Barstow Community College

INSTRUCTIONAL PROGRAM REVIEW

(Refer to the Program Review Handbook when completing this form)

PROGRAM:	Natural Science and Mathematics A.S.			
Academic Year:	2012–13	FULL PROGRAM REVIEW	**Date Submitted:**	Nov 2, 2012
Academic Year:	2013–14	ANNUAL UPDATE	**Date Submitted:**	Oct 2, 2013
Academic Year:	2014–15	ANNUAL UPDATE	**Date Submitted:**	Oct 6, 2014

By:

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1. Program Mission and Vision

A. Program Mission

PROGRAM REVIEW RESPONSE from OCTOBER 2012.

Natural Science and Math examines the physical universe, its life forms, and its natural phenomena. The program helps the student develop an appreciation and understanding of the scientific method and helps the student apply logical, quantitative, and qualitative reasoning in solving problems and analyzing arguments in both the natural sciences and mathematics.

B. Program Vision *(Where would you like the Program to be three years from now?)*

PROGRAM REVIEW RESPONSE from OCTOBER 2012.

Natural Science and Math's vision is to achieve and maintain excellence in student learning and success.

C. Describe how mission and vision align with and contribute to the College's Mission and Vision

PROGRAM REVIEW RESPONSE from OCTOBER 2012.

A. "Fostering an innovative learning environment that respects the diversity of individual backgrounds, abilities, and cultures." All of the departments in Math and Natural Sciences offer an extensive course curriculum, each of which is unique in its treatment of diverse topics. In the natural sciences, a majority of courses have a laboratory component which gives the instructor a unique opportunity to really get to know and work with their students on a one-to-one basis. The laboratory environment promotes teamwork, student-student, and student-instructor interactions. With a variety of learning methodologies and teaching strategies, it is possible for students to choose a learning style that most closely matches theirs. In some courses, a "Learning Styles Inventory," is administered at the beginning of each semester. This helps students understand what their learning style is and what it means to them in different classroom situations. Many of our students have difficulty with their initial math and science courses; and Barstow Community College has a viable and productive tutoring center for students in need of additional help beyond the classroom.
B. "Offering programs to prepare student in basic skills, career and technical education, lifelong learning opportunities, and comprehensive lower division courses that meet articulation agreements for student transfer to four-year colleges and universities." The following courses meet the associate degree requirements for CSU transfer and for IGETC requirements (BIOL 11 and MATH 1 are not on the IGETC list of classes).
Physical Science: ASTR 1, ASTR 1L, CHEM 1, CHEM 2A, CHEM 2B, GEOL 1, GEOL 1L, GEOL 2, GEOL 3, GEOL 5, OCEA 1, PHSC 1, and PHSC 2
Life Science: BIOL 1, BIOL 2, BIOL 4, BIOL 5, BIOL 8, BIOL 10, BIOL 10L, and BIOL 11
Mathematics: MATH 1, MATH 2, MATH 3, MATH 4A, MATH 4B, MATH 4C, and MATH 5
These courses have been designed and articulate for Natural Science/Math majors transferring to four-year colleges and universities. The goals of all these courses are to provide the necessary background and tools for students to achieve the institutional or general education goals of Barstow Community College. The over-arching institutional goals for BCC are: communication, critical thinking, professional development, and global awareness. All of us in the natural sciences and mathematics areas strive to prepare our students for upper division work at their transfer institution.
The contributing departments of the Natural Science/Math degree contribute to the Barstow Community College Educational Master Plan (2011) in the following ways:
A. To anticipate courses, programs, and services of the College.
There are four courses that are in preparation that add a needed emphasis on the curriculum as a whole. Biochemistry and Astronomy 2 are being developed to meet student need and demand. The Math Department is adding Developmental Math and Quantitative Reasoning. Allied Health requirements are fluid at best and the departments are responding to those changing requirements.

B. To project the delivery of a balanced curriculum, providing transfer, career/technical, and basic skill education.
See the answer to A above.
C. To provide analysis of current program of instruction
See the answer to A above. it is also mandated that each department review its curriculum and pre-requisites on a minimum 6 year plan. The Biology Department is set to review its pre-requisites during the Spring and Fall 2013 semesters.

Math & Natural Sciences A.S Program Outcomes

DATE:	October 2, 2013
ANNUAL UPDATE #1:	The Natural Science and Mathematics Program mission and vision were unchanged as they continue to serve the needs of our students. Astronomy 2 has been approved by the Chancellor's Office and will be offered Spring 2014. Biochemistry remains under development. Biology faculty are reviewing pre-requisites and will complete the process by the end of the Fall 2013 semester.
DATE:	October 6, 2014
ANNUAL UPDATE #2:	Our mission and vision remain strong statements of our commitment to serve the needs of our students. As a program, we remain dedicated to expanding our courses to serve the needs of our students. Biochemistry has been developed and is tentatively scheduled for Spring 2015. The pre-requisites of biology courses have been reviewed and are in line with other colleges' course offerings.

2. Program Description and Overview

Assume the reader does not know anything about the Program. Describe the Program, including—but not limited to—the following:

A. Organization, including staffing and structure
B. Who do you service (including Demographics)?
C. What kind of services does your program provide?
D. How do you provide them?

PROGRAM REVIEW RESPONSE from OCTOBER 2012.

The Natural Science/Math Program includes the natural and physical sciences as well as mathematics.

- There are two full-time Biology instructors, one full-time Chemistry instructor, one full-time Earth Science and Astronomy instructor, and two full-time mathematics instructors.
- There are approximately 12 adjunct instructors, most of which are in math.
- The program provides the basic requirements for allied health programs, especially nursing.
- It also provides for transfer courses to complete a bachelor's degree at four-year colleges and universities.
- The program also provides classes for those who are interested in continuing their education but may not be pursuing a degree.
- Natural Science and Mathematics provides both day and night classes in all the disciplines.
- In the sciences most of the classes are traditional format with a few online deliveries (i.e. Astronomy, Intro. to Biology, and Environmental Biology).
- There are hybrid math classes as well as online and traditional.
- Early morning classes are available in the natural sciences and in math.

