minor changes from 2010 comprehensive program review; progress on Goal 1 and 4 detailed in Section 5.2)

**Goal 1:** Develop new biology course in Field Ecology and Animal Behavior.

**Objective:** Field ecology course is essential for the new Environmental Sciences degree (in development) and the Animal Behavior course will increase student's options when it comes to biology electives.

**Time Frame:** Submit paperwork to AP&P by Fall 2011.

**Justification:** These courses will be part of an Environmental Sciences degree will help students to transfer to universities in order to train in this as future professionals in the environmental field. Also, by having other elective choices, biology (and other science majors) will have opportunity to expand their educational horizon. Currently, the only electives available are Anatomy & Physiology along with Microbiology. These courses are highly impacted due to increasing demands from nursing.

**Goal 2:** Offer Biology 110 & 120 year round

**Objective:** Facilitate transfer of health and science majors to four-year degree granting institutions.

**Revised Time Frame:** The offerings of BIOL 110 and BIOL 120 year-round are planned to coincide with the opening of the new Health and Science building when there will be a dedicated laboratory for the biology majors courses.

**Justification:** In order to meet increasing student demands and to more accurately place entering freshmen with credits in biology and a desire to major in biology.

**Goal 3:** Enhance the Anatomy and Physiology offerings at AVC.

**Objectives:** Offer additional sections of Biology 201, General Human Anatomy, both conventional and hybrid online. Expand the anatomical collection (see Area

10.2). Acquire new computers and data collection devices for BIOL 202 (see Area10.2). Create new courses or expand existing courses to meet the needs of Health-Science programs (e.g. cross-sectional anatomy).

**Time-frame:** Ongoing, beginning with completion of the Health-Sciences building, which will have a dedicated anatomy lab and a dedicated physiology lab.

**Justification:** The need in the community for foundational sciences courses to support nursing education has been illustrated by the increased number of for-profit institutions now offering anatomy and physiology courses. These courses have not been deemed equivalent to those at AVC as they lack prerequisites and involve less instructional contact hours and substandard laboratory experience.

**Goal 4:** Enhance instruction in both the theoretical aspects and laboratory practices of Microbiology.

**Objectives:** Offer additional sections of BIOL 204, both conventional and hybrid online. Update technology, resources, and laboratory experiences for students.

**Time-frame:** Ongoing

**Justification:** To meet the demand of students preparing for the RN Program and other Health Science careers.

**Goal 5:** Improve student success in SLOs and introduce students to techniques and equipment found in modern laboratories.

**Objective:** Develop new and improve existing laboratory assignments. Acquire new computers and data collection devices.

**Time Frame:** Open (dependent on grant awards)

**Justification:** To ensure AVC students are prepared for upper division biology courses, and for the laboratory workplace.

**Chemistry:** (no changes from 2010 comprehensive program review)

**Goal 1:** Develop a community advisory board

**Objectives:** Ensure that the college is responsive to needs of the community. Inform the community of current college offerings and potential degree program. Open doors for students to have work/internship experiences with local employers.

**Time Frame:** Ongoing, starting in 2011-2012

**Justification:** The community and the college are integrally linked.

Communication is the key to maximize mutual benefit for these parties and students.

**Goal 2:** Establish an AS in Chemistry Degree

**Objective:** Improve articulation of lower division coursework with bachelor's degree granting institutions.

**Time Frame:** 2011-2012

**Justification:** To support the implementation of SB1440; an AS in Chemistry will afford students the opportunity to transfer seamlessly to an institution that offers a bachelor's degree in chemistry.

**Goal 3:** Develop a Chemistry Technician Program

**Objective:** Establish a certificate program, which would be recognized by employers as excellent preparation for laboratory technicians

**Time Frame:** 3-5 years

**Justification:** To support community partners who need highly qualified laboratory technicians

**Drafting and Engineering:** (no changes from 2010 comprehensive program review; some progress on Goal 2 detailed in Section 5.2)

**Goal 1:** Convene an active community advisory board for the drafting/CAD program.

**Objectives:** Ensure that the drafting/CAD program is responsive to needs of the profession and the community. Inform the community of current college offerings. Provide opportunities for students to have work/internship experiences with local employers.

**Time Frame:** One year-annual meetings, at the least.

**Justification:** The local aerospace and other community/regional industries require the skills provided by the drafting/CAD program and the college must be responsive to their requirements. Communication is the key to maximize mutual benefit for these parties and students.

**Goal 2:** Review the current engineering curriculum to more closely align it with transfer institutions and CSU Long Beach.

**Objective:** Improve articulation of lower division coursework with bachelor's degree granting institutions.

**Time Frame:** 2011-2012

**Justification:** Transfer to college and university programs now requires knowledge of Matlab and Solid Works. These programs must be incorporated into our current curriculum and students must carry these skills and knowledge into their junior year.

