Program Review

Natural Sciences

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PCC Pasadena City College

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General Information (Program Review)

Educational Master Plan

Standing Requirements

Introduction

Pasadena City College began offering the Natural Sciences AA degree in 2009-2010 as a way to begin to capture a large number of students who were "majoring" in the Sciences but transferring without obtaining any degree or certificate from the college. The Degree is fulfilling its function: at the current rate of degree completion the Division is on track to reach the Educational Master Plan goal of 1206 STEM Degrees awarded by 2015. The degree is intentionally broad, allowing students to obtain a basic foundation in the sciences which encompasses the core courses needed for specialization in a STEM field in the upper Division.

The Natural Sciences AA degree was created before implementation of AA-T degrees and serves as an excellent bridge to the time where each specific STEM discipline has their own AA-Transfer degree. Currently AA-T's exist for Geology and Physics; Geography, Kinesiology and Biology are in the works; Chemistry and Engineering may never be created due to high unit constraints. It is critical therefore that the Natural Sciences AA remain as the primary avenue to document the accomplishments of STEM students at the college.

The Review is divided into several Parts. Initially faculty from each discipline mapped each course to the overall program outcomes (Curriculum Map). As part of this process, there was a strong opinion from faculty that the program outcomes need to be updated and revised. The remainder of the Review is divided into three areas: Student Success and Achievement; Faculty Development and Curriculum and Institutional Support. In the area of Student Success and Achievement, total of 4 outcomes were addressed. In the Faculty Development and Curriculum area, the Review encompasses 2 outcomes. Under Institutional Support, the Review examines budgetary support and space allocation.

The process, although long, has been a good one and represents the collaborative hard work of both faculty and the dean. Happy reading!

Mission Statement

The Natural Sciences Associate of Arts degree supports the college's mission of successful student learning by delivering a first-class science education focused on the dual mission of producing an adequate number of well-trained and competent professional scientists as well as members of a well-versed scientifically literate citizenry. Our primary focus for the Natural Sciences AA Degree is for students to gain a scientific understanding of the world around them. Our science majors must have the knowledge base, skills and training to meet the needs of an expanding scientific workforce.

Students are prepared for transfer to a variety of higher education institutions including the UC's and CSU's, as well as private universities and colleges. Our general education students must have a deep understanding of science, scientific methods and principles, and the limitations of science in order to meet the challenges of a world increasingly connected to science and technology.

Completion of the Natural Sciences AA Degree directly impacts the STEM Degree Student Success Achievement Area listed in the Educational Master Plan. Specifically, the EMP priorities that are supported include: A2.2 Development of

hybrid and online course offerings to expand the availability of transfer courses; B1.4 Support a culture of innovation; B2.1 Centers of Excellence and Hubs of Innovation; D2.2 Develop STEM and cohort pathways; D2.4 Facilitate timely progression through degree pathways; D3 Partnerships and articulation with 4-year universities ; J2 Support second-career students.

Program Outcomes (Program Level)

Natural Sciences AA program Outcomes

Outcome

Outcome	Mapping
Outcome #1 Successfully apply the scientific method to address global problems and act as a responsible global citizen.	No Mapping
Outcome #2 Synthesize the major paradigms in 3 of the 5 disciplines in the Natural Sciences Division.	No Mapping
Outcome #3 Demonstrate adequate preparation for advanced study in one focal discipline within the Natural Sciences Division.	No Mapping

Curriculum Map

Active Maps

Biological Sciences (See appendix)
Alignment Set: Natural Sciences AA program Outcomes
Created: 04/24/2012 9:59:00 am PST
Last Modified: 03/08/2013 11:02:12 am PST

A curriculum map for the biological sciences portion of the Natural Sciences Major.

Chemistry (See appendix)
Alignment Set: Natural Sciences AA program Outcomes
Created: 04/09/2012 10:06:57 am PST
Last Modified: 03/08/2013 11:16:39 am PST

A curriculum map for the chemistry portion of the Natural Sciences Major.

Geosciences (See appendix)
Alignment Set: Natural Sciences AA program Outcomes
Created: 04/04/2012 2:04:38 pm PST
Last Modified: 03/08/2013 11:00:52 am PST

A curriculum map for the geosciences portion of the Natural Sciences Major.

Physics (See appendix)
Alignment Set: Natural Sciences AA program Outcomes
Created: 06/05/2012 1:54:09 pm PST
Last Modified: 03/08/2013 11:17:05 am PST

A curriculum map for the Physics portion of the Natural Sciences Major.

Curriculum Map Attachments (Map)

2011-2012 Program Review

Components, Outcomes & Measures

Introduction/Background

Pasadena City College began offering the Natural Sciences AA degree in 2009-2010 as a way to begin to capture a large number of students who were "majoring" in the Sciences but transferring without obtaining any degree or certificate from the college. The Degree is fulfilling its function: at the current rate of degree completion the Division is on track to reach the Educational Master Plan goal of 1206 STEM Degrees awarded by 2015. The degree is intentionally broad, allowing students to obtain a basic foundation in the sciences which encompasses the core courses needed for specialization in a STEM field in the upper Division.

The Natural Sciences AA degree was created before implementation of AA-T degrees and serves as an excellent bridge to the time where each specific STEM discipline has their own AA-Transfer degree. Currently AA-T's exist for Geology and Physics; Geography, Kinesiology and Biology are in the works; Chemistry and Engineering may never be created due to high unit constraints. It is critical therefore that the Natural Sciences AA remain as the primary avenue to document the accomplishments of STEM students at the college.

This program review began in Spring of 2012 led by professor Darcy Mack of the Chemistry Department. The bulk of the work was essentially divided up by discipline as follows: Biology - Dr. Janet Chen, Professor Barry Chess; Chemistry – Professor Darcy Mack; Physics – Professor Jerry Shi; Geosciences – Dr. David Douglass & Dr. Martha House (after returning from sabbatical). Additional thanks to the many faculty who contributed in a variety of ways and in particular to our finishing team made up of Paul Jarrell, Katharina Aebi-Rodriguez, Veronica Jaramillo, Rhea Presiado and Sonya Valentine. The writing team would like to acknowledge the advice and counsel of David Colley who has helped us greatly with both mechanics and process.

The Review is divided into several Parts. Initially faculty from each discipline mapped each course to the overall program outcomes (Curriculum Map). As part of this process, there was a strong opinion from faculty that the program outcomes need to be updated and revised. The remainder of the Review is divided into three areas: Student Success and Achievement; Faculty Development and Curriculum and Institutional Support. In the area of Student Success and Achievement, total of 4 outcomes were addressed. In the Faculty Development and Curriculum area, the Review encompasses 2 outcomes. Under Institutional Support, the Review examines budgetary support and space allocation.

The process, although long, has been a good one and represents the collaborative hard work of both faculty and the dean. Happy reading!

Components/Outcomes and Measures

Category 1: Student Success and Achievement

Component A: Student Success and Retention

Outcome 1
Progress in student success and retention

Measure: Student Success and Retention in Biology

Description of Measure (WHAT data were used to measure the outcome?): Overall student success and retention rates for Biology 11 were used to measure success and retention.

Acceptable Target and Rationale: Maintaining success rates at or above 74% and retention rates at or above 87% would be considered acceptable as these are the rates seen in 2010-2011, which were near the highest rates seen over the last five years.

Ideal Target and Rationale: Success rates at or above 79% and retention rates at or above 92% would be considered ideal as this would represent a five percent increase in both categories and would represent a rate higher than any seen in the last five years.

What steps were taken to analyze the data?: Success and retention data were analyzed by

division faculty and the Natural Sciences division dean.

Key/Responsible Personnel (WHO analyzed the data?): Division faculty and the Natural Sciences division dean.

Supporting Attachments:

Student_success_and_retention_biology_11.xlsx (Excel Workbook (Open XML)) (See appendix)

Measure: Student Success and Retention in Chemistry

Description of Measure (WHAT data were used to measure the outcome?): Overall student success and retention rates for Chemistry 22 were used to measure success and retention.

Acceptable Target and Rationale: Maintaining success rates at or above 71% and retention rates at or above 85% would be considered acceptable as these are the rates seen in 2010-2011, which were near the highest rates seen over the last five years.

Ideal Target and Rationale: Success rates at or above 74.5% and retention rates at or above 89% would be considered ideal as this would represent a five percent increase in both categories and would represent a rate higher than any seen in the last five years.

What steps were taken to analyze the data?: Success and retention data were analyzed by division faculty and the Natural Sciences division dean.

Key/Responsible Personnel (WHO analyzed the data?): Division faculty and the Natural Sciences division dean.

Supporting Attachments:

Student success and retention chemistry.xlsx (Excel Workbook (Open XML)) (See appendix)

Measure: Student Success and Retention in Geoscience

Description of Measure (WHAT data were used to measure the outcome?): Overall student success and retention rates for Geography 1 were used to measure success and retention.

Acceptable Target and Rationale: Maintaining success rates at or above 75% and retention rates at or above 89% would be considered acceptable as these are the rates seen in 2010-2011, which were near the highest rates seen over the last five years.

Ideal Target and Rationale: Success rates at or above 80% and retention rates at or above 94% would be considered ideal as this would represent a five percent increase in both categories and would represent a rate higher than any seen in the last five years.

What steps were taken to analyze the data?: Success and retention data were analyzed by division faculty and the Natural Sciences division dean.

Key/Responsible Personnel (WHO analyzed the data?): Division faculty and the Natural Sciences division dean.

Supporting Attachments:

Student success and retention geography 1 (Microsoft Excel) (See appendix)

Measure: Student Success and Retention in Physics

Description of Measure (WHAT data were used to measure the outcome?): Overall student success and retention rates for Physics 10 during the years 2006-2011 were used to measure success and retention.

Acceptable Target and Rationale: Maintaining success rates at or above 82.8% and retention rates at or above 90.5% would be considered acceptable as these are the rates seen in 2010-2011, which were above the average rate seen over the last five years.

Ideal Target and Rationale: Success rates at or above 87% and retention rates at or above 95% would be considered ideal as this would represent a five percent increase in both categories and would represent a rate higher than any seen in the last five years.

What steps were taken to analyze the data?: Success and retention data were analyzed by division faculty and the Natural Sciences division dean.

Key/Responsible Personnel (WHO analyzed the data?): Division faculty and the Natural Sciences division dean.

Supporting Attachments:

physics_success_retention.xlsx (Excel Workbook (Open XML)) (See appendix)

Outcome 3

Course student learning outcomes are assessed and the results are used for improvement

Measure: SLO Data

Description of Measure (WHAT data were used to measure the outcome?): SLO data from eLumen and from faculty in various disciplines within Natural Sciences

Acceptable Target and Rationale: An acceptable target would be if SLOs were measured and reported for 70% of Natural Science courses as this would serve as a guideline for assessment within each discipline.