DATE:	October 2, 2013
ANNUAL UPDATE #1:	There were no changes to the program description or overview.
DATE:	October 6, 2014
ANNUAL UPDATE #2:	There were changes to the program overview. We now have 3 full time math instructors, which better meets the needs of our students. We have increased the number of adjuncts in biology and chemistry and have maintained many of our mathematics adjuncts.

3. Program Data

A. PERFORMANCE DATA

Discuss the program's performance on the specific data items listed below:

1) Full-time/Part-Time Faculty Ratio

PROGRAM REVIEW RESPONSE from OCTOBER 2012.

Course Completion Rate

	Fall 2011	Spring 2012
Astr 1	73.0	71.5
Geol 1	64.0	91.0
Bio 1	82.0	NA
Bio 2	76.3	88.0
Bio 4	79.0	94.0
Bio 5	74.0	81.0
Bio 8	NA	89.0
Bio 10	74.0	NA
Bio10L	57.0	NA
Bio 10 DE	76.0	NA
Chem 1	41.5	45.5
Math 50	76.3	67.0
Math 55	64.3	75.8
Math 101	66.0	81.0
Math 1	NA	89.0
Math 2	48.0	35.0
Math 3	91.0	90.3
Math 4A	NA	NA
Math 4B	NA	83.0
Math 4C	83.0	NA
Math 5	NA	NA
Phys. Sci.	71.0	70.0

Course Success and Retention

	Fall 2011	Fall 2011	Spring 2012	Spring 2012

	Retention	Success	Retention	Success
Biology	93.0	95.2	94.0	91.7
Chemistry	69.0	75.0	60.5	67.0
Phys. Sciences	85.0	95.5	85.0	95.0
Math	88.0	80.4	87.0	89.8

Full Time/Part Time Faculty Ratio

	Fall 2011	Spring 2012
Biology	2:1	2:2
Chemistry	1:0	1:0
Phys. Sciences	1:1	1:2
Math	2:6	2:11

WSCH/FTEF ratio

	Fall 2011	Spring 2012
Astr 1	113/3.75	81/5.40
Geol 1	126/4.20	90/3.00
Biol 2	195/4.33	177/5.90
Biol 4	297/9.90	297/9.90
Biol 5	161/5.37	175/5.83
Biol 8	NA	225/7.50
Biol 10	84.10/2.80	NA
Biol 10L	58/1.93	NA
Biol 10 DE	135/4.50	NA
Chemistry	87/2.90	88/2.60
Math 101	129/4.30	78/2.60
Math 50	157/5.24	142/4.74
Math 55	129/4.29	153/5.10
Math 2	104/3.47	60/2.00
Math 3	147/4.90	111/3.70
Math 4A	45/1.50	NA
Math 4B	NA	25/0.83
Math 4C	25/0.83	NA
Phys. Sci.	75/2.50	69/2.30

The above data is most likely flawed (FTES and FTE); there is a drastic drop in the data from both CampusData and the Chancellor's office data. Hopefully, this can be corrected within the next few months.

Fill rate

	Fall 2011	Spring 2012
Astr 1	84.3	74.1
Biol1	102.0	110.0
Bio 10	50.0	100.0
Bio 10L	103.0	NA
Bio 10 DE	94.0	NA
Biol 2	69.8	102.0
Biol 4	78.1	103.0
Biol 5	81.3	84.4

Biol 8	NA	78.1
Chem 1	65.6	64.1
Geol 1	81.3	NA
Geol 4	NA	96.9
Math 101	85.8	65.3
Math 50	100.0	78.8
Math 55	97.5	85.8
Math 2	78.0	58.0
Math 3	128.0	90.2
Math 4A	27.5	NA
Math 4B	NA	25.0
Math 4C	300.0	NA
Phy. Sci.	84.4	90.6

2) Course Completion Rate

	TRADITIONAL	ONLINE
a) Full-time:	See above	See above
b) Part-time:	See above	See above

3) Course Success/Retention Rate

	TRADITIONAL	ONLINE
a) Full-time:	See above	See above
b) Part-time:	See above	See above

4) WSCH/FTEF Ratio

	TRADITIONAL	ONLINE
a) Full-time:	See above	See above
b) Part-time:	See above	See above

5) Fill Rate

	TRADITIONAL	ONLINE
a) Full-time:	See above	See above
b) Part-time:	See above	See above

Discussion:

DATE: October 2, 2013

ANNUAL UPDATE #1:

Full-Time/Part-Time Faculty Ratio

	Full-Time	Part-Time
Fall 2012	7	10
Spring 2013	8	16
Summer 2013	5	5
Total for All Terms	**9**	**20**

A more detailed break-down of faculty ratio is attached.

Course Completion Rate

	Traditional	Online
Full-Time	879	605
Part-Time	533	940

A more detailed break-down of course completion rates is attached.

Course Success/Retention Rate

	Traditional	Online
Full-Time	77.3	65.8
Part-Time	70.4	67.1

A more detailed break-down of course success and retention rates is attached.

WSCH/FTEF Ratio

Data not available at this time.

Fill Rate: as reported as EOT/MAX

	Traditional	Online
Full-Time	71.91%	55.75%
Part-Time	62.7%	71.3%

A more detailed break-down of fill rates, including 1st Day/Max, Census/Max, and EOT/MAX, is attached.

