

# INSTRUCTIONAL Program Review Annual Update

Department:	EARTH SCIENCE PROGRAM    Drafted and Submitted by Scott Bulkley		
Academic Year:	2017-2018	Annual Update # 1	<input type="checkbox"/> Annual Update #2 <input checked="" type="checkbox"/>

## 1. Progress on Program Level Outcomes (PLOs) and Student Learning Outcomes (SLOs) *(from #3B of full PR)*

### A) List your Program Level Outcomes:

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

1. 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)
2. Design a scientific inquiry, including use of proper controls and analyses, and/or (2)
3. Demonstrate critical thinking skills shown by the analysis of data sets and the synthesis of information to draw conclusions, and/or (2,3)
4. Produce an essay explaining scientific processes in clear and concise terms, and/or (1)
5. 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

1. Demonstrate problem solving abilities in the major content areas of science, and/or (1,2)
2. Analyze the logic of objective questions and choosing the correct answers, and/or (1,2)
3. 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

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

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### B) Summarize the progress you have made on Program Level Outcomes (PLOs):

The Program is now measuring and assessing its Program Level Outcomes (PLOs). Program Level Outcomes are being measured in three different ways. The following chart lists the data for each category for the 2016-2017 Academic Year.

1) Success Rate Data from each Course and Department. This data is also disaggregated by mode of delivery.

Astronomy Department:	62.88%
Online:	62.20%
Traditional:	65.50%

Oceanography Department:	80.00%
Traditional:	80.00%

Physical Science Department:	66.67%
Traditional:	66.67%

2) Completion Rate Data from each Course and Department. This data is also disaggregated by mode of delivery.

Astronomy Department:	79.12%
Online:	78.05%
Traditional:	82.52%

Oceanography Department:	93.33%
Traditional:	93.33%

Physical Science Department:	75.44%
Traditional:	75.44%

3) Enrollment/Fill Rate Data from each Course and Department. This data is also disaggregated by mode of delivery.

Astronomy Department:	77.87%
Online:	83.17%
Traditional:	64.63%

Oceanography Department:	46.88%
Traditional:	46.88%

Physical Science Department:	91.94%
Traditional:	91.94%

The Program Learning Outcomes data from the last year is currently being analyzed to see if there are any appropriate changes and/or modifications to be made for the future.

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### C) Summarize the progress you have made on course level outcomes and assessments (SLOs):

Over the last Academic year, all course-level SLOs were measured and assessed each semester for each class offered in the Program. The Assessments for the 2016-2017 Academic Year based upon measurement of Course-Level Student Learning Outcomes are as follows:

	<u>Fall 2016</u>	<u>Spring 2017</u>
ASTR 1:		
SLO #1: Student Success Rate =	62%	68%
SLO #2: Student Success Rate =	62%	68%
SLO #3: Student Success Rate =	87%	84%
ASTR 1L:		
SLO #1: Student Success Rate =	74%	75%
SLO #2: Student Success Rate =	80%	82%
SLO #3: Student Success Rate =	86%	80%
OCEA 1:		
SLO #1: Student Success Rate =	Not Offered	65%
SLO #2: Student Success Rate =	Not Offered	65%
SLO #3: Student Success Rate =	Not Offered	80%
PHSC 2:		
SLO #1: Student Success Rate =	65%	63%
SLO #2: Student Success Rate =	65%	63%
SLO #3: Student Success Rate =	85%	83%

### D) 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 the 2016-2017 Academic Year:

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- a) The Public Telescope Viewing Events were scheduled far enough in advance during each semester to allow for a “make-up” event to occur if the weather did not cooperate. On March 30, 2017, this situation actually occurred and a Viewing Event was cancelled due to dangerous winds, however we subsequently conducted another successful evening for the Barstow community four weeks later on April 27.
- b) In the ASTR 1L course, students were given a Survey at the end of the course to rate the quality and effectiveness of each Laboratory experience, and changes/deletions were made based upon the results of this survey. This survey proved to be a valuable tool in determining the overall effectiveness of each Laboratory experience/activity and will definitely be continued.
- c) For both the ASTR 1 and ASTR 1L courses, students were given access to an online Website associated with the textbook in order to help with the successful completion of the Sky Journal Project in these classes. This enabled the students in these classes to have access to Exploration Web links, a calendar of upcoming astronomical events, and a guide to the celestial constellations.
- d) Student tutors for ALL courses were recommended to Tutorial Services in order to assist students.
- e) Where student tutors could not be located and/or approved by Tutorial Services in order to assist students with a course, the instructor offered to individually tutor students either on a one-to-one basis or in groups during his office hours.
- f) ALL exams in ALL courses were reviewed to make sure that problematic questions were analyzed and changes were made to improve those questions and/or areas of instruction before the next time that the course is taught.
- g) In the PHSC 2 course, students were given quizzes in the form of Crosswords, in order to further aid in understanding the important vocabulary terms described in the textbook. This also had the additional benefit of assisting the students in preparation for the exams in the course.
- h) In the OCEA 1 course, a New and more comprehensive Textbook was adopted for the class.