Ideal Target and Rationale: An ideal target would be if SLOs were measured and reported for 100% of Natural Science courses as this would provide substantial assessment within each discipline.

What steps were taken to analyze the data?: SLO data provided by eLumen and individual faculty were analyzed.

Key/Responsible Personnel (WHO analyzed the data?): Faculty within various disciplines analyzed SLO data.

Supporting Attachments:

Geography 1 SLO Assessment Results (Microsoft Excel) (See appendix)
Geography 1 SLO Assessment Rubric (Microsoft Word) (See appendix)
Natural Sciences Assessment Report (Adobe Acrobat Document) (See appendix)
SLO Achievement by Course NS (Adobe Acrobat Document) (See appendix)

Success and retention rates reflect overall effectiveness of the Program

No measures specified

Course SLOs are assessed and the results are used for improvement

Measure: Annual Assessment Report from 2012-13

Description of Measure (WHAT data were used to measure the outcome?): Natural Sciences Annual Assessment Report from 2012-13

Acceptable Target and Rationale:

Ideal Target and Rationale:

What steps were taken to analyze the data?:

Key/Responsible Personnel (WHO analyzed the data?):

Supporting Attachments:

No Annual Assessment Report submitted (Adobe Acrobat Document) (See appendix)

Measure: eLumen Course SLO Data

Description of Measure (WHAT data were used to measure the outcome?): Natural Sciences eLumen Course SLO Data

Acceptable Target and Rationale:

Ideal Target and Rationale:

What steps were taken to analyze the data?:

Key/Responsible Personnel (WHO analyzed the data?):

Supporting Attachments:

NaturalSciences_CSLO_eLumendata_2008_2013 (Adobe Acrobat Document) (See appendix)

AA Program SLOs are assessed and the results are used for improvement

Measure: Annual Assessment Report from 2012-13

Description of Measure (WHAT data were used to measure the outcome?): Natural Sciences Annual Assessment Report from 2012-13

Acceptable Target and Rationale:

Ideal Target and Rationale:

What steps were taken to analyze the data?:

Key/Responsible Personnel (WHO analyzed the data?):

Supporting Attachments:

No Annual Assessment Report submitted (Adobe Acrobat Document) (See appendix)

Measure: eLumen Course PSLO Data

Description of Measure (WHAT data were used to measure the outcome?): Natural Sciences eLumen Course PSLO Data

Acceptable Target and Rationale:

Ideal Target and Rationale:

What steps were taken to analyze the data?:

Key/Responsible Personnel (WHO analyzed the data?):

Supporting Attachments:

Missing_PSLO (Adobe Acrobat Document) (See appendix)

Component B. Demographics

Outcome 2

Success rates by ethnicity are regularly evaluated and addressed

Measure: Success rates by ethnicity are regularly evaluated and addressed for Biology

Description of Measure (WHAT data were used to measure the outcome?): Retention and success data for each ethnic group enrolled in Biology during the spring 2010 semester was used to evaluate success rates for racial groups.

Acceptable Target and Rationale: Black, Hispanic, Native American and Pacific Islander students had a lower success rate than did the overall student population in Biology 11. Black students succeeded at a rate of 50%, Hispanic at a rate of 56%, Native American at a rate of 59%, and Pacific Islander at a rate of 61%. Black and Hispanic students had a lower retention rate than did the overall student population in Biology 11. Black students were retained at a rate of 78% and Hispanic students at a rate of 80%. A 5% increase in success and retention rates for both groups would represent an acceptable short term target.

Ideal Target and Rationale: Asian and white students had the highest success rates at 76% and 74% respectively. The highest student retention values were 88%. Ideally, the success and retention rates for all black, Hispanic, Native American, and Pacific Islander students should match that of the overall student population in Biology 11.

What steps were taken to analyze the data?: Ethnicity data correlated to student success and retention was collected and analyzed.

Key/Responsible Personnel (WHO analyzed the data?): Division faculty and the Natural Sciences division dean.

Supporting Attachments:

Success_Rates_by_ethnic_group_biology_11.xls (Microsoft Excel) (See appendix)

Measure: Success rates by ethnicity are regularly evaluated and addressed for Chemistry

Description of Measure (WHAT data were used to measure the outcome?): Retention and success data for each ethnic group enrolled in Chemistry 22 during the spring 2010 semester was used to evaluate success rates for ethnic groups.

Acceptable Target and Rationale: Black, Hispanic, and Pacific Islander students had a lower success rate than did the overall student population in Chemistry 22. Black students succeeded at a rate of 45%, Hispanic at a rate of 50%, and Pacific Islander at a rate of 50%. Black and Native American students had a lower retention rate than did the overall student population in Chemistry 22. Black students were retained at a rate of 60% and Native Americans at a rate of 67%. A 5% increase in success and retention rates for both groups would represent an acceptable short term target.

Ideal Target and Rationale: The success and retention rates for Black, Hispanic, Pacific Islander, and Native American students should match that of the overall student population in Chemistry 22. Ideally, all students should match the highest values for success (72%) and retention (81%) shown by Asian students in Chemistry 22.

What steps were taken to analyze the data?: Ethnicity data correlated to student success and retention was collected and analyzed.

Key/Responsible Personnel (WHO analyzed the data?): Division faculty and the Natural Sciences division dean.

Supporting Attachments:

Success Rates by ethnic group chemistry.xls (Microsoft Excel) (See appendix)

Measure: Success rates by ethnicity are regularly evaluated and addressed for Geoscience

Description of Measure (WHAT data were used to measure the outcome?): Retention and success data for each ethnic group enrolled in Geography 1 during the spring 2010 semester was used to evaluate success rates for ethnic groups.

Acceptable Target and Rationale: Black and Hispanic students had a lower success rate than did the overall student population in Geography 1. Black students were retained at a rate of 78.5% and succeeded at a rate of 51.9%. Hispanic students were retained at a rate of 83% and succeeded at a rate of 62%. A 5% increase in success and retention rates for both groups would represent an acceptable short term target.

Ideal Target and Rationale: The success and retention rates for all student groups should match that of the overall student population in Geography 1. Ideally, black and hispanic students would succeed at 76% and be retained at 88%, which are among the highest success and retention rates in Geography 1.

What steps were taken to analyze the data?: Ethnicity data correlated to student success and retention was collected and analyzed.

Key/Responsible Personnel (WHO analyzed the data?): Division faculty and the Natural Sciences division dean.

Supporting Attachments:

Success_rates_by_ethnic_groups_geography_1.xls (Microsoft Excel) (See appendix)

Measure: Success rates by ethnicity are regularly evaluated and addressed for Physics

Description of Measure (WHAT data were used to measure the outcome?): Retention and success data for each racial group enrolled in Physics 10 during the spring 2010 semester was

used to evaluate success rates for racial groups.

Acceptable Target and Rationale: Black, Hispanic, Native American and Pacific Islander students had a lower success rate than did the overall student population in Physics 10. Black students succeeded at a rate of 73%, Hispanic at a rate of 69%, Native Americans at a rate of 75%, and Pacific Islanders at a rate of 67%. Black, Hispanic and Pacific Islander students also had a lower retention rate than did the overall student population in Physics 10. Black students were retained at a rate of 78%, Hispanic students at a rate of 81%, and Pacific Islanders at a rate of 75%. A 5% increase in success and retention rates for both groups would represent an acceptable short term target.

Ideal Target and Rationale: Asian students showed the highest success (91%) and retention (94%). Ideally, the success and retention rates for Black, Hispanic and Pacific Islander, students should match that of the overall student population in Physics 10.

What steps were taken to analyze the data?: Ethnicity data correlated to student success and retention was collected and analyzed.

Key/Responsible Personnel (WHO analyzed the data?): Division faculty and the Natural Sciences division dean.

Supporting Attachments:

success_rates_by_ethnic_group_physics.xlsx (Excel Workbook (Open XML)) (See appendix)

Success rates by demographic groups are evaluated

No measures specified

Diversity demographics and recruitment efforts are evaluated

No measures specified

Component C. Progression and Awards Conferred

Outcome 1

The Program shows progress in conferring achievements

Measure: Natural Sciences AA Degrees Awarded

Description of Measure (WHAT data were used to measure the outcome?): Number of Natural Sciences AA degrees awarded per year as reported to the board of trustees on 1-16-2013.

Acceptable Target and Rationale: The number of STEM degrees increased 309% from 2009-10 to 2010-11. From 2010-11 to 2011-12 the number of STEM degrees awarded increased 184%. In 2011-12 there were 261 STEM degrees awarded. If this level of STEM degrees is sustained we will easily achieve our EMP goals.

Ideal Target and Rationale: The Educational Master plan has set a goal if 1206 Total STEM degrees awarded by the end of the 2014-15 Academic year. This goal was established in order for PCC to become number one in the state in STEM transfers.

What steps were taken to analyze the data?: A graph was made to analyze the STEM degree data (attached).

Key/Responsible Personnel (WHO analyzed the data?): Division faculty and the Natural Sciences division dean.

Supporting Attachments:

Degrees by Major (Microsoft Excel) (See appendix)

STEM AWARDS Spreadsheet (Excel Workbook (Open XML)) (See appendix)

An Excel Spreadsheet of STEM Degrees Awarded as of 1/18/13

STEM Degrees Awarded (Adobe Acrobat Document) (See appendix)

A PDF of STEM Degrees Awarded as of 1/13

Program demonstrates consistent enrollment based on demand	*No measures specified*
Courses are offered in a sequence and frequency that facilitates program completion	*No measures specified*
Number of awards granted demonstrates the effectiveness of the program	*No measures specified*

Component D. Student Enrollment & Faculty-to-Student Ratios

Outcome 2
FTES/FTEF ratios are evaluated for effectiveness

Measure: FTES/FTEF ratios are evaluated for effectiveness for Biology

Description of Measure (WHAT data were used to measure the outcome?): FTES/FTEF ratios for Biology 11 were obtained for the 2006-2007 through 2010-2011 academic years and compared to student success and retention rations for the same years.

Acceptable Target and Rationale: The peak student success and retention rates (73% success and 88% retention) declined in 2010-2011, the year that FTES/FTEF ratio exceeded 21. FTES/FTEF ratios should be returned to below 21 to increase student success/retention.

Ideal Target and Rationale: FTES/FTEF rates should be lowered (if possible based on division resources) to determine optimal FTES/FTEF ratios for student success.

What steps were taken to analyze the data?: Success and retention data, along with FTES/FTEF data was analyzed by division faculty and the Natural Sciences division dean.