DATE: October 6, 2014

ANNUAL UPDATE #2:

Full-Time/Part Time Faculty Ratio
Biology: 2:3
Chemistry: 1:1
Mathematics: 3:10
Physical Science: 1:1

Course Completion Rate

	2013-2014
Astr 1	.85
Astr 1L	.97
Geol 3	.88
Geol 4	.78
Bio 1	.81
Bio 2	.92
Bio 4	.89
Bio 5	.89
Bio 8	1.00
Bio 10	.95
Bio10L	.96
Chem 1	.78
Math 50	.88
Math 55	.91
Math 101	.89
Math 1	.96
Math 2	.79
Math 3	.87
Math 4A	1.00
Math 4B	.67
Math 4C	1.00
Math 5	NA
OCEA 1	.96
Phys. Sci.	.85

Course Success Rate

	2013-2014
Astr 1	.69
Astr 1L	.95
Geol 3	.88
Geol 4	.68
Bio 1	.81
Bio 2	.72
Bio 4	.76
Bio 5	.82
Bio 8	.9
Bio 10	.79
Bio10L	.88
Chem 1	.57
Math 50	.64
Math 55	.74
Math 101	.67
Math 1	.93
Math 2	.55
Math 3	.7
Math 4A	.9
Math 4B	.33
Math 4C	1.00
Math 5	NA
OCEA 1	.93

Phys. Sci.	.65

WSCH/FTEF ratio

	2013-2014
Astr 1	566.7
Geol 3	275.7
Geol 4	307.5
Biol 2	374.0
Biol 4	525
Biol 5	520.6
Biol 8	483.3
Biol 10	284.7
Biol 10L	458.8
Chemistry	462.7
Math 101	368.7
Math 50	466.6
Math 55	571.1
Math 2	581.4
Math 3	473.1
Math 4A	144.1
Math 4B	46
Math 4C	146
Phys. Sci.	390

Fill Rate

	2013-2014
Astr 1	.925
Astr 1L	.95
Biol1	.79
Bio 10	.6
Bio 10L	.87
Biol 2	.83
Biol 4	1.0
Biol 5	.96
Biol 8	1.2
Chem 1	.9
Geol 3	.57
Geol 4	.68
Math 101	.8
Math 50	.78
Math 55	.97
Math 2	.82
Math 3	.81
Math 4A	.25
Math 4B	.13
Math 4C	.1
Phy. Sci.	.87

B. Progress on Program Level Outcomes (PLOs) and Student Learning Outcomes

1) Summarize the progress your program has made on program and/or course level SLO measures. *(Include **Outcome Statements** in this summary.)*

PROGRAM REVIEW RESPONSE from OCTOBER 2012.

Natural Science/Mathematics Program Outcomes:

Progress Summarized:

The Natural Science/Mathematics program has completed two cycles of the assessment process for Program Level Outcomes (PLO). All course level SLOs are assessed each semester for each class and a core group are analyzed by the Class Climate assessment each semester. That data is aggregated and program norms are being established.

2) Describe any program, course, and/or instructional changes made by your program as a result of the outcomes assessment process.

PROGRAM REVIEW RESPONSE from OCTOBER 2012.

The major change is a commitment to encourage the students to use the tutoring center and other student aids provided by the publisher to increase success in math and science. Many courses have additional website information for the student (i.e. Biol 2, Biol 4, Biol 5, Geol 1, Chem 1, and most all mathematics classes).

3) Reflecting on the responses for #1 and #2 above, what will you implement for the next assessment cycle?

PROGRAM REVIEW RESPONSE from OCTOBER 2012.
From #6.3 (What is your plan for completing and then continuing the assessment cycle?)

We have already completed two cycles of assessment. The plan is to continue and gather baseline type data. Significant changes were made in the assessment process after the first cycle. The data from the second cycle is being analyzed, but no significant changes are going to be made for this current cycle other than those mentioned in #2.

DATE: October 2, 2013

ANNUAL UPDATE #1: In 2012-2013, for each course taught in that academic year, all Natural Science and Math course outlines of record were updated to accurately list the SLOs to assist all faculty have consistent and uniform SLOs. All student learning outcomes were assessed for each course taught. In addition, program norms continue to be established and faculty are discussing ways in which to assess program learning outcomes. Faculty remain committed to encouraging students to use the tutoring center, publisher-provided study aids, and faculty office hours to increase student success in math and science.

DATE:	October 6, 2014
ANNUAL UPDATE #2:	With course outlines of record updated and SLOs routinely collected for each course taught, discussion continues on how to best assess program learning outcomes. Program norms have not been clearly defined as faculty continue to discuss how our program should be evaluated relative to other natural science and mathematics programs in California community colleges. As faculty, we remain committed to helping our students achieve success and encourage the use of the tutoring center, study aids developed by faculty and publishers, online learning platforms, and faculty office hours by our students.

C. Supporting Assessment Data *(See Handbook for additional information)*

1) Provide a list of any additional measures *(not included in 3.A.)* that you have chosen to gauge your program's effectiveness *(e.g.: transfers, degrees, certificates, satisfaction, student contacts, student headcount, Perkin's data, etc.).*

PROGRAM REVIEW RESPONSE from OCTOBER 2012.

The program also tracks the number of degrees in the Natural Sciences/Math program. We also did the Program Level Outcomes for Natural Science/Math.

2) Summarize the results of these measures.

PROGRAM REVIEW RESPONSE from OCTOBER 2012.

We had 26 degrees awarded in 2009, 39 in 2010, 34 in 2011, and so far in 2012 we have 22 and that, of course does not include the last semester counted in 2012.
We utilize a standard rubric for our PLOs that include 4 areas of concentration: conceptual understanding, strategies and processes, communication, and accuracy. These are in alignment with the mission and strategic plan. The overall results are based on 4 basic classes in the program (Bio 5, Chem 1, Geol 1, and Math 55). The scores were: CU (76%), PS (70%), C (70%) and A (74%).

3) What did you learn from your evaluation of these measures, and what improvements have you implemented, or do you *plan** to implement, as a result of your analysis of these measures? *(*List any resources required for planned implementation in #10: Resources.)*

PROGRAM REVIEW RESPONSE from OCTOBER 2012.

Providing students with the tools to be successful is the major outcome for degrees and certificates. In the PLO program analysis we also checked a number of other factors: 80% of the students did read the text and reviewed lecture notes/slides regularly; 70% studied in a study group; only 50% attended any tutoring sessions; most got help from a classmate or friend (78%); and the factor that contributed to most problems was work (72%).
The instructors are encouraging the use of faculty office hours, the tutoring center, and the use of study groups. Time management skills looks to be a major factor in the successful student.