### E) Reflecting on the responses for B) and C) above, what will you implement for the next assessment cycle?

Based upon analysis of the Program Learning Outcome and Student Learning Outcome assessment data, the following items will be implemented for the next assessment cycle:

#### **ALL CLASSES:**

- 1) Library Exercises and Tutorials are now a part of ALL of the courses taught in every department of the Earth Science Program.
- 2) Every effort will be made to identify a Student Tutor who will be recommended to Tutorial Services in order to assist students with each course offered in the program. If a Student Tutor cannot be located and/or approved by Tutorial Services in order to assist students with ANY of the courses, the full-time instructor will offer to individually tutor students either on a one-to-one basis or in groups during his office hours.
- 3) ALL exams in ALL courses in the program will continue to 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.

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### **ASTR 1:**

- 1) Students will be required to submit a "camera ready" example of one page from their Sky Journal Project at an appropriate time Mid-semester so that the instructor can assess their successful progress with this assignment.
- 2) Students will gain access to a new online Website associated with the textbook in order to prepare for the exams in the course. This will enable all students in the class to have access to animated flashcards, an online glossary, chapter outlines, and practice quizzes.
- 3) Students will also now have access to additional online resources in order to help with the successful completion of the Sky Journal Project in this course. This will enable all students in the class to have access to Exploration Web links, a calendar of upcoming astronomical events, and a guide to the constellations.

### **ASTR 1L:**

- 1) For next semester, students will work in small groups (instead of individually) on the Sky Journal Project as an experiment to see if there is a marked increase in student learning.
- 2) Based upon the data collected from student surveys and analysis, three labs will be deleted and replaced with alternative assignments for next semester.
- 3) Some of the existing labs will now be spread out over two-nights in order to give the students additional time to complete them.
- 4) A new graded Library Research Laboratory Activity will be implemented for the students to complete as part of their overall Library tutorial experience.
- 5) Next semester the students' presentations for their astronomical research will be conducted over a span of two nights. This will allow greater flexibility in scheduling the speeches, while also providing the opportunity for longer and more complex presentations as well.
- 6) Students will continue to be given a Survey at the end of the course to rate the quality and effectiveness of each Laboratory experience, and changes/deletions will be made based upon the results of this survey. This survey has proved to be a valuable tool in determining the overall effectiveness of each Laboratory experience/activity. In addition, students are now awarded up to 5 additional points toward their grade for their efforts in completing the survey.

### **OCEA 1:**

- 1) A New and more comprehensive Textbook has been adopted and will be utilized for this course.
- 2) The Research Project Assignment will be distributed at an earlier part of the semester in order to afford students greater time to research and complete the assignment.
- 3) More in-class time will be devoted to the Research Project. The instructor will take ONE FULL CLASS period to discuss the parameters of the project, and display representative samples created by previous students in the course.

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### PHSC 2:

- 1) Students will be given quizzes in the form of Crosswords, in order to further aid in understanding the important vocabulary terms described in the textbook. This should also have the additional benefit of assisting the students in preparation for the exams in the course.
- 2) A major in-class Review Session will be scheduled before the Final Exam for this course.
- 3) Students will continue to play an important role in assessing the work of other project groups in the class, as well as completing a "Self-Evaluation" Form addressing the level of their own individual contributions on the Research Project assignment. The implementation of the Peer-Evaluation and Self-Evaluation components of the Research Project proved to be one of the most valuable improvements ever in pedagogy for this course. Students are now playing a much more important role in the project, and active participation amongst ALL of the members of each group rose decisively.
- 4) Library Tutorials will continue with the addition of an actual exercise for the students to complete as part of the tutorial experience.