Key/Responsible Personnel (WHO analyzed the data?): Division faculty and the Natural Sciences division dean.

Supporting Attachments:

FTES_per_FTEF_biology.xlsx (Excel Workbook (Open XML)) (See appendix)

Measure: FTES/FTEF ratios are evaluated for effectiveness in Chemistry

Description of Measure (WHAT data were used to measure the outcome?): FTES/FTEF ratios for all chemistry classes were obtained for the 2006-2007 through 2010-2011 academic years and compared to student success and retention rations for the same years.

Acceptable Target and Rationale: Over those 5 years, the FTES/FTEF ratio has decreased slightly and the success and retention rates have been increasing slightly (there is an exception to the trend in success rate in 2008-2009). We should keep the FTES/FTEF ratio at its current amount of 16.0 to help us meet our goals of student success and retention.

Ideal Target and Rationale: FTES/FTEF rates should be lowered (if possible based on division resources) to determine optimal FTES/FTEF ratios for student success.

What steps were taken to analyze the data?: Success and retention data, along with FTES/FTEF data was analyzed by division faculty and the Natural Sciences division dean.

Key/Responsible Personnel (WHO analyzed the data?): Division faculty and the Natural Sciences division dean.

Supporting Attachments:

FTES per FTEF chemistry.xlsx (Excel Workbook (Open XML)) (See appendix)

Measure: FTES/FTEF ratios are evaluated for effectiveness in Geosciences

Description of Measure (WHAT data were used to measure the outcome?): FTES/FTEF ratios for Geography 1 were obtained for the 2006-2007 through 2010-2011 academic years and compared to student success and retention rations for the same years.

Acceptable Target and Rationale: The greatest student success and retention rates (80% success and 92% retention) were found in 2009-2010, the year that FTES/FTEF was at its lowest (18.5). FTES/FTEF ratios should be returned to 18.5 (from their current 21.1) to increase student success/retention.

Ideal Target and Rationale: FTES/FTEF rates should be lowered (if possible based on division resources) to determine optimal FTES/FTEF ratios for student success.

What steps were taken to analyze the data?: Success and retention data, along with FTES/FTEF data was analyzed by division faculty and the Natural Sciences division dean.

Key/Responsible Personnel (WHO analyzed the data?): Division faculty and the Natural Sciences division dean.

Supporting Attachments:

FTES/FTEF and student success and retention geography 1 (Microsoft Excel) (See appendix)

Measure: FTES/FTEF ratios are evaluated for effectiveness in Physics

Description of Measure (WHAT data were used to measure the outcome?): FTES/FTEF ratios for all physics classes were obtained for the 2006-2007 through 2010-2011 academic years and compared to student success and retention rations for the same years.

Acceptable Target and Rationale: Over those 5 years, the FTES/FTEF ratio has risen slightly while success and retention rates have decreased slightly. We should keep the FTES/FTEF ratio at its current value of 16.8 to help us meet our goals of student success and retention.

Ideal Target and Rationale: FTES/FTEF rates should be lowered (if possible based on division resources) to determine optimal FTES/FTEF ratios for student success.

What steps were taken to analyze the data?: Success and retention data, along with FTES/FTEF data was analyzed by division faculty and the Natural Sciences division dean.

Key/Responsible Personnel (WHO analyzed the data?): Division faculty and the Natural Sciences division dean.

Supporting Attachments:

physics_FTEperFTEF.xlsx (Excel Workbook (Open XML)) (See appendix)

Category 2: Faculty Development and Curriculum

Component A. Faculty Development

Outcome 1

Full-Time Faculty assess need for and are given opportunity to pursue necessary professional development and growth

Measure: Full-Time Faculty assess need for and are given opportunity to pursue necessary professional develop

Description of Measure (WHAT data were used to measure the outcome?): The number of faculty attending professional development conferences (as well as the number of conferences) was tracked from 2008-2009 through 2010-2011 and compared to student success and retention over the same time period.

Acceptable Target and Rationale: Acceptable targets for professional development (conference attendance) depend on the frequency of upcoming conferences and the desire of

faculty to attend. In the near term, the inability of faculty to pursue desired professional development (i.e conference attendance) should be tracked.

Ideal Target and Rationale: Ideally, there should be no impediments to faculty development with 100% of faculty requesting conference attendance being able to attend. This situation is primarily dependent on proper funding levels.

What steps were taken to analyze the data?: Professional development, as represented by conference attendance, was tracked from 2008-2009 to 2010-2011. The number of conferences and attendees over that time period was compared to student success and retention over the same period.

Key/Responsible Personnel (WHO analyzed the data?): Division faculty and the Natural Sciences division dean.

Supporting Attachments:

Professional Development Natural Sciences (Microsoft Excel) (See appendix)

Component B. Curriculum Management

Outcome 2
Curricula is properly articulated with CSU and UC systems

Measure: There exists a proper articulation of courses between Nat Sci Div and UC/CSU

Description of Measure (WHAT data were used to measure the outcome?): The presence of articulation agreements between Pasadena City College and UC/CSU for courses in the Natural Sciences Division was determined.

Acceptable Target and Rationale: With the exception of special interest/personal growth courses, all routinely offered baccalaureate level courses within the Natural Sciences should currently articulate with a course(s) at UC/CSU.

Ideal Target and Rationale: With the exception of special interest/personal growth courses, all baccalaureate level courses within the Natural Sciences should currently articulate with a course(s) at UC/CSU.

What steps were taken to analyze the data?: Assist.org was queried to determine current articulation agreements.

Key/Responsible Personnel (WHO analyzed the data?): Division faculty and The Natural Sciences division dean.

Supporting Attachments:

CSU Transfer Eligible Courses Nat Sci Div.pdf (Adobe Acrobat Document) (See appendix)
UC Transfer Eligible Courses Nat Sci Div.pdf (Adobe Acrobat Document) (See appendix)

Success and retention data for distance education courses are compared to the face-to-face courses.

No measures specified

Program curriculum is aligned with appropriate external agencies, regulations, and/or professional organizations

No measures specified

Curricula are properly articulated with K-12

No measures specified

and/or CSU and UC systems	
All Course Outlines of Record are reviewed and, if necessary, updated once every two years	*No measures specified*

Category 3: Institutional Support

Component A. Budget

Outcome 1
Effective Allocation of the Division's Resources to Meet the Requirements of the Program

Measure: Budgetary support is adequate for accomplishing the mission of the Natural Sciences Division.

Description of Measure (WHAT data were used to measure the outcome?): Supply, equipment and student worker need levels that are currently necessary to the completion of the mission statement of the Natural Sciences division were identified.

Acceptable Target and Rationale: Budgetary support must exist to purchase/repair/replace all equipment and fund all student worker positions needed to achieve EMP Goal of increasing STEM Degrees. Science education is both equipment and supply intensive and therefore expensive. Yet with nearly 14,000 students served per year, we are allocated less than $10 per student (see attached budget summary) for supplies, student travel, equipment purchase / repair/ replacement. If we are to achieve EMP goals of increasing STEM Degrees, we must have an adequate budget to repair equipment, replace outdated equipment and purchase the new equipment required for curricular innovation. In addition, faculty must have professional development opportunities to learn to use new equipment, understand modern pedagogies and apply both to a modernized curriculum.

Ideal Target and Rationale: Budgetary support must exist to purchase/repair/replace all equipment and fund all student worker positions needed to advance the educational priorities within the division. Ideally, and in order for continued growth to occur, additional budgetary support must be provided to contribute to student success in a changing scientific and academic environment so as to provide students with a contemporary education. For example, field work is a demonstrated success strategy for retention of students in STEM. A 3-day field trip for 30 students runs at least $1,000 for transportation alone (3 vans @ $100/day*3 days plus fuel). With an entire Student Travel budget of $12,700 this means the Division is budgeted for one field trip a month. In comparison, the Student travel budget for athletics is $ 93,000... As another example, the Division has over 600 Microscopes which must be cleaned, adjusted, aligned and repaired by an outside vendor on a regular basis. Last time we had this done it cost about $ 2,600 for 60 scopes for Life Sciences alone - using about 150% of the annual equipment repair budget. This is only 10% of our microscopes which ideally should be serviced annually. Ideally (and as directed by the EMP) the Natural Sciences AA degree program should grow and this will require increased budgetary support.

What steps were taken to analyze the data?: Equipment and student worker needs were determined by surveying faculty in all disciplines.

Key/Responsible Personnel (WHO analyzed the data?): Division faculty and the Natural Sciences division Dean.

Supporting Attachments:

Critial Equipment requests (Adobe Acrobat Document) (See appendix)

PDF of equipment Needs by Division / discipine created in response to addition of Prop 30 Funds

NAt Sci AA Degree Budget Allocations (Excel Workbook (Open XML)) (See appendix)

Spreadsheet of Instructional Equipment Needs (Excel Workbook (Open XML)) (See appendix)

Spreadsheet of instructional equipment needs across divisions / disciplines showing the details of equipment needed.

Student Worker Refunding (Excel Workbook (Open XML)) (See appendix)

Spreadsheet showing needs to refund hourly worker budgets created for restoration of prop 30 funds

Number of full-time and part-time faculty and staff meets program needs	*No measures specified*
College resources are effectively allocated to meet program needs (equipment, technology, supplies, etc.)	*No measures specified*
Full-time and part-time staff pursue necessary professional development and growth	*No measures specified*

Component B. Space Allocation

Outcome 1

Available space is appropriately used and allocated

Measure: Available space is appropriately allocated and used

Description of Measure (WHAT data were used to measure the outcome?): The availability of lab and lecture space, student learning space, office space for full time and adjunct faculty, and equipment storage space commensurate with the needs of the division and the number of class sections offered was analyzed to determine if available space was appropriately utilized.

Acceptable Target and Rationale: An acceptable target would be available lab and lecture space being adequate to meet the goals and needs of the program as well as the availability of student learning space, office space for full time and adjunct faculty, and equipment storage space commensurate with the needs of the division and the number of class sections offered.

Ideal Target and Rationale: Space within the division would allow for the growth required to meet the EMP - Student Success and Achievement Area goals. Storage space would be adequate to support supply items and field equipment. Currently these are still being stored in the "U" building. Previously there were plans to create additional storage in close proximity to Science Village but those have not come to fruition. Shared faculty office space in Science Village has advantages, however it lacks shared space available for faculty to hold private conversations with students or each other. Ideally, additional space can be allocated for supply and field equipment storage as well as the identification of some faculty and student conference areas. Although less desirable, some classes can be offered on weekends when the labs are less utilized.

What steps were taken to analyze the data?: Faculty and classified staff were queried as to needs for lecture/laboratory/storage and office space. Room schedules are routinely analyzed for underutilized space by the Division Secretary, scheduling coordinators and the Division Dean. This information was ruminated on primarily by the Division Dean.