4) Include DCP Program Assessment Benchmarks, providing analysis of data on long term goals and objectives.

PROGRAM REVIEW RESPONSE from OCTOBER 2012.

Benchmark II relates both SLO and PLO data collection. All courses were analyzed for SLOs for the four major fields of study in Natural Science/Mathematics. There is no standard rubric used at the course level and each instructor assesses the SLOs independently of each other. For the PLOs, however, there

is a standard rubric that assesses Conceptual Understanding, Processes and Strategies, Communication, and Accuracy. Biol 5, Geol 1, Chem 1, and Math 55 are used for analysis in the PLOs; these are courses that students most often take in the degree program. Approximately 175 students were assessed each semester and only Math 55 and Chem 1 had multiple sections. Data was collected by the 6 full-time faculty and 2 part-time faculty for SLOs and only the full-time faculty for PLOs (only full-time faculty taught the assessed classes).

		Fall 2011	
	PLO #1	**PLO #2**	**PLO #3**
Biol 5	84	77	84
Chem 1	ND	ND	ND
Geol 1	68	68	86
Math 55	67	62	57

ND=not determined

		Spring 2012	
	PLO #1	**PLO #2**	**PLO #3**
Biol 5	82	67	79
Chem 1	ND	ND	76
Geol 1	Not taught	Not taught	Not taught
Math 55	88	73	84

All of the course level SLOs and the degree level PLOs tie directly to the four Core Competencies of the college: Communication, Critical Thinking, Personal Development, and Global Awareness.

DATE: October 2, 2013

ANNUAL UPDATE #1:

3.C.1: We continue to track the number of degrees awarded in Natural Science and Mathematics.

3.C.2: There were 28 degrees awarded in Natural Science and Mathematics in 2012-2013. The faculty member responsible for gathering and analyzing PLO data accepted a new position prior to the start of Fall 2013. The new faculty member has been unable to find the PLO data for 2012-2013. It is recommended that the Natural Science and Mathematics program faculty discuss as soon as possible and no later than by the end of the Fall 2013 how future PLO data will be gathered, analyzed, and stored. A system accessible by all area faculty is recommended.

3.C.4: To better assist students achieving success, faculty continue to assess PLOs and SLOs. In the upcoming year, part-time faculty will be asked to assess PLOs in their classes in addition to full-time faculty continuing to assess PLOs. Both full-time and part-time faculty assess SLOs.

DATE: October 6, 2014

ANNUAL UPDATE #2:

3.C.1. We continue to track the number of degrees awarded in Natural Science and Mathematics. With the hiring of the Dean of Institutional Research, the ability to track this data should be made easier.

3.C.2. There were 34 degrees awarded in Natural Science and Mathematics in 2013-2014. The Natural Science and Mathematics faculty need time to meet

during a Best Practices meeting this school year to review how PLO data will be gathered, analyzed, and stored. With the hiring of the Dean of Institutional Research, we hope to have guidance on what matrixes would be good benchmarks for success.

3.C.4: Faculty continue to assess PLOs and SLOs. Training for adjunct faculty in PLO assessment needs to be provided so that it is easier for them to collect and report this data. Full-time and adjunct faculty continue to assess SLOs.

D. Two-Year Scheduling Plan

1) What is the program's Two-Year Scheduling Plan? What changes, if any, have been made since the last Program Review?

PROGRAM REVIEW RESPONSE from OCTOBER 2012.

In Biology we have only two courses that are not taught every semester; Bio 10L is offered only in the Fall and Bio 8 is offered only in the Spring.

In Chemistry the CHEM 1 course is taught in the Fall and Spring every year.

The two year plans are filed in the Instruction Office. All departments filed a two-year plan in 2006-2007. Earth Sciences and Mathematics have offered courses in compliance with their two-year plan (no changes have been made in the plan).

2) How effective has the Two-Year Scheduling Plan been in meeting student needs and educational goals?

PROGRAM REVIEW RESPONSE from OCTOBER 2012.

NOTE: This question was not on the PROGRAM REVIEW from OCTOBER 2012.

Therefore, it was not answered in Oct 2012 full program review – see update Oct 2013

3) Reflecting on these results, what are the goals for the next assessment cycle?

PROGRAM REVIEW RESPONSE from OCTOBER 2012.

NOTE: This question was not on the PROGRAM REVIEW from OCTOBER 2012.

Therefore, it was not answered in Oct 2012 full program review – see update Oct 2013

DATE: October 2, 2013

ANNUAL UPDATE #1: Question 3.D.1 – No changes have been made to the two-year scheduling plan.

Question 3.D.2 – The scheduling plan has been effective in meeting student needs and educational goals. A measure of the effectiveness is the continued strong enrollment in natural science and mathematics courses. While there are fewer students who have declared a math/science major compared to previous years (477 in 2012-2013 compared to 496 2011-2012 and 566 in 2010-2011) this change may be more related to improving economic conditions or other external factors.

	Question 3.D.3 (Reflecting on these results, what are the goals for the next assessment cycle?) – The goals for the next assessment cycle include continuing to assess the needs of the students to best provide opportunities for success. Biology faculty have been asked to help pilot TracDat. The data gathered should help faculty better understand the dynamic needs of students, continuously gather assessment data, and better align program goals with institutional goals.
DATE:	October 6, 2014
ANNUAL UPDATE #2:	Question 3.D.1 – No changes have been made to the two-year scheduling plan. Question 3.D.2 – The scheduling plan has been effective in meeting student needs and educational goals. A measure of the effectiveness is the continued strong enrollment in natural science and mathematics courses. Question 3.D.3 (Reflecting on these results, what are the goals for the next assessment cycle?) – The goals for the next assessment cycle include continuing to assess the needs of the students to best provide opportunities for success. Biology faculty participated in piloting TracDat. As we continue to learn how to use TracDat, we will continue to gather and analyze data that better helps us understand the needs of our students, and better align our program goals with the institutional goals.

