

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

ASTR = 1 to 1.49	(One Full-Time, Two regular Part-Time)
GEOL = 1 to 0	
OCEA = 1 to 0	
PHSC = 4 to 1	(One Full-Time, One occasional Part-Time)

	TRADITIONAL	ONLINE
2) Course Completion Rate (Retention)		
ASTR 1	0.65	0.91 TOTAL: 0.85
ASTR 1L	0.97	
GEOL 1L	0.74	
GEOL 4	0.86	
OCEA 1	0.85	
PHSC 2	0.83	

3) Course Success Rate		
ASTR 1	0.72	0.77
ASTR 1L	0.90	
GEOL 1L	0.74	
GEOL 4	0.86	
OCEA 1	0.78	
PHSC 2	0.65	

4) WSCH/FTEF Ratio (Efficiency)		
ASTR 1	715	
ASTR 1L	317.65	
GEOL 1L	154.05	
GEOL 4	285	
OCEA 1	405	
PHSC 2	450	

ASTR 1		931.7
PHSC 2	271.0	

5) Fill Rate		
ASTR 1	1.08	1.11
ASTR 1L	0.90	
GEOL 1L	0.63	
GEOL 4	0.59	
OCEA 1	0.84	
PHSC 2	0.94	

Reflect on the data above:

1) **Full-time/Part-time Faculty Ratio:** We have a sufficient number of instructors to meet the demand in the program. There is a Full-Time to Part-Time faculty ratio that does not indicate the need for the creation of any other Full-Time positions in the program. Currently we are offering two to three online sections of the ASTR 1 course per semester. Part-Time instructors usually teach these, and we are having success with securing a sufficient pool of adjuncts to meet our demand in this area.

2) **Course Completion Rate (Retention):** Generally the Course Completion Rate for all of the courses in the Earth Science Program is very high. The one notable exception is the Course Completion Rate for the traditional delivery of ASTR 1, Introduction to Astronomy. A comparison with previous years' retention rates indicates this to be a bit of an anomaly. However, these Completion Rates are still lower than for other courses in the program. This may be due to the difficulty of the subject matter combined with a lack of sufficient preparation for such a rigorous science course on the part of some of the students. It is worth noting that the overall Course Completion Rate for ASTR 1 is 0.85, which is rather high.

3) **Course Success Rate:** Generally the Course Success Rate for all courses in the Earth Science Program is very positive. The one notable exception is the Course Success Rate for PHSC 2, Introduction to Earth Science. Since this course is usually comprised of the most underprepared and science-phobic students at the college, this may contribute somewhat to the lower than normal Success Rate. However, it is definitely worth noting that the vast majority of students that ACTUALLY complete the course and take the Final Exam do earn a "C" or better. Almost all of the failing grades in this course are from students that stopped attending AFTER the drop deadline, but well BEFORE the end of the class.

4) **WSCH/FTEF Ratio (Efficiency):** WSCH/FTEF Ratio, or efficiency, was strongest for the Astronomy 1 course, and weakest for the Geology courses. Enrollment in the Geology courses was a little lower than in previous years, and this undoubtedly affected these numbers. As a way of improving efficiency, GEOL 4 may only be slated for a once a year delivery, instead of being offered every semester. Perhaps some additional advertising and marketing is necessary for this course as well. ASTR 1L is our Observational Astronomy course, and the maximum enrollment per class (20) is limited by the available space in the Astronomical Observatory. Enrollments for this course have been very strong taking into consideration the classroom capacity.

5) **Fill Rate:** The Fill Rate is superb for all courses in the program except the Geology courses, GEOL 1L and GEOL 4. Enrollment in the Geology courses was a little lower than in previous years, and this undoubtedly affected these numbers. In the future GEOL 4 may only be offered for delivery once a year. The counselors will be contacted to make sure that they are sufficiently recommending the courses in the Geology Department to those students that could benefit from taking them. Perhaps some additional advertising and marketing is necessary for both of these courses as well.

B. PROGRESS ON PROGRAM LEVEL OUTCOMES (PLOS) AND STUDENT LEARNING OUTCOMES (SLOS)

1) List your Program Level Outcomes (PLOs).