Key/Responsible Personnel (WHO analyzed the data?): Division faculty and the Natural Sciences division Dean.

Supporting Attachments:

Room Schedules (Excel Workbook (Open XML)) (See appendix)

Room Schedules for Natural Sciences Division Courses.

The space needs of the program are met	*No measures specified*

Review Findings and Recommendations

Finding per Measure

Category 1: Student Success and Achievement

Component A: Student Success and Retention

Outcome 1
Progress in student success and retention

Measure: Student Success and Retention in Biology

Description of Measure (WHAT data were used to measure the outcome?): Overall student success and retention rates for Biology 11 were used to measure success and retention.

Acceptable Target and Rationale: Maintaining success rates at or above 74% and retention rates at or above 87% would be considered acceptable as these are the rates seen in 2010-2011, which were near the highest rates seen over the last five years.

Ideal Target and Rationale: Success rates at or above 79% and retention rates at or above 92% would be considered ideal as this would represent a five percent increase in both categories and would represent a rate higher than any seen in the last five years.

What steps were taken to analyze the data?: Success and retention data were analyzed by division faculty and the Natural Sciences division dean.

Key/Responsible Personnel (WHO analyzed the data?): Division faculty and the Natural Sciences division dean.

Supporting Attachments:

Student_success_and_retention_biology_11.xlsx (Excel Workbook (Open XML)) (See appendix)

Findings for Student Success and Retention in Biology

Summary of Findings: Based on current and past data from Biology 11 (chosen as an indicator for biology courses in general), our ideal target can be reached with a roughly 5% increase in success and retention rates, since we are currently near our target levels.

Results: Acceptable Target Achievement: Met; Ideal Target Achievement : Approaching

Recommendations for Improvement: Improvement can be made in this area through better counseling of students prior to enrollment in biology courses (especially in terms of basic skills needs) and increasing student services such as tutoring or study skills workshops. Further, adopting the use of a variety of pedagogical methods (lecture, lab, incorporation of an online component, problem-based inquiry) will better cater to the various ways that students learn.

Over the past year (beginning Fall 2012) approximately 1/2 of the Biology 11 sections offered have been in the traditional format, while the remaining sections are taught in a hybrid Project-based format (1.5 Hours lecture online, 1.5 hrs lecture and 3 hours lab in a face-to-face mode. Preliminary results suggest a 15-20 % increase in retention and success. The lead professor - Katie Rodriguez - will be giving a paper on this redesign at the Fall AACU STEM Conference in San Diego this October (Abstract Attached).

Reflections/Notes : Some of our students suffer from a lack of preparation prior to enrolling biology courses. Many are at a basic skills level in terms of language (written and oral) and have a difficult time synthesizing observations into a coherent hypothesis. Some students also lack

proper study skills.

Substantiating Evidence:

AACU STEM CONF.pdf (Adobe Acrobat Document) (See appendix)

Measure: Student Success and Retention in Chemistry

Description of Measure (WHAT data were used to measure the outcome?): Overall student success and retention rates for Chemistry 22 were used to measure success and retention.

Acceptable Target and Rationale: Maintaining success rates at or above 71% and retention rates at or above 85% would be considered acceptable as these are the rates seen in 2010-2011, which were near the highest rates seen over the last five years.

Ideal Target and Rationale: Success rates at or above 74.5% and retention rates at or above 89% would be considered ideal as this would represent a five percent increase in both categories and would represent a rate higher than any seen in the last five years.

What steps were taken to analyze the data?: Success and retention data were analyzed by division faculty and the Natural Sciences division dean.

Key/Responsible Personnel (WHO analyzed the data?): Division faculty and the Natural Sciences division dean.

Supporting Attachments:

Student success and retention chemistry.xlsx (Excel Workbook (Open XML)) (See appendix)

Findings for Student Success and Retention in Chemistry

Summary of Findings: Based on current and past data from Chemistry 22 (chosen as an indicator for chemistry courses in general), our ideal target can be reached with a roughly 5% increase in success and retention rates, since we are currently near our target levels.

Results: Acceptable Target Achievement: Met; Ideal Target Achievement : Approaching

Recommendations for Improvement: We are working on improving our chemistry success rates in other chemistry classes by adding Supplemental Instruction and changing the labs so they are more inquiry-based requiring students to take more ownership in the learning process. Supplemental Instruction (SI) helps students develop study skills and potentially helps with motivation and math skills as well. Improvement can be made in other chemistry classes (such as chemistry 22) by extending SI and potentially inquiry-based learning to other courses. Study skills can also partially be addressed by "College" courses currently on offer.

Reflections/Notes : Some of the barriers to student success and retention for our students (particularly in Chemistry 22) are the inability to apply math skills, weak English language ability (written and oral), study skills, and motivation. For many of the students who have lower success rates, the students either don't know how to study, don't know how much time is really needed to spend studying, or have no desire to spend the time studying even if they know they need to do more.

Several action items have been addressed in chemistry over the past year. Exclusive to chem 22 is the Chem Boost program. After fall registration is complete and prior to classes starting, Chem 22 students are invited to participate in a two week not-for-credit "boot camp" which will prepare them to be successful to chem 22. As an added incentive, they are reassessed at the end of the boot camp and if they place high enough, they are placed directly into Chemistry 1A (and can skip Chem 22 completely).

Measure: Student Success and Retention in Geoscience

Description of Measure (WHAT data were used to measure the outcome?): Overall student success and retention rates for Geography 1 were used to measure success and retention.

Acceptable Target and Rationale: Maintaining success rates at or above 75% and retention rates at or above 89% would be considered acceptable as these are the rates seen in 2010-2011,

which were near the highest rates seen over the last five years.

Ideal Target and Rationale: Success rates at or above 80% and retention rates at or above 94% would be considered ideal as this would represent a five percent increase in both categories and would represent a rate higher than any seen in the last five years.

What steps were taken to analyze the data?: Success and retention data were analyzed by division faculty and the Natural Sciences division dean.

Key/Responsible Personnel (WHO analyzed the data?): Division faculty and the Natural Sciences division dean.

Supporting Attachments:

Student success and retention geography 1 (Microsoft Excel) (See appendix)

Findings for Student Success and Retention in Geoscience

Summary of Findings: Based on current and past data from Geography 1 (chosen as an indicator for geosciences courses in general), our ideal target can be reached with a roughly 5% increase in success and retention rates, since we are currently near our target levels.

Results: Acceptable Target Achievement: Met; Ideal Target Achievement : Approaching

Recommendations for Improvement: Improvement can be made in this area through better counseling of students prior to enrollment in geoscience courses (especially in terms of basic skills needs). This will be partially addressed by "College" courses currently on offer. Further, increasing the variety in delivery methods available may also improve this factor (such as is envisioned by the incorporation of more hybrid and online options for students), although student support will be needed for this effort.

Over the past year, geoscience faculty have successfully put through C&I a GIS Certificate Program and Corresponding courses. Currently there are plans to develop a GIS lab inthe Geosciences area. This will be a critical component of both the Geology and Geography Programs and will provide a "milestone" certificate for students transferring in the geosciences as well as certification for students who wish to go directly into the workforce.

This fall, four geoscience faculty will be attending a workshop designed to increase student success in the geosciences at two year colleges.

Reflections/Notes : Our students suffer from a lack of preparation prior to enrolling in geoscience courses. Many are at a basic skills level in terms of language (written and oral) and have a difficult time synthesizing observations into a coherent hypothesis.

Substantiating Evidence:

ABS copy.pdf (Adobe Acrobat Document) (See appendix)

Measure: Student Success and Retention in Physics

Description of Measure (WHAT data were used to measure the outcome?): Overall student success and retention rates for Physics 10 during the years 2006-2011 were used to measure success and retention.

Acceptable Target and Rationale: Maintaining success rates at or above 82.8% and retention rates at or above 90.5% would be considered acceptable as these are the rates seen in 2010-2011, which were above the average rate seen over the last five years.

Ideal Target and Rationale: Success rates at or above 87% and retention rates at or above 95% would be considered ideal as this would represent a five percent increase in both categories and would represent a rate higher than any seen in the last five years.

What steps were taken to analyze the data?: Success and retention data were analyzed by division faculty and the Natural Sciences division dean.

Key/Responsible Personnel (WHO analyzed the data?): Division faculty and the Natural Sciences division dean.

Supporting Attachments:

physics_success_retention.xlsx (Excel Workbook (Open XML)) (See appendix)

Findings for Student Success and Retention in Physics

Summary of Findings: No Physics Faculty were willing/available to analyze findings.

Results: Acceptable Target Achievement: Met; Ideal Target Achievement : Approaching

Recommendations for Improvement: The Majority of Physics 10 sections are offered in an online mode. This summer one of the senior Physics Faculty - Ken cheney - Worked with the distance Education department to completely re-write the model course for Physics 10 online.

Reflections/Notes :

Outcome 3

Course student learning outcomes are assessed and the results are used for improvement

Measure: SLO Data

Description of Measure (WHAT data were used to measure the outcome?): SLO data from eLumen and from faculty in various disciplines within Natural Sciences

Acceptable Target and Rationale: An acceptable target would be if SLOs were measured and reported for 70% of Natural Science courses as this would serve as a guideline for assessment within each discipline.

Ideal Target and Rationale: An ideal target would be if SLOs were measured and reported for 100% of Natural Science courses as this would provide substantial assessment within each discipline.

What steps were taken to analyze the data?: SLO data provided by eLumen and individual faculty were analyzed.

Key/Responsible Personnel (WHO analyzed the data?): Faculty within various disciplines analyzed SLO data.

Supporting Attachments:

- Geography 1 SLO Assessment Results (Microsoft Excel) (See appendix)
- Geography 1 SLO Assessment Rubric (Microsoft Word) (See appendix)
- Natural Sciences Assessment Report (Adobe Acrobat Document) (See appendix)
- SLO Achievement by Course NS (Adobe Acrobat Document) (See appendix)

Findings for SLO Data

Summary of Findings: NS: Less than 70% of faculty within the Natural Sciences have been using eLumen to report SLO assessment. Although not recorded within eLumen, some faculty within various areas of each discipline have been conducting SLO assessments. An example of an assessment for Geography 1 is shown below.

Geog 1: The PCC Geography Faculty, Dr. Powers and Dr. Presiado developed a common assignment for assessing student learning outcome 10 in Physical Geography (Geography 1). As a result of this process, several important factors emerged and resulted in our action. In general, we realized that we had too many course level Student Learning Outcomes. As a result of this finding we rewrote and consolidated our course SLO's and updated this via the C&I process. We also realized that our first try at creating an assignment for the SLO (a 5 question suite of map based multiple choice type questions) may not be the best tool to measure student mastery of the outcome.