4. Curriculum

A. List any new courses or program changes since the last program review. Be sure to include any newly approved prerequisites or corequisites.

PROGRAM REVIEW RESPONSE from OCTOBER 2012.

ASTR:
ASTR 1, ASTR 1L
BIOL:
BIOL 1, BIOL 2, BIOL 4, BIOL 5, BIOL 8, BIOL 10, BIOL 10L, BIOL 11
CHEM:
CHEM 1, CHEM 2A, CHEM 2B
GEOL:
GEOL 1, GEOL 1L, GEOL 2, GEOL 3, GEOL 4, GEOL 5
MATH:
MATH 1, MATH 2, MATH 3, MATH 4A, MATH 4B, MATH 5, MATH 50, MATH 55, MATH 101
GEOG:
GEOG 50, GEOG 51, GEOG 52, GEOG 53
OCEA:
OCEA 1
PHSC:
PHSC 1

There are 34 courses available in the departments associated with the Natural Science and Mathematics degree. The number of classes for the actual degree depends on the emphasis of the student, whether it is

natural science or mathematics (for detailed description see the latest Barstow Community College online catalogue.

Natural Science
Due to the new Chancellor's Office requirement for Methods of Instruction, most of our courses are not in full compliance. We have added the SLOs to each COR and will also be doing a prerequisite review next year. The new Methods of Instruction have been completed for Bio 2, Bio 4, Bio 5, and Bio 8 which have been submitted to the Curriculum Committee for review. Chemistry and Earth Sciences have yet to complete the Methods of Instruction.

Mathematics
Due to the new Chancellor's Office requirement for Methods of Instruction, none of the math courses are in full compliance.

1. Prerequisites: Biology (4; 50%) Chemistry (3; 100%), Mathematics (10; 91%) Astronomy (1; 100%), Geology (0; 0%), Geography (0; 0%), Physical Science (0; 0%)
2. Co-requisites: Biology (0), Chemistry (0), Mathematics (0), Astronomy (0), Geology (0), Geography (0), Physical Science (0)
3. Advisory: Not applicable

For the total number of courses required by the degree and the options, please see the latest online catalogue.

B. Explain the current evaluation process. How and when was the curriculum last evaluated? *(Appropriateness, archiving, deleting, revising, etc.)*

PROGRAM REVIEW RESPONSE from OCTOBER 2012.

NOTE: This question was not on the PROGRAM REVIEW from OCTOBER 2012.

Therefore, it was not answered in Oct 2012 full program review – see update Oct 2013

C. List any courses not in full compliance with Curriculum Committee Standards, including those that have not been updated in the past six years *(see Curriculum Manual for additional information, if necessary)*.

PROGRAM REVIEW RESPONSE from OCTOBER 2012.

D. Curriculum Development: What is the plan for maintaining the currency and viability of your curriculum *(including all modes of delivery)*?

PROGRAM REVIEW RESPONSE from OCTOBER 2012.

The Biology Department and Chemistry Department are in early development of an online Biochemistry course (no lab). Many of the two year nursing programs are adding Biochemistry as a prerequisite for entrance into their program; the four year colleges and universities have already implemented this requirement. The Chemistry Department is also looking at changes in CHEM 1 to make it a course that covers general chemistry with organic chemistry and biochemistry. Nursing programs are now requiring a course that has all three of those disciplines. We have had students who have had to retake chemistry because our CHEM 1 does not cover the extra topics.
Physical Sciences are working on developing an ASTR 2 class which would cover the planets.

The Biochemistry course mentioned above would be an online course; it would be a 3-hour lecture course with no lab. This course will be designed for the allied health student who needs a basic introduction to the field of biochemistry. It would be cross listed in both biology and chemistry. Astronomy 2 would be both traditional and online delivery.

This past Spring semester (2012) Biology and Chemistry archived or deleted a number of courses that had not been taught in many years. There is no plan to teach them again in the future. All of the physics courses were archived this past semester since we have no physics instructor and they have not been taught in at least 7 years.

DATE: October 2, 2013

ANNUAL UPDATE #1:

4. A. At this time, natural science and mathematics courses are in compliance of all issues (not including prerequisite validations). Validation of prerequisites for courses will be complete by the end of the Fall 2013 semester. Natural science and mathematics courses completed the Methods of Instruction in their CORs.

CHEM 1 now has a MATH 55 prerequisite, changed from a MATH 50 prerequisite. CHEM 1 also changed from a 4 unit to a 5 unit course, effective with the Spring 2014 semester.

4. B. Curriculum evaluation is an on-going process, with faculty assessing the educational needs of students when recommending changes. Chemistry and Biology faculty recognized the need to offer a Biochemistry course to meet the needs of Allied Health students; such assessment of student needs is dynamic and fluid. Developing a process of formal curriculum evaluation should be discussed over the 2013-2014 school year. Planning such evaluation would require release time for faculty members to meet and discuss such processes.

4.C. No changes

4.D. The Biology and Chemistry disciples remain committed to developing necessary courses to meet the needs of pre-nursing students and other allied health students, in addition to meeting the needs of general education students and other students with diverse interests in the natural sciences. The Chemistry faculty have concluded that changing CHEM 1 to cover general chemistry, organic chemistry, and biochemistry is not feasible due to topic coverage and laboratory facilities.

Astronomy 2, an observational science class examining the planets, is currently being developed. It will be delivered in a traditional format to offer better opportunities for student success.

DATE: October 6, 2014

ANNUAL UPDATE #2:

4.A. Natural science and mathematics courses are in compliance of all issues. Validation of prerequisites for courses have been completed. Methods of Instruction in the CORs are being updated.
4.B. Curriculum evaluation remains an ongoing process, with faculty identifying a need to develop a plan for formal curriculum evaluation within the natural sciences and mathematics program.
4.C. No changes
4.D. The natural sciences remain committed to developing necessary courses to meet the needs of pre-nursing students and other allied health students, including the creation of a pre-nursing certificate or similar recognition that a student has completed courses in preparation for a nursing program. The faculty remain

committed to meeting the needs of general education students and others with diverse interests in the natural sciences.