**Geosciences:** (two of the goals from 2010 comprehensive program review have been met. See Section 5.2 for details)

**Goal 1:** Create an Associates Degree in Geography.

**Objectives:** Improve articulation of lower division coursework with bachelor's degree granting institutions. Also to meet the needs of SB 1440.

**Time Frame:** Have the degree in the 2014-15 catalog.

**Justification:** This goal supports AVC's mission to provide "quality, comprehensive education", offers another degree option to students interested in Geosciences, and helps AVC comply with SB 1440. It is being developed in accord with the "Transfer Model Curriculum" outlined by the Chancellor's Office to ensure that students can easily transfer into the CSU system.

**Physical Sciences:** (two goals listed in 2010 comprehensive program review were met (see Section 5.2); minor revisions to other goals)

**Revised Goal 1:** Ensure proper preparation of students entering PHYS 101, 102 and PSCI 101

**Objective:** Increase the math standards for the students taking PHYS 101 and 102 by revising the COR to require MATH 135 (Plane Trigonometry) and Math 130 (College Algebra) or Math 140 (Pre-Calculus) as a pre-requisite for PHYS 101. Increase math standards for students taking PSCI (even by eventually offering an introductory non-credit math class to go along with the PSCI class that will cover simple math like equations, graphic etc.)

**Time Frame:** Paperwork will be submitted to AP&P by fall 2012.

**Justification:** Many of the concepts in physics require the knowledge of trigonometry. In addition this prerequisite would align our curriculum with CSU and UC curricula. Many of the concepts in PSCI 101 require simple mathematical calculations and graphing. We will look into similar curricula of nearby colleges to align our curriculum to those.

**Goal 2: Continue the implementation of active learning methods in the classroom.**

**Objective:** Replace and/or upgrade existing technology based tools in physics/physical science/astronomy to take advantage of the latest innovations in teaching pedagogies. **Time Frame:** Open

**Justification:** Newer equipment will allow us to further develop and improve our laboratory assignments.

**Water Distribution and Treatment Operations:** (No change; on target to meet these goals set in comprehensive program review.)

**Goal 1:** Rebuild and convene the Water Treatment Advisory Committee.

**Objective:** To ensure the courses that count toward certification and licensure in water treatment are relevant to industry standards.

**Time frame:** By Fall 2011

**Justification:** This is a crucial component to meeting our program's mission and the college's, as well as ILOs 2 and 6.

**Goal 2:** Complete the conversion of the non-credit water treatment courses to credit courses and determine if additional courses are required.

**Objective:** Fully develop the certificate and degree programs including practical/laboratory and field experiences.

**Time Frame:** 2011-2012 academic year.

**Justification:** Healthy drinking water is vital to all communities in the high desert.

**Goal 3:** Explore the creation of a program in water sciences.

**Objective:** Fully assess the need for a certificate or degree program to deal with the handling of drinking water, water for agricultural and industrial purposes, and waste water management. **Time Frame:** 2011-2012 academic year.

**Justification:** Water is a resource of limited yet vital supply.

## **Area 10 Long Term Resource Planning – Updated annually**

**If applicable, describe significant long-term resource needs that should be addressed in the next four years. The Educational Master Plan, student learning outcomes assessment reports, and data analysis may provide reference information to support your response. Use lists and tables to clarify your requests and make them easy for the Strategic Planning and Budget Council to review quickly. If there may be negative consequences for enrollment, safety or other important concerns if the funding is not provided please make this known in context.**

### **10.1 List faculty and staff requirements to meet program needs in the next four years. Be specific and brief when offering a reason for the position (e.g. replacement, increased demand for subject, growth in student population). Mark the position as new or replacement. Place titles on list in order (rank) of importance.**

1. Full-time Engineering Faculty (replacement; currently this essential program has no full-time faculty. There is a critical need to interface with students, community partners, transfer institutions, and grant-funding organizations.)
2. Full-time GIS Faculty (A new full time faculty position in Geography or GIS is required. As noted in section 5.1, adjunct and instructor overload account for 62% of the teaching in the geosciences area. This demonstrates strong need for an additional full time instructor. Additionally, as discussed in the comprehensive 2010 program review, another full time instructor is essential to help shoulder responsibilities associated with the GIS program. The GIS certificate program is at risk because the one full-time faculty member responsible for all GIS courses and most geography courses can not simultaneously reach out to students, trouble shoot constant computer problems, stay current with the fast-changing technology, and maintain the advisory group.
3. Full-time physics instructor (increased offerings in physics to support the engineering program and other STEM efforts are taxing the few instructors qualified in this area. Adjunct and overload hours accounted for 68% of courses taught in the physical sciences. This continues the trend of increase in this area.)
4. Chemistry lab technician (especially for nights and weekends. This need will be even more pressing when an AS degree in chemistry is established. New equipment in the new health sciences building, particularly sensitive instrumentation for CHEM 205 (Analytical Chemistry) will require attention. Similarly, the planned chemistry technician certificate program will increase demand on the only chemistry lab technician.)
5. Full-time Biology Faculty (replacement; It is recommend that one full-time biology faculty with specialty in botany and another full-time faculty in molecular biology to be added to the program. Currently the state higher education is being