Results: Acceptable Target Achievement: Not Met; Ideal Target Achievement : Moving Away

Recommendations for Improvement: NS: Faculty with Natural Sciences need to report SLO assessment data into eLumen on a regular basis.

Geog 1: As a result of this process, several important factors emerged and resulted in our action. 1. We realized that by assessing SLO #10, we obviously had too many course level Student Learning Outcomes. As a result of this finding we rewrote and consolidated our course SLO's and updated this via the C&I process. 2. We also realized that our first try at creating an assignment for the SLO (a 5 question suite of map based multiple choice type questions) may not be the best tool to measure student mastery of the outcome. We are going to update our assignment to use a more authentic assessment. Dr. Presiado has been piloting a new team

based assessment using Project Based Learning and online rubrics to test one such authentic assessment. 3. Use of this assessment tool, and reflection on student results had caused some change in course pedagogy as well. For example, in Dr. Presiado's class there has been a move away from lecture based instruction, and a move toward open source resources, project based team learning, and authentic assessments.

Reflections/Notes : NS: Overall, a majority of faculty within the Natural Sciences have not been consistently reporting SLO assessment data to eLumen. Anecdotally, it is clear that many faculty are assessing student learning outcomes, and have made use of these results, yet have not been reporting these results in a formalized way. As a division, faculty within each discipline need to develop a more formal and consistent process to ensure this data is systematically documented within eLumen and utilized by faculty within the division to promote student success.

Geog 1: In conclusion, this assessment has caused multiple, meaningful improvements to Geography 1. The PCC Geography Faculty look forward to engaging with the iterative assessment process to continue to improve the course, our own teaching skills, and most importantly student success.

Success and retention rates reflect overall effectiveness of the Program

No measures specified

Course SLOs are assessed and the results are used for improvement

Measure: Annual Assessment Report from 2012-13

Description of Measure (WHAT data were used to measure the outcome?): Natural Sciences Annual Assessment Report from 2012-13

Acceptable Target and Rationale:

Ideal Target and Rationale:

What steps were taken to analyze the data?:

Key/Responsible Personnel (WHO analyzed the data?):

Supporting Attachments:

No Annual Assessment Report submitted (Adobe Acrobat Document) (See appendix)

Findings for Annual Assessment Report from 2012-13

No Findings Added

Measure: eLumen Course SLO Data

Description of Measure (WHAT data were used to measure the outcome?): Natural Sciences eLumen Course SLO Data

Acceptable Target and Rationale:

Ideal Target and Rationale:

What steps were taken to analyze the data?:

Key/Responsible Personnel (WHO analyzed the data?):

Supporting Attachments:

NaturalSciences_CSLO_eLumendata_2008_2013 (Adobe Acrobat Document) (See appendix)

Findings for eLumen Course SLO Data

No Findings Added

AA Program SLOs are assessed and the results are used for improvement

Measure: Annual Assessment Report from 2012-13

Description of Measure (WHAT data were used to measure the outcome?): Natural Sciences Annual Assessment Report from 2012-13

Acceptable Target and Rationale:

Ideal Target and Rationale:

What steps were taken to analyze the data?:

Key/Responsible Personnel (WHO analyzed the data?):

Supporting Attachments:

No Annual Assessment Report submitted (Adobe Acrobat Document) (See appendix)

Findings for Annual Assessment Report from 2012-13

No Findings Added

Measure: eLumen Course PSLO Data

Description of Measure (WHAT data were used to measure the outcome?): Natural Sciences eLumen Course PSLO Data

Acceptable Target and Rationale:

Ideal Target and Rationale:

What steps were taken to analyze the data?:

Key/Responsible Personnel (WHO analyzed the data?):

Supporting Attachments:

Missing_PSLO (Adobe Acrobat Document) (See appendix)

Findings for eLumen Course PSLO Data

No Findings Added

Component B. Demographics

Outcome 2

Success rates by ethnicity are regularly evaluated and addressed

Measure: Success rates by ethnicity are regularly evaluated and addressed for Biology

Description of Measure (WHAT data were used to measure the outcome?): Retention and success data for each ethnic group enrolled in Biology during the spring 2010 semester was used to evaluate success rates for racial groups.

Acceptable Target and Rationale: Black, Hispanic, Native American and Pacific Islander students had a lower success rate than did the overall student population in Biology 11. Black students succeeded at a rate of 50%, Hispanic at a rate of 56%, Native American at a rate of 59%, and Pacific Islander at a rate of 61%. Black and Hispanic students had a lower retention rate than did the overall student population in Biology 11. Black students were retained at a rate of 78% and Hispanic students at a rate of 80%. A 5% increase in success and retention rates for both groups would represent an acceptable short term target.

Ideal Target and Rationale: Asian and white students had the highest success rates at 76% and 74% respectively. The highest student retention values were 88%. Ideally, the success and retention rates for all black, Hispanic, Native American, and Pacific Islander students should match that of the overall student population in Biology 11.

What steps were taken to analyze the data?: Ethnicity data correlated to student success and retention was collected and analyzed.

Key/Responsible Personnel (WHO analyzed the data?): Division faculty and the Natural Sciences division dean.

Supporting Attachments:

Success_Rates_by_ethnic_group_biology_11.xls (Microsoft Excel) (See appendix)

Findings for Success rates by ethnicity are regularly evaluated and addressed for Biology

Summary of Findings: Overall, black and hispanic students have a much lower success rate than other ethnic groups in biology courses. Black, Hispanic, Native American and Pacific Islander students had a lower success rate than did the overall student population in Biology 11. Black students succeeded at a rate of 50%, Hispanic students at a rate of 56%, Native American at a rate of 59%, and Pacific Islander at a rate of 61%. Black and Hispanic students had a lower retention rate than did the overall student population in Biology 11. Black students were retained at a rate of 78% and Hispanic students at a rate of 80%. A 5% increase in success and retention rates for both groups would represent an acceptable short term target.

Results: Acceptable Target Achievement: Not Met; Ideal Target Achievement : Approaching

Recommendations for Improvement: A 5% increase in success and retention will improve the current situation, but the ideal target will be to improve these numbers so that they are on par with that of the overall student population in this course. This may be addressed by more pre-enrollment support (basic skills courses and training, college preparation courses) and by support during enrollment (tutoring, counseling). We also may be able to increase student success by increasing student services such as supplemental instruction, tutoring, or study skills workshops.

The Biology 11 course redesign project which has been occurring over the past year effects about Biology 11 sections being offered (~16 / semester). Early results show a narrowing of the achievement gap for Hispanic students as compared with the traditional course. The magnitute of the gap is typically about 15%, and preliminary results suggest a narrowing of the gap to about 5%.

Reflections/Notes : Some of our students suffer from a lack of preparation or experience with more intense college classes prior to enrolling in biology courses. Our challenge is to overcome the cultural differences that may lead to a gap among these groups.

Measure: Success rates by ethnicity are regularly evaluated and addressed for Chemistry

Description of Measure (WHAT data were used to measure the outcome?): Retention and success data for each ethnic group enrolled in Chemistry 22 during the spring 2010 semester was used to evaluate success rates for ethnic groups.

Acceptable Target and Rationale: Black, Hispanic, and Pacific Islander students had a lower success rate than did the overall student population in Chemistry 22. Black students succeeded at a rate of 45%, Hispanic at a rate of 50%, and Pacific Islander at a rate of 50%. Black and Native American students had a lower retention rate than did the overall student population in Chemistry 22. Black students were retained at a rate of 60% and Native Americans at a rate of 67%. A 5% increase in success and retention rates for both groups would represent an acceptable short term target.

Ideal Target and Rationale: The success and retention rates for Black, Hispanic, Pacific Islander, and Native American students should match that of the overall student population in Chemistry 22. Ideally, all students should match the highest values for success (72%) and retention (81%) shown by Asian students in Chemistry 22.

What steps were taken to analyze the data?: Ethnicity data correlated to student success and retention was collected and analyzed.

Key/Responsible Personnel (WHO analyzed the data?): Division faculty and the Natural Sciences division dean.

Supporting Attachments:

Success Rates by ethnic group chemistry.xls (Microsoft Excel) (See appendix)

Findings for Success rates by ethnicity are regularly evaluated and addressed for Chemistry

Summary of Findings: Overall, black and hispanic students have a much lower success rate than other ethnic groups in chemistry courses.

Results: Acceptable Target Achievement: Not Met; Ideal Target Achievement : Approaching

Recommendations for Improvement: A 5% increase in success and retention will improve the current situation, but the ideal target will be to improve these numbers so that they are on par with that of the overall student population in this course. This may be addressed by more pre-enrollment support (basic skills courses and training, college preparation courses) and by support during enrollment (tutoring, counseling). We also may be able to increase student success by increasing student services such as supplemental instruction, tutoring, or study skills workshops.

Reflections/Notes : Some of our students suffer from a lack of preparation or experience with more intense college classes prior to enrolling in chemistry courses. Our challenge is to overcome the cultural differences that may lead to a gap among these groups.

Measure: Success rates by ethnicity are regularly evaluated and addressed for Geoscience

Description of Measure (WHAT data were used to measure the outcome?): Retention and success data for each ethnic group enrolled in Geography 1 during the spring 2010 semester was used to evaluate success rates for ethnic groups.

Acceptable Target and Rationale: Black and Hispanic students had a lower success rate than did the overall student population in Geography 1. Black students were retained at a rate of 78.5% and succeeded at a rate of 51.9%. Hispanic students were retained at a rate of 83% and succeeded at a rate of 62%. A 5% increase in success and retention rates for both groups would represent an acceptable short term target.

Ideal Target and Rationale: The success and retention rates for all student groups should match that of the overall student population in Geography 1. Ideally, black and hispanic students would succeed at 76% and be retained at 88%, which are among the highest success and retention rates in Geography 1.

What steps were taken to analyze the data?: Ethnicity data correlated to student success and retention was collected and analyzed.

Key/Responsible Personnel (WHO analyzed the data?): Division faculty and the Natural Sciences division dean.

Supporting Attachments:

Success_rates_by_ethnic_groups_geography_1.xls (Microsoft Excel) (See appendix)

Findings for Success rates by ethnicity are regularly evaluated and addressed for Geoscience

Summary of Findings: Overall, black and hispanic students have a much lower success rate than other ethnic groups in geoscience courses.

Results: Acceptable Target Achievement: Not Met; Ideal Target Achievement : Approaching

Recommendations for Improvement: A 5% increase in success and retention will improve the current situation, but a the ideal target will be to improve these numbers so that they are on par with that of the overall students population in this course. This may be addressed by more pre-enrollment support (basic skills courses and training, college preparation courses) and by support during enrollment (tutoring, counseling).