Numbers Indicate the Relationship of Program Learning Outcomes (PLOs) to the Outcomes Assessment: Core Competencies

1. Communication
2. Critical Thinking
3. Global Consciousness (Awareness)
4. Personal Development and Responsibility

PLO #1. Students will be able to demonstrate, orally and in written form, an understanding of the processes of earth science, the scientific method, and the relationship between scientific research and established knowledge. This includes the ability to

- a. Recognize the way in which research leads to generally accepted conclusions and the integration of new research data with the building of a body of scientific knowledge, and/or (1,3,4)
- b. Design a scientific inquiry, including use of proper controls and analyses, and/or (2)
- c. Demonstrate critical thinking skills shown by the analysis of data sets and the synthesis of information to draw conclusions, and/or (2,3)
- d. Produce an essay explaining scientific processes in clear and concise terms, and/or (1)
- e. Produce laboratory reports which address background information, procedures, results, and analysis of data during a lab exercise or inquiry project. (1,2)

PLO #2. Students will be able to demonstrate both content knowledge in earth science and test taking skills when completing essay and objective exams. This includes the ability to

- a. Demonstrate problem solving abilities in the major content areas of science, and/or (1,2)
- b. Analyze the logic of objective questions and choosing the correct answers, and/or (1,2)
- c. Writing clear concise responses to essay questions. (1,2,4)

PLO #3. Evaluate scientific data, draw reasonable conclusions, recognize the ethical implications of these conclusions, and apply these conclusions to personal, community, or scientific problems. This includes the ability to

- a. Choose what data to collect in order to address a specific hypothesis, and/or (2,3)
- b. Collect data and keep organized records, and/or (2)
- c. Ability to reach and clearly express logical conclusions based on scientific data, and/or (1,2,3)
- d. Relate how scientific information is relevant to personal and community issues, and/or (4)
- e. Recognize the ethical implications of scientific research and the responsibility to use knowledge wisely. (4)

2) Summarize the progress you have made on Program Level Outcomes.

The Earth Science Program drafted and finalized its Program Learning Outcomes (PLOs) for its 2012 Program Review (see above). In addition, the Program has begun the assessment process for its Program Level Outcomes (PLOs). Program Level Outcomes are being measured in three different ways. Success and retention data for each department and course is being used as well as a student survey for a direct measurement. That data is currently being aggregated and program norms are being established.

3) Summarize the progress made on course-level outcomes and assessments; use specific data, if possible.

All courses in the Earth Sciences Program have had Student Learning Outcomes (SLOs) drafted, measured and assessed for at least the last TWO regular Program Review Cycles (six years). All course level SLOs continue to be measured and assessed each semester for each class.

The Assessments for the 2014-2015 academic year based upon measurement of Course-Level Student Learning Outcomes are as follows:

	<u>Fall 2014</u>	<u>Spring 2015</u>
ASTR 1:		
SLO #1: Student Success Rate =	75%	70%
SLO #2: Student Success Rate =	75%	70%
SLO #3: Student Success Rate =	83%	85%
ASTR 1L:		
SLO #1: Student Success Rate =	79%	75%
SLO #2: Student Success Rate =	85%	85%
SLO #3: Student Success Rate =	88%	80%
GEO 4:		
SLO #1: Student Success Rate =	70%	72%
SLO #2: Student Success Rate =	70%	72%
SLO #3: Student Success Rate =	83%	85%
OCEA 1:		
SLO #1: Student Success Rate =		70%
SLO #2: Student Success Rate =		70%
SLO #3: Student Success Rate =		80%
PHSC 2:		
SLO #1: Student Success Rate =	67%	63%
SLO #2: Student Success Rate =	67%	63%
SLO #3: Student Success Rate =	88%	84%
GEO 1L:		
SLO #1: Student Success Rate =	68%	
SLO #2: Student Success Rate =	68%	
SLO #3: Student Success Rate =	85%	

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

Based upon the process of outcomes assessment, the following changes were made during this last Program Review Cycle:

ASTR 1:

1) The Sky Journal Research Projects were collected at the midterm point in the semester for an initial evaluation. In addition, students were provided with some in-class time to work on their Sky Journal Project. The Project was also distributed to the students on the very first day of instruction allowing them more completion time.