remapped to facilitate student transfers. Many biology programs require three undergraduate biology core courses. We currently only offer Biology 110 & 120, with botany being covered briefly in the latter course. By having a specialist teach our botany class, we can expand the topics that are covered in Biology 120, thus being able to keep up with new developments in this field. Another compelling reason is that 58% of the courses in biology are taught by adjunct or overload.)

6. Full-time chemistry faculty (62% of chemistry classes are taught by adjunct or overload.)

7. Full-time faculty member for water distribution and treatment operations. (The water treatment program is taught by adjunct faculty members who have experience as water treatment professionals. For the continued maintenance and expansion of the program, a full-time faculty member is required.)

8. Student workers (cost-effective way to free some of the time of the laboratory technicians; experience in a science lab is also beneficial to students)

**10.2 List facilities (remodels, renovations or new), equipment and technology needed to provide a safe and appropriate environment for student learning in next four years. Place items on list in order (rank) of importance.**

**Biology, chemistry, geosciences, physical sciences:**

A comprehensive review of equipment was conducted. A list of equipment to purchase for the new building (Group 2 equipment) was submitted to the Director of Facilities. High and medium priority items from this section in the comprehensive 2010 program review were included on the list. Items not included on that list are:

**Biology**

1. Digital Microscopes - Computer, video, photo microscopes and photo printers for capturing images and conducting measurements by the students and displaying slides for the whole class be the instructor.
2. Florescent Microscope for Biology 110.
3. Calibrated Micrometers along with oculars.
4. Acquiring Gel Electrophoresis Equipment for Biology 110.
5. Acquiring vertebrate (amphibian, reptiles, etc.) bone specimens to be used in the comparative morphology lab in Biology 120.
6. HGS Molecular Structure Model (C sect for organic chemistry) W.H. freeman & Company (X10)
7. High-speed camera to allow students (biology majors) to conduct in class experiments analyzing animal behavior.

**Anatomy and physiology**

1. Replacement and expansion of anatomical models
2. Addition of new DVD programs covering human dissection and A&P topics.



3. Replacement of cadavers as needed. A new cadaver was delivered for Fall 2011.

The Geography/Geology labs still have a diminished supply of equipment while lab classes taught at the Palmdale Center have very little permanent equipment. Items needed are:

- Globes for Palmdale Lab
- Declinated compasses for Palmdale Lab
- Class sets of GPS receivers, one for each lab
- 100ft/30m tape measure for Palmdale Lab
- SPSS software for Geography 221: Spatial Analysis in GIS
- Adobe Creative Suite software for Geography 222: Cartography in GIS
- 2 Stream Tables (for simulating river geomorphology), 1 for each lab
- 6 Munsell Soil Color Charts, 3 for each lab

The Engineering and Engineering Technology labs are in need of additional equipment, replacement computers and software upgrades including:

- 3 computer workstations plus software in the Materials Lab
- Microscope with digital video camera
- National Instrument Labview software and study kit: thermocouples, interfacing boards, switches, valves, transducers, etc.
- Combustion bomb calorimeter and accessories
- High temperature oven
- Hardness apparatus

The water distribution and treatment operations program needs to establish an on campus laboratory. Describing the operation of different types of valves is not nearly as effective as demonstrating different types of valves. Practical applied experiences would make students much better prepared to put their classroom skills to use in the field. This could be achieved through the development of laboratory practicums and the establishment of cooperative arrangements with local civic, county and federal water preparation and treatment facilities. An on campus laboratory would be welcomed. Faculty also want to ensure that tours of the various water treatment facilities are included in the courses so that students can experience the subject material first-hand.

### **10.3 Identify funding needed to support student learning.**

It is critical to maintain supply budgets because all laboratory courses require consumables.

Funding for a laboratory for the Water Distribution and Treatment program will be sought from Perkins funds, industry contributions and federal grants for technician training.

Significant progress in equipment updating has been seen with the refurbishments being provided as part of the new building construction and grants from the AVC Foundation

have also provided some much needed equipment. Funding sources for the outstanding equipment items are still required. Area 10.2 identifies unfulfilled needs.

The Department of Education STEM grants will support some of the student learning needs described above.