Reflections/Notes : The problem that we observe in these ethnic groups is also seen in other groups, although to a lesser extent. Our challenge is to overcome the cultural differences that may lead to a gap among these groups.

Measure: Success rates by ethnicity are regularly evaluated and addressed for Physics

Description of Measure (WHAT data were used to measure the outcome?): Retention and success data for each racial group enrolled in Physics 10 during the spring 2010 semester was used to evaluate success rates for racial groups.

Acceptable Target and Rationale: Black, Hispanic, Native American and Pacific Islander students had a lower success rate than did the overall student population in Physics 10. Black students succeeded at a rate of 73%, Hispanic at a rate of 69%, Native Americans at a rate of 75%, and Pacific Islanders at a rate of 67%. Black, Hispanic and Pacific Islander students also had a lower retention rate than did the overall student population in Physics 10. Black students were retained at a rate of 78%, Hispanic students at a rate of 81%, and Pacific Islanders at a rate of 75%. A 5% increase in success and retention rates for both groups would represent an acceptable short term target.

Ideal Target and Rationale: Asian students showed the highest success (91%) and retention (94%). Ideally, the success and retention rates for Black, Hispanic and Pacific Islander, students should match that of the overall student population in Physics 10.

What steps were taken to analyze the data?: Ethnicity data correlated to student success and retention was collected and analyzed.

Key/Responsible Personnel (WHO analyzed the data?): Division faculty and the Natural Sciences division dean.

Supporting Attachments:

success_rates_by_ethnic_group_physics.xlsx (Excel Workbook (Open XML)) (See appendix)

Findings for Success rates by ethnicity are regularly evaluated and addressed for Physics

Summary of Findings: No Physics faculty were willing / able to address findings for physics.

Results: Acceptable Target Achievement: Not Met; Ideal Target Achievement : Approaching

Recommendations for Improvement:

Reflections/Notes :

Success rates by demographic groups are evaluated	*No measures specified*
Diversity demographics and recruitment efforts are evaluated	*No measures specified*

Component C. Progression and Awards Conferred

Outcome 1

The Program shows progress in conferring achievements

Measure: Natural Sciences AA Degrees Awarded

Description of Measure (WHAT data were used to measure the outcome?): Number of Natural Sciences AA degrees awarded per year as reported to the board of trustees on 1-16-2013.

Acceptable Target and Rationale: The number of STEM degrees increased 309% from 2009-10 to 2010-11. From 2010-11 to 2011-12 the number of STEM degrees awarded increased 184%. In 2011-12 there were 261 STEM degrees awarded. If this level of STEM degrees is sustained we will easily achieve our EMP goals.

Ideal Target and Rationale: The Educational Master plan has set a goal if 1206 Total STEM degrees awarded by the end of the 2014-15 Academic year. This goal was established in order for PCC to become number one in the state in STEM transfers.

What steps were taken to analyze the data?: A graph was made to analyze the STEM degree data (attached).

Key/Responsible Personnel (WHO analyzed the data?): Division faculty and the Natural Sciences division dean.

Supporting Attachments:

Degrees by Major (Microsoft Excel) (See appendix)

STEM AWARDS Spreadsheet (Excel Workbook (Open XML)) (See appendix)

An Excel Spreadsheet of STEM Degrees Awarded as of 1/18/13

STEM Degrees Awarded (Adobe Acrobat Document) (See appendix)

A PDF of STEM Degrees Awarded as of 1/13

Findings for Natural Sciences AA Degrees Awarded

Summary of Findings: Students in STEM fields have a long-standing tradition of transferring without obtaining a 2-year degree or certificate. This is particularly a problem in STEM fields because often students transfer to a 4-year school but still attend PCC to pick up a few remaining high-level lower division classes (such as Organic chemistry). If a student applies for graduation and receives a degree, they can no longer use financial aid at our institution. Therefore they often never apply for a degree. The AAT degrees have further confounded this because although they can get in to a CSU with a Minimum of STEM courses, it is often recommended that they have many more units in higher level science and math courses.

Results: Acceptable Target Achievement: Met; Ideal Target Achievement : Approaching

Recommendations for Improvement: We are continuing to encourage students to get a degree before they transfer for several reasons. It is a sad fact that not all transfers complete the Bachelors degree. Therefore if they did not get a 2 year degree all they are left with is a transcript which carries a lot less weight in the workforce. Second, it has been shown that students who complete a 2-year degree finish 4-year programs at about a 15 to 20% higher rate.

Reflections/Notes : There are both internal and external challenges to "Increasing STEM degrees". The addition of more AAT degrees should accelerate the rate at which STEM degrees are awarded over the next few years.

Program demonstrates consistent enrollment based on demand

No measures specified

Courses are offered in a sequence and frequency that facilitates program completion

No measures specified

Number of awards granted demonstrates the effectiveness of the program	*No measures specified*

Component D. Student Enrollment & Faculty-to-Student Ratios

Outcome 2
FTES/FTEF ratios are evaluated for effectiveness

Measure: FTES/FTEF ratios are evaluated for effectiveness for Biology

Description of Measure (WHAT data were used to measure the outcome?): FTES/FTEF ratios for Biology 11 were obtained for the 2006-2007 through 2010-2011 academic years and compared to student success and retention rations for the same years.

Acceptable Target and Rationale: The peak student success and retention rates (73% success and 88% retention) declined in 2010-2011, the year that FTES/FTEF ratio exceeded 21. FTES/FTEF ratios should be returned to below 21 to increase student success/retention.

Ideal Target and Rationale: FTES/FTEF rates should be lowered (if possible based on division resources) to determine optimal FTES/FTEF ratios for student success.

What steps were taken to analyze the data?: Success and retention data, along with FTES/FTEF data was analyzed by division faculty and the Natural Sciences division dean.

Key/Responsible Personnel (WHO analyzed the data?): Division faculty and the Natural Sciences division dean.

Supporting Attachments:

FTES_per_FTEF_biology.xlsx (Excel Workbook (Open XML)) (See appendix)

Findings for FTES/FTEF ratios are evaluated for effectiveness for Biology

Summary of Findings: Lower FTES/FTEF ratios lead to better success and retention.

Results: Acceptable Target Achievement: Not Met; Ideal Target Achievement : Approaching

Recommendations for Improvement: Return FTES/FTEF to lower values (aim for values at or below 20).

Reflections/Notes : Budget and scheduling constraints may limit the amount of improvement in this area.

Measure: FTES/FTEF ratios are evaluated for effectiveness in Chemistry

Description of Measure (WHAT data were used to measure the outcome?): FTES/FTEF ratios for all chemistry classes were obtained for the 2006-2007 through 2010-2011 academic years and compared to student success and retention rations for the same years.

Acceptable Target and Rationale: Over those 5 years, the FTES/FTEF ratio has decreased slightly and the success and retention rates have been increasing slightly (there is an exception to the trend in success rate in 2008-2009). We should keep the FTES/FTEF ratio at its current amount of 16.0 to help us meet our goals of student success and retention.

Ideal Target and Rationale: FTES/FTEF rates should be lowered (if possible based on division resources) to determine optimal FTES/FTEF ratios for student success.

What steps were taken to analyze the data?: Success and retention data, along with FTES/FTEF data was analyzed by division faculty and the Natural Sciences division dean.

Key/Responsible Personnel (WHO analyzed the data?): Division faculty and the Natural Sciences division dean.

Supporting Attachments:

FTES per FTEF chemistry.xlsx (Excel Workbook (Open XML)) (See appendix)

Findings for FTES/FTEF ratios are evaluated for effectiveness in Chemistry

Summary of Findings: Lower FTES/FTEF ratios lead to better success and retention.

Results: Acceptable Target Achievement: Not Met; Ideal Target Achievement : Approaching

Recommendations for Improvement: Return FTES/FTEF to lower values (aim for values at or below those of 2009-2010).

Reflections/Notes : Budget and scheduling constraints may limit the amount of improvement in this area.

Measure: FTES/FTEF ratios are evaluated for effectiveness in Geosciences

Description of Measure (WHAT data were used to measure the outcome?): FTES/FTEF ratios for Geography 1 were obtained for the 2006-2007 through 2010-2011 academic years and compared to student success and retention rations for the same years.

Acceptable Target and Rationale: The greatest student success and retention rates (80% success and 92% retention) were found in 2009-2010, the year that FTES/FTEF was at its lowest (18.5). FTES/FTEF ratios should be returned to 18.5 (from their current 21.1) to increase student success/retention.

Ideal Target and Rationale: FTES/FTEF rates should be lowered (if possible based on division resources) to determine optimal FTES/FTEF ratios for student success.

What steps were taken to analyze the data?: Success and retention data, along with FTES/FTEF data was analyzed by division faculty and the Natural Sciences division dean.

Key/Responsible Personnel (WHO analyzed the data?): Division faculty and the Natural Sciences division dean.

Supporting Attachments:

FTES/FTEF and student success and retention geography 1 (Microsoft Excel) (See appendix)

Findings for FTES/FTEF ratios are evaluated for effectiveness in Geosciences

Summary of Findings: Lower FTES/FTEF ratios lead to better success and retention.

Results: Acceptable Target Achievement: Not Met; Ideal Target Achievement : Approaching

Recommendations for Improvement: Return FTES/FTEF to lower values (aim for values at or below those of 2009-2010).

Reflections/Notes : Budget and scheduling constraints may limit the amount of improvement in this area.

Measure: FTES/FTEF ratios are evaluated for effectiveness in Physics

Description of Measure (WHAT data were used to measure the outcome?): FTES/FTEF ratios for all physics classes were obtained for the 2006-2007 through 2010-2011 academic years and compared to student success and retention rations for the same years.

Acceptable Target and Rationale: Over those 5 years, the FTES/FTEF ratio has risen slightly while success and retention rates have decreased slightly. We should keep the FTES/FTEF ratio at its current value of 16.8 to help us meet our goals of student success and retention.

Ideal Target and Rationale: FTES/FTEF rates should be lowered (if possible based on division resources) to determine optimal FTES/FTEF ratios for student success.

What steps were taken to analyze the data?: Success and retention data, along with

FTES/FTEF data was analyzed by division faculty and the Natural Sciences division dean.

Key/Responsible Personnel (WHO analyzed the data?): Division faculty and the Natural Sciences division dean.