5. Internal Factors *(see Handbook for worksheet)*

A. Strengths

PROGRAM REVIEW RESPONSE from OCTOBER 2012.
From #5 Program Status: What is going well and why?

All of our classes traditionally make and many close during registration. Enrollment is up in Natural Science and Math. The major strength of each of the departments within the program lies in the diversity of the courses offered. There are courses in all of the fields of geology, astronomy, and oceanography. In addition, there is a general introductory course in Earth Science which gives non-majors a very broad introduction to all of the earth science subjects. In Biology, Concepts in Biology serves the same purpose as a general introduction to the many areas of the biological sciences. Online courses and night classes are offered in each of the contributing departments. There is currently no major weaknesses with respect to curriculum in any of the departments within the Natural Science/Mathematics program.

B. Weaknesses

PROGRAM REVIEW RESPONSE from OCTOBER 2012.
From #5 Program Status: What is not going well and why?

In Biology both instructors have overload assignments each semester and it is difficult to develop and plan for future projects when there is no time to do it. Also, the DCP and DE Coordinator come from the Biology department. There is only one chemistry instructor; there was an adjunct a few years ago. The chemistry instructor also teaches in the mathematics area. We also have only one geology instructor and it is difficult to plan with one instructor departments. In mathematics, the last full-time instructor who left was not replaced and enrollment has increased overall in all of the departments. However, we do realize that with the economic conditions in the state of California, there is probably not going to be any change in staffing.

DATE: October 2, 2013

ANNUAL UPDATE #1:

5. A. The strengths identified in October 2012 continue to remain as strengths in this annual update. The curriculum of the Natural Science and Mathematics program remains robust.
5. B. The weaknesses identified in October 2012 remain as weaknesses. An increase in faculty in the chemistry, geology, and mathematics disciplines would increase those disciplines ability to plan future curriculum improvements. However, the economic conditions in the state of California, while improving, remain challenging and we do realize that there is probably not going to be an increase in staffing.

DATE: October 6, 2014

ANNUAL UPDATE #2:

5.A. We continue to have our classes make and full during registration. Enrollment continues to be up in Math and Natural Science. Our course diversity is expanding with the creation and approval of Biochemistry and Astronomy 2. Our program curriculum remains robust.
We have added a full-time mathematics instructor, allowing our mathematics courses to better meet the needs of our students. We have added a chemistry

adjunct to expand the number of chemistry sections offered. With the addition of a night adjunct in biology, the overload assignments for the biology instructors has slightly decreased, allowing for more time to plan and develop future projects in the fall.
5.B. The weaknesses identified in October 2012 have been addressed. An increase in the supplies budget would allow chemistry and biology to offer current laboratory experiences to students. We need to replace some non-consumable materials, such as pH meters and anatomical models, as well as order fresh microbial supplies for microbiology. Chemistry would like to see an increase in the budget for distilled water, an essential component of properly completed chemistry and biology experiments.

6. External Factors *(see Handbook for worksheet)*

A. Opportunities

PROGRAM REVIEW RESPONSE from OCTOBER 2012.
From Question 3 *(What external factors have a significant impact on the program? Include the following, as applicable)*

Job Market: The math requirement for the degree is the general Math 55 requirement for the two-year degree. Most of the majors in the program are in the allied health fields in which the demand far exceeds the number available. Therefore, the job market, at this time, is not a critical limiting factor.

B. Threats

PROGRAM REVIEW RESPONSE from OCTOBER 2012.
From Question 3 *(What external factors have a significant impact on the program? Include the following, as applicable)*

Budgetary Constraints: The full-time math instructor who left has not been replaced. This program review will address that later in the Budget Allocation Proposals. Departmental budgets have been reduced and this places a burden on science especially since they have classes that use consumables and must be replaced yearly.

Requirements from four-year institutions: Notification of any articulation changes usually comes from the counselors; for example, the changes in math requirements for science and changes in the structure of general chemistry.

Requirements from two-year allied health programs: The two-year programs have added requirements and changed existing requirement. The changes in requirements have the greatest effect on our students. Chemistry now must be a "General, Biochemistry, and Organic" general class and it must be stated so in the course title.

DATE: October 2, 2013

ANNUAL UPDATE #1:	The external factors identified in October 2012 remain. The job market remains a strong opportunity while budgetary constraints and requirements from four-year institutions remain as external threats.
DATE:	October 6, 2014
ANNUAL UPDATE #2:	The external factors identified in October 2012 remain. The budgetary constraints placed on science classes with consumables remains a threat. To address this threat, the science faculty need to become better equipped at communicating our need for replacements of consumables.

7. Continuing Education/Professional Development

A. What continuing education and/or professional development activities have program/unit members participated in during the current cycle?

PROGRAM REVIEW RESPONSE from OCTOBER 2012.

B. What are the continuing education and/or professional development plans for the upcoming cycle?

PROGRAM REVIEW RESPONSE from OCTOBER 2012.

DATE:	October 2, 2013
ANNUAL UPDATE #1:	Faculty members have participated in several conferences and workshops focusing on professional development since October 2012. For the upcoming year, faculty members intend to pursue continuing education opportunities, and attend professional development conferences germane to their disciples. Faculty have also been invited to make presentations on pedagogy at professional development and research conferences.
DATE:	October 6, 2014
ANNUAL UPDATE #2:	Faculty members have participated in several conferences and workshops focusing on professional development since October 2013. For the upcoming year, faculty members intend to pursue continuing education opportunities, and attend professional development conferences germane to their disciplines.

8. Prior Goals/Objectives

Briefly summarize the progress your program/ has made in meeting the goals and objectives identified in the most recent Program Review or Annual Update. *(Include measurements of progress or assessment methods.)*

PROGRAM REVIEW RESPONSE from OCTOBER 2012.
From Question 7

Our most recent Program Review for the Natural Science/Mathematics degree is unofficial. The last ones submitted were departmental (2009-2010). The goals of the departments were essentially the same as portions of the Master Plan:

Goal One: Provide learning programs and an environment that ensures student success.