2) A NEW Comprehensive Study Guide was added and appears to be helping with student learning.

3) Several lecture units in ASTR 1 have been expanded to include activities utilizing the telescope in our Astronomical Observatory.

ASTR 1L:

1) Labs where the student average score was less than 70% were reviewed: some of the labs were altered, and one was deleted with a new lab substituted.

2) All of the computers as well as the Astronomy software were completely upgraded with new state-of-the-art versions, and this appears to be fostering a more diverse and comprehensive learning environment.

GEOLOGY 4:

1) The geology software in the classroom was upgraded, and students were given more of an opportunity during class time to utilize the new computer programs. This appears to have contributed to greater student learning.

2) More hands-on experiential learning activities were added to the course including Sedimentary Rock and Fossil Identification.

OCEANOGRAPHY 1:

1) A Library Tutorial was scheduled during the semester to allow students to better understand the research process, and to be better exposed to all of the tools and assistance that are available to them. Students indicated that they thought this was helpful.

2) Students were required to submit an Outline for their Research Project Assignment at the Midterm point of the semester. Students were provided with some in-class time to work on their research and the handout for the Project was given to the students earlier in the semester.

3) A New Comprehensive Study Guide for each Exam was developed and distributed to students.

GEOLOGY 1L:

1) A New Comprehensive Study Guide for each Exam was developed and distributed to students.

2) The Outline for the Research Project will now be due at the halfway point in the semester to increase preparedness.

3) Fossil Identification with actual specimens has been added to the Geologic Time unit.

PHYSICS 2:

1) Individual Questions on Exams where less than 50% of students scored correct were analyzed and changes were made to improve those areas of instruction. As a result, several problematic questions were changed or deleted from the Exams and new updated questions were added.

2) The Research Project was distributed to the students on the very first day of instruction allowing them more completion time.

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

a) A student tutor for ALL courses will be recommended to Tutorial Services in order to assist students.

b) ALL exams in ALL courses will be reviewed to make sure that problematic questions are analyzed and changes are made to improve those questions and/or areas of instruction before the next time that the course is taught.

- c) More one-on-one communication opportunities between the instructor and individual students in preparation for the exams will be added to the course.
- d) Outlines for Research Projects in ALL courses taught will be assigned to the students and submitted to the instructor by the halfway point in the semester so that direct feedback can be given.
- e) Students may benefit from additional communication with the instructor for other activities as well. Accordingly, one-on-one class time will be provided between the instructor and the Research Project groups for consultation, assistance, and to help guide the students and/or answer any questions. Groups will also be required to present a weekly oral update on their progress with this project to the instructor. A Grading Rubric, created from the assignment Checklist, will be implemented for the Research Project.
- f) Outlines for ALL Oral Presentations in ALL classes will now be required to be submitted from ALL students. Students will be required to submit a more comprehensive outline on their presentation in advance and provide references (and citations) as well. One-on-one time between the instructor and each student will be provided to guide/help the student on the Oral Presentation Project and/or answer any questions. A Grading Rubric will be created and implemented for the Oral Presentation Assignment.
- g) Library Exercises and Tutorials will now be a part of ALL of the courses taught in every department.
- h) New Computer Activities for ALL courses will be added and enhanced due to the upgrade of all of the computers and software programs in the Earth Science Laboratory Classroom.

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.).

Degree/Transfer Completion Outcomes (from Student Success Scorecard Data):

COMPLETION: (Percentage of degree, certificate and/or transfer-seeking students starting first time in 2008-09 tracked for six years through 2013-14 who completed a degree, certificate or transfer-related outcomes.)