Supporting Attachments:

physics_FTEperFTEF.xlsx (Excel Workbook (Open XML)) (See appendix)

Findings for FTES/FTEF ratios are evaluated for effectiveness in Physics

No Findings Added

Category 2: Faculty Development and Curriculum

Component A. Faculty Development

Outcome 1

Full-Time Faculty assess need for and are given opportunity to pursue necessary professional development and growth

Measure: Full-Time Faculty assess need for and are given opportunity to pursue necessary professional develop

Description of Measure (WHAT data were used to measure the outcome?): The number of faculty attending professional development conferences (as well as the number of conferences) was tracked from 2008-2009 through 2010-2011 and compared to student success and retention over the same time period.

Acceptable Target and Rationale: Acceptable targets for professional development (conference attendance) depend on the frequency of upcoming conferences and the desire of faculty to attend. In the near term, the inability of faculty to pursue desired professional development (i.e conference attendance) should be tracked.

Ideal Target and Rationale: Ideally, there should be no impediments to faculty development with 100% of faculty requesting conference attendance being able to attend. This situation is primarily dependent on proper funding levels.

What steps were taken to analyze the data?: Professional development, as represented by conference attendance, was tracked from 2008-2009 to 2010-2011. The number of conferences and attendees over that time period was compared to student success and retention over the same period.

Key/Responsible Personnel (WHO analyzed the data?): Division faculty and the Natural Sciences division dean.

Supporting Attachments:

Professional Development Natural Sciences (Microsoft Excel) (See appendix)

Findings for Full-Time Faculty assess need for and are given opportunity to pursue necessary professional develop

Summary of Findings: Professional development of faculty, as measured by attendance at professional development conferences, is low compared to the number of faculty in the division. This is at least in part due to a lack of funding for professional development (conference registration, travel etc.).

Results: Acceptable Target Achievement: Met; Ideal Target Achievement : Moving Away

Recommendations for Improvement: Faculty should be encouraged to regularly attend conferences in their area of study, as well as those dedicated to effective pedagogy. Fully funding all professional development travel requests would most likely lead to greater professional development among faculty members.

Reflections/Notes : While faculty development cannot be made compulsory, budgetary insufficiency certainly impacts those faculty who would like to attend conferences but cannot without support from the division.

Component B. Curriculum Management

Outcome 2

Curricula is properly articulated with CSU and UC systems

Measure: There exists a proper articulation of courses between Nat Sci Div and UC/CSU

Description of Measure (WHAT data were used to measure the outcome?): The presence of articulation agreements between Pasadena City College and UC/CSU for courses in the Natural Sciences Division was determined.

Acceptable Target and Rationale: With the exception of special interest/personal growth courses, all routinely offered baccalaureate level courses within the Natural Sciences should currently articulate with a course(s) at UC/CSU.

Ideal Target and Rationale: With the exception of special interest/personal growth courses, all baccalaureate level courses within the Natural Sciences should currently articulate with a course(s) at UC/CSU.

What steps were taken to analyze the data?: Assist.org was queried to determine current articulation agreements.

Key/Responsible Personnel (WHO analyzed the data?): Division faculty and The Natural Sciences division dean.

Supporting Attachments:

- CSU Transfer Eligible Courses Nat Sci Div.pdf (Adobe Acrobat Document) (See appendix)
- UC Transfer Eligible Courses Nat Sci Div.pdf (Adobe Acrobat Document) (See appendix)

Findings for There exists a proper articulation of courses between Nat Sci Div and UC/CSU

Summary of Findings: Proper articulation agreements exist between Pasadena City College and UC/CSU for courses in the Natural Sciences. Courses are reviewed for C-ID compatibility on an obgoing basis as we work closely with the college's articulation office.

Results: Acceptable Target Achievement: Met; Ideal Target Achievement : Approaching

Recommendations for Improvement: None

Reflections/Notes : Currently, all regularly scheduled courses within the Natural Sciences articulate with a course(s) at CSU/UC. Courses should be regularly reviewed so as to remain in articulation with their corresponding UC/CSU courses.

Substantiating Evidence:

- NATURAL SCIENCES-AST-CID[1].docx (Word Document (Open XML)) (See appendix)

Success and retention data for distance education courses are compared to the face-to-face courses.

No measures specified

Program curriculum is aligned with appropriate external agencies, regulations, and/or professional organizations

No measures specified

Curricula are properly articulated with K-12 and/or CSU and UC systems	*No measures specified*
All Course Outlines of Record are reviewed and, if necessary, updated once every two years	*No measures specified*

Category 3: Institutional Support

Component A. Budget

Outcome 1
Effective Allocation of the Division's Resources to Meet the Requirements of the Program

Measure: Budgetary support is adequate for accomplishing the mission of the Natural Sciences Division.

Description of Measure (WHAT data were used to measure the outcome?): Supply, equipment and student worker need levels that are currently necessary to the completion of the mission statement of the Natural Sciences division were identified.

Acceptable Target and Rationale: Budgetary support must exist to purchase/repair/replace all equipment and fund all student worker positions needed to achieve EMP Goal of increasing STEM Degrees. Science education is both equipment and supply intensive and therefore expensive. Yet with nearly 14,000 students served per year, we are allocated less than $10 per student (see attached budget summary) for supplies, student travel, equipment purchase / repair/ replacement. If we are to achieve EMP goals of increasing STEM Degrees, we must have an adequate budget to repair equipment, replace outdated equipment and purchase the new equipment required for curricular innovation. In addition, faculty must have professional development opportunities to learn to use new equipment, understand modern pedagogies and apply both to a modernized curriculum.

Ideal Target and Rationale: Budgetary support must exist to purchase/repair/replace all equipment and fund all student worker positions needed to advance the educational priorities within the division. Ideally, and in order for continued growth to occur, additional budgetary support must be provided to contribute to student success in a changing scientific and academic environment so as to provide students with a contemporary education. For example, field work is a demonstrated success strategy for retention of students in STEM. A 3-day field trip for 30 students runs at least $1,000 for transportation alone (3 vans @ $100/day*3 days plus fuel). With an entire Student Travel budget of $12,700 this means the Division is budgeted for one field trip a month. In comparison, the Student travel budget for athletics is $ 93,000... As another example, the Division has over 600 Microscopes which must be cleaned, adjusted, aligned and repaired by an outside vendor on a regular basis. Last time we had this done it cost about $ 2,600 for 60 scopes for Life Sciences alone - using about 150% of the annual equipment repair budget. This is only 10% of our microscopes which ideally should be serviced annually. Ideally (and as directed by the EMP) the Natural Sciences AA degree program should grow and this will require increased budgetary support.

What steps were taken to analyze the data?: Equipment and student worker needs were determined by surveying faculty in all disciplines.

Key/Responsible Personnel (WHO analyzed the data?): Division faculty and the Natural Sciences division Dean.

Supporting Attachments:

Critial Equipment requests (Adobe Acrobat Document) (See appendix)

PDF of equipment Needs by Division / discipine created in response to addition of Prop 30 Funds

NAt Sci AA Degree Budget Allocations (Excel Workbook (Open XML)) (See appendix)

Spreadsheet of Instructional Equipment Needs (Excel Workbook (Open XML)) (See appendix)

Spreadsheet of instructional equipment needs across divisions / disciplines showing the details of equipment needed.

Student Worker Refunding (Excel Workbook (Open XML)) (See appendix)

Spreadsheet showing needs to refund hourly worker budgets created for restoration of prop 30 funds

Findings for Budgetary support is adequate for accomplishing the mission of the Natural Sciences Division.

Summary of Findings: We are woefully underfunded... for example, we assimilated 8 full time faculty from Kinesiology as well as several dozen adjunct faculty - primarily assistant coaches, and were not given additional clerical support in the division office in spite of requests. We have asked for funds for equipment for the past year and half and have received zero allocations (see attached spread sheet of "critical" equipment needs arccoss the divisions.) This has let to a funding deficit for Natural Sciences and Kinesiology of approximately $320,000.

Results: Acceptable Target Achievement: Not Met; Ideal Target Achievement : Moving Away

Recommendations for Improvement: Without new equipment money (which hasn't been available for the past three years) we are currently not meeting acceptable targets for funding the Natural Sciences AA degree program. Fund Divisions adequately with support staff, personnel, supply and equipment money to do the job properly. Furthermore, place positions in the budget properly. For example, athletic trainers are in the kinesiology cost center and should be in the athletics cost center.

Reflections/Notes : Our budget is insufficient to maintain and support the equipment, supplies, field trips and student assistants which directly impacts students in the classroom and the quality of their education. Clearly then, current budget levels are inadequate for additional growth to occur. Budgetary support must exist to achieve EMP Goal of increasing STEM Degrees. Science education is both equipment and supply intensive. With nearly 14,000 students served per year, we are allocated less than $10 per student for supplies, student travel, equipment purchase / repair/ replacement. If we are to achieve EMP goals of increasing STEM Degrees, we must have an adequate budget to repair equipment, replace outdated equipment and purchase the new equipment required for curricular innovation. In addition, faculty must have professional development opportunities to learn to use new equipment, understand modern pedagogies and apply both to a modernized curriculum. Without new equipment money, which hasn't been available for the past three years, we are currently not meeting acceptable targets for funding the Natural Sciences AA degree program. In order for growth and student success to occur in a rapidly changing scientific and academic environment, additional budgetary support must be provided.

Substantiating Evidence:

Instructional Equip Needs F12-V3.xlsx (Excel Workbook (Open XML)) (See appendix)

Number of full-time and part-time faculty and staff meets program needs	*No measures specified*
College resources are effectively allocated to meet program needs (equipment, technology, supplies, etc.)	*No measures specified*
Full-time and part-time staff pursue necessary	*No measures specified*

professional development and growth

Component B. Space Allocation

Outcome 1
Available space is appropriately used and allocated

Measure: Available space is appropriately allocated and used

Description of Measure (WHAT data were used to measure the outcome?): The availability of lab and lecture space, student learning space, office space for full time and adjunct faculty, and equipment storage space commensurate with the needs of the division and the number of class sections offered was analyzed to determine if available space was appropriately utilized.

Acceptable Target and Rationale: An acceptable target would be available lab and lecture space being adequate to meet the goals and needs of the program as well as the availability of student learning space, office space for full time and adjunct faculty, and equipment storage space commensurate with the needs of the division and the number of class sections offered.

Ideal Target and Rationale: Space within the division would allow for the growth required to meet the EMP - Student Success and Achievement Area goals. Storage space would be adequate to support supply items and field equipment. Currently these are still being stored in the "U" building. Previously there were plans to create additional storage in close proximity to Science Village but those have not come to fruition. Shared faculty office space in Science Village has advantages, however it lacks shared space available for faculty to hold private conversations with students or each other. Ideally, additional space can be allocated for supply and field equipment storage as well as the identification of some faculty and student conference areas. Although less desirable, some classes can be offered on weekends when the labs are less utilized.