Objective 1.1-Expand and/or revise the curriculum to meet the dynamic needs of students and community. Specifically we address Action 2 in the Plan which states "Develop student skills that promote lifelong learning with competencies in computer literacy, oral and written communication, and critical and analytical thinking." These are emphasized in the student learning outcomes. Natural Science/Mathematics offers a wide variety of courses, each of which is unique in its treatment of diverse topics. Many of the courses have a laboratory component that gives instructors the unique opportunity to really know and work with their students. The laboratory environment promotes teamwork and student-student and student-instructor interactions. Many students have difficulty with their initial science and math courses and BCC has a viable and productive tutoring center for students in need of additional help outside the classroom.

Objective 1.3- Support flexible pedagogies designed to improve student learning and achievement.
Objective 1.5- Develop learning support systems that are effective and flexible to meet changing student needs and enrollment growth. In particular, Action 2, "Enhance collaboration between tutorial services and faculty" by donating instructor copy textbooks and recommending tutors to the Center.
Objective 1.6- Provide modern facilities and classrooms with integrated technologies that support learning programs and accommodate projected student growth. Faculty have been provided with training for both live and online delivery.

Goal Four: Create an effective work environment

Objective 4.1- Enhance college wide dialog and develop a more effective link between department and institutional goals. Action 4 emphasizes planning sessions, objectives, and measurable outcomes contained in a program review.

Goal Five: Improve college programs through systematic evaluation.

Objective 5.2- Align courses and programs with mission, overall curriculum and System's Office reporting taxonomies. Action 2 is adding student learning outcomes to the program template.
Objective 5.3- Include SLO assessment for online courses at all levels of evaluation.
The Natural Science and Mathematics Program has met or exceeded all of the above stated goals from the last composite program reviews of the individual departments (Biology, Chemistry, Earth Science, and Mathematics).

DATE: October 2, 2013

ANNUAL UPDATE #1:

Goal One:
Objective 1.1: We continue to expand and revise the curriculum as necessary to meet the dynamic needs of our students. Astronomy 2 has been approved through the Chancellor's Office for delivery. This course offering expands students' choices in observational science courses. BIOL 2 has been approved through the Curriculum Committee level to be offered as a hybrid class; Biochemistry remains in development.
Objective 1.3: Faculty continue to support flexible, research-based pedagogies designed to improve student learning and achievement.
Objective 1.5: Faculty continue to support student use of tutoring services.
Objective 1.6: Faculty continue to receive training for both live and online delivery of courses in modern facilities and classrooms.

Goal Four:
Objective 4.1: Faculty remain committed to playing their role in enhancing college-wide dialog and linking department and institutional goals.

Goal Five:
Objective 5.2: Student learning outcomes were added to the System's Office reporting taxonomies, enhancing the evaluation of courses.
Objective 5.3: SLO assessment for online courses continues at all levels of evaluation.

DATE:	October 6, 2014
ANNUAL UPDATE #2:	Goal One: Objective 1.1: We continue to expand and revise the curriculum as necessary to meet the dynamic needs of our students. Objective 1.3: Faculty continue to support flexible, research-based pedagogies designed to improve student learning and achievement. Objective 1.5: Faculty continue to support student use of tutoring services. Objective 1.6: Faculty continue to receive training for both live and online delivery of courses in modern facilities and classrooms. Goal Four: Objective 4.1: Faculty remain committed to playing their role in enhancing college-wide dialog and linking department and institutional goals. Goal Five: Objective 5.2: Student learning outcomes were added to the System's Office reporting taxonomies, enhancing the evaluation of courses. Objective 5.3: SLO assessment for online courses continues at all levels of evaluation.

9. Goals/Objectives/Actions (ACTION PLAN)

A. **GOALS:** Formulate Program Goals to maintain or enhance program strengths, or to address identified weaknesses.

B. **ALIGNMENT:** Indicate how each Goal is aligned with the College's Strategic Priorities.

C. **OBJECTIVES:** Define Objectives for reaching each Goal.

D. **ACTIONS/TASKS REQUIRED TO ACHIEVE OBJECTIVE:** Create a coherent set of specific steps (Actions/Tasks) that must be taken to achieve each Objective.

E. **OUTCOMES:** State intended Outcomes and list appropriate measures and assessment methods for each Outcome.

F. **ADDITIONAL INFORMATION:** This area provides for the additional communication of information necessary to further "close the loop" on the goal or action plan, as it relates to Institutional Planning. This may include references to other institutional documents, such as governing or compliance documents (i.e. Board Policy, Administrative Procedures, Title V), institutional planning documents (i.e. Strategic Plan, Educational Master Plan, Facilities Plan, Technology Plan), or Board, Presidential, Supervisory or Departmental recommendations or goals, etc. *(See Handbook for additional examples.)*

Complete the following table with your Program's **ACTION PLAN**, which must include a **minimum of 3 goals**:

ACTION PLAN					
	GOAL	ALIGNMENT WITH BCC STRATEGIC PRIORITIES (click link for list of Strategic Priorities)	OBJECTIVE	ACTIONS/TASKS REQUIRED TO ACHIEVE OBJECTIVE	OUTCOMES, MEASURES, and ASSESSMENT
#1	Provide students a successful college learning experience; aligns with Strategic Priority #2.	*List all that apply:* - **Foster** innovative learning environment - **Provide** Successful college learning experience - **Promote** and support student engagement - **Cultivate** and enhance local partnerships - **Attract**/develop excellent employees - **Strengthen** college planning/ decision making	#1 Plan and implement programs based on learning needs and career paths	- Evaluate prerequisites - Evaluate curriculum and add new classes as needed - Evaluate current career paths or job market	The COR is up to date and in compliance; the success and retention rates show improvement in critical areas; addition of new classes
			#2 Augment current and emerging technologies to foster student learning	- DE with new Moodle platform - Use of smartboards, tablet pcs,etc. - Computer simulations in the laboratory sciences and the use of the Math lab	Success, retention, and fill rates in online classes with the new more interactive platform. Student surveys on the use of computer simulations in labs
			#3		
	Additional Information:	We have students who are not prepared for the rigor of either math or science. Our chemistry course has no prerequisite and weak math students flail and fail when they try to take chemistry. By putting a prerequisite of Math 55 we should be able to increase our success rate by not putting students in the class who are primed to fail.			
	DATE: OCTOBER 2, 2013	ANNUAL UPDATE #1:	The first goal of the program remains and faculty are in the process of identifying ways in which the outcomes, measures, and assessment of success of the goal can be more quantifiably measured. In the past year, faculty have continued to ensure that all courses are in compliance, noted that retention rates are improving, and new classes are in development. The challenge for 2013-2014 will be to identify ways in which to measure and assess how successful faculty are in providing students with a successful college learning experiences.		
	DATE: OCTOBER 6, 2014	ANNUAL UPDATE #2:	We remain committed to our first goal as we continue to ensure that all courses are in compliance. We are continuing to work on ways to measure and assess how successful faculty are in providing students with successful college learning experiences. In next year's full Program Review we are going to set goals with measurable outcomes.		
#2	Foster and improve offerings in regard to innovative learning environment that respects diversity; aligns with Strategic Priority #1	*List all that apply:*	#1 Offer programs and services for individual student populations	- Counselor data on services - Curriculum data from 2 and 4 year schools	Number of transfers; counselor data concerning transfer agreements; degree requirements from 2 and 4-year schools and universities.
			#2 Advance a culture of inclusion that promotes and	- Measured with SLOs and PLOs - Professional development and dialog on inclusive strategies	Analysis of the course level assessments and the program level assessments

ACTION PLAN					
	GOAL	ALIGNMENT WITH BCC STRATEGIC PRIORITIES (click link for list of Strategic Priorities)	OBJECTIVE	ACTIONS/TASKS REQUIRED TO ACHIEVE OBJECTIVE	OUTCOMES, MEASURES, and ASSESSMENT
			appreciates the human condition		
			#3		
	Additional Information:	We need to make sure we have the best, if not the latest, equipment in the laboratory. Students need to be successful in the lab and working with antiquated or broken instrumentation is not the way to achieve success.			
	DATE: OCTOBER 2, 2013	ANNUAL UPDATE #1:	The second goal of the program remains and faculty are committed to providing innovative learning environments that respects diversity for students. To achieve this goal, faculty need laboratory equipment and professional development funding. Students need access to modern, fully functional instrumentation to be able to achieve success in the Natural Science and Mathematics program. Students benefit from faculty trained in research-based pedagogical approaches learned at professional development workshops and through continuing education opportunities.		
	DATE: OCTOBER 6, 2014	ANNUAL UPDATE #2:	We remain committed to providing innovative learning environments that respects diversity for students. We still need laboratory equipment and professional development funding while students need access to fully functional, technology-savvy instrumentation in the laboratories.		
#3		*List all that apply:*	#1		
			#2		
			#3		
	Additional Information:				
	DATE:	ANNUAL UPDATE #1:			
	DATE:	ANNUAL UPDATE #2:			
#4		*List all that apply:*	#1		
			#2		
			#3		
	Additional Information:				
	DATE:	ANNUAL UPDATE #1:			

ACTION PLAN					
	GOAL	ALIGNMENT WITH BCC STRATEGIC PRIORITIES (click link for list of Strategic Priorities)	OBJECTIVE	ACTIONS/TASKS REQUIRED TO ACHIEVE OBJECTIVE	OUTCOMES, MEASURES, and ASSESSMENT
	DATE:	ANNUAL UPDATE #2:			
#5		*List all that apply:*	#1		
			#2		
			#3		
	Additional Information:				
	DATE:	ANNUAL UPDATE #1:			
	DATE:	ANNUAL UPDATE #2:			
#6		*List all that apply:*	#1		
			#2		
			#3		
	Additional Information:				
	DATE:	ANNUAL UPDATE #1:			
	DATE:	ANNUAL UPDATE #2:			

10. Resources Required

List all significant resources needed to achieve the objectives shown in the table above, including personnel, training, technology, information, equipment, supplies, and space. Every request for additional resources must support at least one objective.

Also list any resources required to implement planned improvements noted in 3.C.

IMPORTANT: A BUDGET ALLOCATION PROPOSAL must be completed and submitted for EACH new resource requested. *(Click the link to access the form.)*

Goal #	Objective #	Resource Required	Estimated Cost	BAP Required? Yes or No	If No, indicate funding source
		Microscopes	$60,000.00 (total cost for 3 years)		
		Vernier pH probes	$1200.00		
		Water distiller	$2000.00		
		Math instructor	$55,488 Salary $11,652 Benefits $15,900 Insur. Total= $83,040.00		
		Earth Sciences Computer Software	$2,500.00		
		DVDs for Earth Sciences	$1,500.00		
		Printer in T-14 Lab	$500.00		
		Computers in T-14 Lab	$23,800.00		
		Geology Equipment and Supplies	$2,500.00		

ANNUAL UPDATE #1: DATE: OCTOBER 2, 2013

Goal #	Objective #	Resource Required	Estimated Cost	BAP Required? Yes or No	If No, indicate funding source
1	2	Microscopes	$60,000.00 (total cost for 3 years)		
1	2	Vernier pH probes	$1200.00		
1	2	Water distiller	$2000.00		
1	1	Math instructor	$55,488 Salary $11,652 Benefits $15,900 Insur. Total= $83,040.00		

ANNUAL UPDATE #2: **DATE:** October 6, 2014

Goal #	Objective #	Resource Required	Estimated Cost	BAP Required? Yes or No	If No, indicate funding source
1	2	Vernier pH probes	$1200.00		