COLLEGE PREPARED: 59.3% (Student's lowest course attempted in Math and/or English was college level)

UNPREPARED FOR COLLEGE: 40.5% (Student's lowest course attempted in Math and/or English was remedial level)

OVERALL: 43% (Student attempted any level of Math or English in the first three years)

HEADCOUNT by Academic Year: (from 2013-14 FactBook, *Original Source: CCCC MIS Referential Data)

2009-10: 7046
2010-11: 4235
2011-12: 4745
2012-13: 4730
2013-14: 4710

DEGREES TOTAL: (from 2013-14 FactBook, *Original Source: CCCC MIS Referential Data)

	2009-10	2010-11		2011-12		2012-13		2013-14		Last YearChg	5-Yr Avg	5-Yr Chg	
AA Degree	154	44.3%	160	44.0%	174	48.6%	141	55.5%	169	52.5%	-5.5%	49.0%	18.6%
AS Degree	176	50.6%	177	48.6%	171	47.8%	103	40.6%	139	43.2%	6.5%	46.1%	-14.6%

AS DEGREES - Biological and Physical Sciences: (from FactBook, Original Source: CCCC MIS Referential Data)

2009-10: 32 (18.2%)
 2010-11: 35 (19.8%)
 2011-12: 32 (18.7%)
 2012-13: 22 (21.4%)
 2013-14: 34 (24.5%)

1a) If this is a CTE program ending with a certificate or degree, include data on employment opportunities, compliance with advisory recommendations, and fiscal viability of program. (Include labor market and demand information using resources in CTE and the PR Handbook.)

N/A

2) Summarize the results of the measures listed in #1 above:

a) Completion:
 BCC Completion Rate for College Prepared Students: While the State Completion Rate has maintained at approximately 70% throughout the last five years, THE BCC Completion Rate is at 59.3% in the most recent period.
 Overall Completion Rate: Barstow College has a slightly lower Completion Rate as compared to the Statewide Completion Rate. For the most recent year, BCC had an Overall Completion Rate of 43%, and statewide it was 47%. Our Completion Rates for College Prepared Students and Overall need to improve to come in line with at least the California State Average.

b) Headcount: The number of students has dropped since 2009-10 and is now holding at about 4,700 for the past three academic years. Overall, there has been a decrease of 33.2% over the last five years, but there has been only a slight decrease of 0.4% in the last academic year.

c) AS Degrees: Although there has been a decrease in the number of AS degrees conferred, from a high of 50.6% in 2009-10 to 43.2% in 2013-14, the number of AS Degrees awarded in Natural Science has actually increased over this same time period.

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.)

Despite a decrease in the numbers of students as reflected by the most recent Headcount, there appears to be an increase in the numbers of AS Degrees awarded in Natural Science. This is another good indication of the general success of the Earth Science Program, and that we are on a positive track. We will continue to track the number of degrees awarded in Natural Science and Mathematics.

D. TWO YEAR SCHEDULING PLAN

1) What is the program's Two-Year Scheduling Plan?

Earth Science Two-Year Scheduling Plan:

Year #1

Fall Semester: GEOL 1L, PHSC 2, ASTR 1, ASTR 1L, GEOL 4

Spring Semester: PHSC 2, ASTR 1, ASTR 1L, GEOL 2, OCEA 1

Year #2

Fall Semester: GEOL 3, PHSC 2, ASTR 1, ASTR 1L, GEOL 4

Spring Semester: PHSC 2, ASTR 1, ASTR 1L, OCEA 1, GEOL 4

**Two to three sections of ASTR 1 Online are offered each semester in addition to the Traditional (Live) course.

***PHSC 1, Physical Science for General Education, has not been offered in many years. This is an interdisciplinary science course, where about half of the course is Earth Science, and the other half is Chemistry and Physics. It is hoped that our new Chemistry Professor may be interested in team teaching this course in the near future. Otherwise, we are probably looking at archiving the course, until we are ready to offer it on a regular basis as part of our Two-Year Scheduling Plan.

2) What changes, if any, have been made since the last Program Review?

No changes have been made to the Two-Year Scheduling Plan during the last Program Review Cycle.

3) How effective has the Two-Year Scheduling Plan been in meeting student needs and educational goals? If this is a degree or certificate pathway, can students complete in two years?

The Earth Science Two-Year 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 courses, and the increase in the number of Natural Science Degrees awarded at the institution. No matter what their major, students are able to easily take all of their Natural Science Requirements in two years.

4) Reflecting on the responses above, what are the goals for the next program review cycle?

The Earth Sciences Program has had a Two-Year Scheduling Plan on file since the year 2000 at BCC. We will continue to review the Two-Year Scheduling Plan during each Regular Program Review Cycle in order to make any indicated changes or additions. We will also 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.