What steps were taken to analyze the data?: Faculty and classified staff were queried as to needs for lecture/laboratory/storage and office space. Room schedules are routinely analyzed for underutilized space by the Division Secretary, scheduling coordinators and the Division Dean. This information was ruminated on primarily by the Division Dean.

Key/Responsible Personnel (WHO analyzed the data?): Division faculty and the Natural Sciences division Dean.

Supporting Attachments:

Room Schedules (Excel Workbook (Open XML)) (See appendix)

Room Schedules for Natural Sciences Division Courses.

Findings for Available space is appropriately allocated and used

Summary of Findings: P,R,E,GM,SV... Basically classrooms spread out across the four corners of the campus. How does one build an integrated program with folks spread across the campus. In addition, we are nearly fully maximized in science village. We cannot meet future demand for chemistry without adequate facilities and space for growth. Attached are spring room schedules for most of the classrooms in Science Village. You will notice that room utilization is high, however laboratory classes cannot be blocked completely back-to-back because of lab set-up and tear down time.

Results: Acceptable Target Achievement: Met; Ideal Target Achievement : Moving Away

Recommendations for Improvement: Replace the U building as planned with a modern science building which includes room for expanding high demand STEM programs which lead to high paying jobs.

Reflections/Notes : Division space allocation is barely adequate to meet the goals and objectives of the program. Most space is fully utilized (see attached sample of room use - Spring 2013) except at times less-desired by students such as late afternoons, Friday afternoons and weekends. In addition, Division courses are offered in 45 different labs and classrooms located in 4 widely separated buildings across campus (SV, E, R, P).

Space within the division does not allow for the growth required to meet the EMP - Student Success and Achievement Area goals. Storage space is inadequate as many supply items and field are still being stored in the "U" building. Plans to create additional storage in close proximity

to Science Village have not come to fruition. Shared faculty office space in Science Village has advantages, however it lacks shared space available for faculty to hold private conversations with students or each other. Ideally, additional space can be allocated for supply and field equipment storage as well as the identification of some faculty and student conference areas. Although less desirable, some classes are being offered on weekends when the labs are less utilized.

Substantiating Evidence:

SV Room SchedulesSp13.xlsx (Excel Workbook (Open XML)) (See appendix)

The space needs of the program are met	*No measures specified*

Overall Recommendations for Improvement

The Associate of Arts Degree in Natural Sciences encompasses a broad range of disciplines and it is therefore very difficulty to fit into a rigid program review format such as this. The real question is how well are we serving our general students population. A better way to think of this is to divide our programs into STEM major programs (e.g. Chemistry Majors, Biology Majors etc...) vs. non-major (general education) programs. The courses discussed here by and large fall into that latter category.

Lessons learned: We have known for a long time about the achievement gap in the sciences... that is black and hispanic students generally complete science classes at a 15 to 20 % lower rate than their white and Asian counterparts. As a result, we have embarked on a 5 year mission to close the achievement gap and the completion gap in the sciences with the help of our HSI STEM Grant funding. Our focus initially is on STEM major courses, however some of the effort has been directed towards non-major and preparatory classes such as Biol 11 and Chem 22. Bright spots include the Chem Boost program, which shortens the sequence of classes in chemistry thereby increasing rates of completion. More relevant to this review is the redesign of Biology 11 into a hybrid-format project based learning. As part of this course, students work on an extended, forensic science project which contextualized general biology in an interesting and engaging way (how could students not love a project which includes DNA analysis of blood-stained panties...). We are still crunching the numbers but after two good semesters we are clearly completing more students, closing the achievement gap and making general biology a whole lot more fun.

Clearly there is more work to be done in Physics. With half the full time faculty over 70, the double edged-sword of tradition has a great impact on renewal and innovation. That being said, some senior faculty are working hard to modernize their online offerings in Physics 10. There is still much work to be done in regards to modernizing and contextualizing the curriculum.

Program Responsiveness

Although it is difficult to demonstrate in the context of this program review, the Natural Sciences Division constantly uses data to drive decision making and change. This has led us to initiate many special programs such as Supplemental Instruction, Chem Boost, Study Jams, and curricular redesign which have led to Centers of Excellence within the Natural Sciences Division. Courses are offered in traditional formats for students who learn best with this approach as well as in a variety of innovative formats that seek to reach students who may learn best in alternative learning environments. Although this program review focused more on nonmajor courses, students in our major's courses excel and a large number successfully transfer to the very best universities, colleges and professional schools in the country. We need to continue finding ways to track the success of all our students. Because the scope of this particular "program" is so broad, covering many different disciplines, it is difficult to focus on specific changes as a result of this program review exercise. A better approach might be to do program review by discipline)i.e. Biology, Chemistry etc...), and require each discipline to specifically address all degrees and/or certificate programs they serve.

Data Sets and Reference Materials

File Attachments:

1. **Demographics - Major - Kinesiology and Wellness.xls** (See appendix)
2. **Demographics - Natural Science.xls** (See appendix)
3. **Divisional Program Review Data** (See appendix)
   Includes Enrollment, Conference and Degree data
4. **SREF - Major - Kinesiology and Wellness.xls** (See appendix)
5. **SREF - Major - Natural Sciences.xls** (See appendix)
6. **Success by Demog - Major - Kinesiology and Wellness.xls** (See appendix)
7. **Success by Demog - Natural Sciences.xls** (See appendix)

Appendix

A. **Biological Sciences** (Curriculum Map)
B. **Chemistry** (Curriculum Map)
C. **Geosciences** (Curriculum Map)
D. **Physics** (Curriculum Map)
E. **Demographics - Major - Natural Sciences.xls** (Microsoft Excel)
F. **Program Review Handbook-1st Run.pdf** (Adobe Acrobat Document)
G. **SREF - Major - Natural Sciences.xls** (Microsoft Excel)
H. **Success by Demog - Major - Natural Sciences.xls** (Microsoft Excel)
I. **UC Transfer Eligible Courses Nat Sci Div.pdf** (Adobe Acrobat Document)
J. **Student success and retention chemistry.xlsx** (Excel Workbook (Open XML))
K. **Student success and retention geography 1** (Microsoft Excel)
L. **CSU Transfer Eligible Courses Nat Sci Div.pdf** (Adobe Acrobat Document)
M. **Degrees by Major** (Microsoft Excel)
N. **FTES per FTEF chemistry.xlsx** (Excel Workbook (Open XML))
O. **FTES/FTEF and student success and retention geography 1** (Microsoft Excel)
P. **FTES_per_FTEF_biology.xlsx** (Excel Workbook (Open XML))
Q. **Geography 1 SLO Assessment Results** (Microsoft Excel)
R. **Geography 1 SLO Assessment Rubric** (Microsoft Word)
S. **Missing_PSLO** (Adobe Acrobat Document)
T. **NAt Sci AA Degree Budget Allocations** (Excel Workbook (Open XML))
U. **Natural Sciences Assessment Report** (Adobe Acrobat Document)
V. **NaturalSciences_CSLO_eLumendata_2008_2013** (Adobe Acrobat Document)
W. **No Annual Assessment Report submitted** (Adobe Acrobat Document)

X. **No Annual Assessment Report submitted** (Adobe Acrobat Document)
Y. **physics_FTEperFTEF.xlsx** (Excel Workbook (Open XML))
Z. **physics_success_retention.xlsx** (Excel Workbook (Open XML))
AA. **Professional Development Natural Sciences** (Microsoft Excel)
AB. **Student_success_and_retention_biology_11.xlsx** (Excel Workbook (Open XML))
AC. **Success Rates by ethnic group chemistry.xls** (Microsoft Excel)
AD. **Success_Rates_by_ethnic_group_biology_11.xls** (Microsoft Excel)
AE. **success_rates_by_ethnic_group_physics.xlsx** (Excel Workbook (Open XML))
AF. **Success_rates_by_ethnic_groups_geography_1.xls** (Microsoft Excel)
AG. **SLO Achievement by Course NS** (Adobe Acrobat Document)
AH. **STEM Degrees Awarded** (Adobe Acrobat Document)
AI. **STEM AWARDS Spreadsheet** (Excel Workbook (Open XML))
AJ. **Critial Equipment requests** (Adobe Acrobat Document)
AK. **Room Schedules** (Excel Workbook (Open XML))
AL. **Spreadsheet of Instructional Equipment Needs** (Excel Workbook (Open XML))
AM. **Student Worker Refunding** (Excel Workbook (Open XML))
AN. **AACU STEM CONF.pdf** (Adobe Acrobat Document)
AO. **ABS copy.pdf** (Adobe Acrobat Document)
AP. **Instructional Equip Needs F12-V3.xlsx** (Excel Workbook (Open XML))
AQ. **NATURAL SCIENCES-AST-CID[1].docx** (Word Document (Open XML))
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AV. **Success by Demog - Natural Sciences.xls** (Microsoft Excel)
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BC. **FTES_per_FTEF_biology.xlsx** (Excel Workbook (Open XML))
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BE. **Geography 1 SLO Assessment Rubric** (Microsoft Word)
BF. **NAt Sci AA Degree Budget Allocations** (Excel Workbook (Open XML))
BG. **Natural Sciences Assessment Report** (Adobe Acrobat Document)
BH. **physics_FTEperFTEF.xlsx** (Excel Workbook (Open XML))
BI. **physics_success_retention.xlsx** (Excel Workbook (Open XML))
BJ. **Professional Development Natural Sciences** (Microsoft Excel)
BK. **SLO Achievement by Course NS** (Adobe Acrobat Document)
BL. **Student success and retention chemistry.xlsx** (Excel Workbook (Open XML))
BM. **Student success and retention geography 1** (Microsoft Excel)
BN. **student success and retention geography 1** (Microsoft Excel)
BO. **Student_success_and_retention_biology_11.xlsx** (Excel Workbook (Open XML))
BP. **Success Rates by ethnic group chemistry.xls** (Microsoft Excel)
BQ. **Success rates by ethnic groups geography 1** (Microsoft Excel)
BR. **Success_Rates_by_ethnic_group_biology_11.xls** (Microsoft Excel)
BS. **success_rates_by_ethnic_group_physics.xlsx** (Excel Workbook (Open XML))
BT. **UC Transfer Eligible Courses Nat Sci Div.pdf** (Adobe Acrobat Document)

BU. **STEM Degrees Awarded** (Adobe Acrobat Document)
BV. **STEM AWARDS Spreadsheet** (Excel Workbook (Open XML))
BW. **Critial Equipment requests** (Adobe Acrobat Document)
BX. **Room Schedules** (Excel Workbook (Open XML))
BY. **Spreadsheet of Instructional Equipment Needs** (Excel Workbook (Open XML))
BZ. **Student Worker Refunding** (Excel Workbook (Open XML))