## 2. GOALS AND OBJECTIVES (Taken From #9--Action Plan--of FULL Program Review)

GOAL		OBJECTIVE		ACTIONS/TASKS REQUIRED TO ACHIEVE OBJECTIVE	OUTCOMES, MEASURES, and ASSESSMENT
<b>#1</b>	Increase Student Enrollment in Geology Courses.	<b>#1</b>	To Promote the Geology Profession.	Work with Counselors to promote and recommend Geology courses and Geology profession to students.	Increased Fill Rates in Geology courses.
		<b>#2</b>	To Enable Students to more efficiently satisfy their educational goals (Natural Science Requirements).	Advertise the Geology courses and Geology profession.	Increased enrollment numbers in Geology Courses.
		<b>#3</b>	To Expand and Enhance the Geology Department with more course offerings and opportunities for students.	Work with PIO Director to promote the Geology Program and Geology Profession.	Increased WSCH/FTEF Ratio (Efficiency) in Geology courses.

### Goal #1 Annual Update: (Assess progress made toward goal attainment)

The Fall 2017 semester represents the first time that any Geology courses have been taught at BCC since 2014. Due to the reassigned time for the Full-time Instructor in the Geology Department to serve as the Academic Senate President, no Geology courses were offered from Spring 2015 until Fall 2017. Thus, full progress was not made on this Goal or the Objectives. Although the first task of working with the counselors to promote and recommend Geology courses was accomplished this semester, it did not seem to have a significant effect for the two courses that were offered this fall semester. GEOL 1L, Physical Geology, had a minimal enrollment and GEOL 4, Age of the Dinosaurs, was actually cancelled due to lack of enrollment. It will be important during the next Program Review Cycle to fulfill the other actions/tasks in order to achieve

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### 2. GOALS AND OBJECTIVES (Taken From #9--Action Plan--of FULL Program Review)

GOAL	OBJECTIVE	ACTIONS/TASKS REQUIRED TO ACHIEVE OBJECTIVE	OUTCOMES, MEASURES, and ASSESSMENT
<p>the desired goal of increased student enrollment in Geology courses. To attain the objectives the priority over the next review cycle will be to 1) continue to work with the Counselors to promote and recommend Geology Courses, 2) advertise future Geology Courses, and 3) work with the PIO Director to promote the Geology Program and its Courses.</p>			

GOAL	OBJECTIVE	ACTIONS/TASKS REQUIRED TO ACHIEVE OBJECTIVE	OUTCOMES, MEASURES, and ASSESSMENT
<b>#2</b> Increase Contact, Relationships and Involvement with Adjunct faculty in the Program.	<b>#1</b> To Increase the number of planned and scheduled faculty conversations and interactions with Adjunct Faculty in the Program.	Obtain a list and contact information (phone and E-mail) for all Part-Time Faculty teaching in the Earth Sciences Program.	Documented All-Program faculty meetings.
	<b>#2</b> To Increase discussion and dialogue between Full-Time and Part-Time faculty of the Earth Science Program.	Contact and Set-up meetings with Adjunct Faculty.	Minutes from All-Program faculty meetings.
	<b>#3</b> To Increase involvement of Part-Time faculty within the Program and in the campus community.	Create Agenda for Meetings with Adjunct Faculty.	Evidence of participation from Adjunct faculty in Program Review and Accreditation processes, and other involvement in the Program and campus community.

#### Goal #2 Annual Update: (Assess progress made toward goal attainment)

Objective #1: There has definitely been substantial progress in increasing the number of conversations and interactions with adjunct faculty in the Program. Communication and discussions with the adjunct member teaching online in the Astronomy Department have occurred on a regular basis. These conversations and discussions have taken place regarding use of the textbook, the regular Public Telescope Viewing Event at the Main Campus and other options for students regarding the telescope-viewing requirement for the ASTR 1 course. The conversations with the online adjunct have been facilitated for the most part by email and/or telephone, and not face-to-face since the faculty member is rarely on campus. However, there were regular face-to-face meetings between the full-time instructor and an on-campus adjunct during the Spring 2017 semester.

Objective #2: Discussion and dialogue between the Full-time and Part-time faculty in the Astronomy Department has definitely increased. With the adjunct that teaches online, most of this communication has been by email or telephone. However, during Spring 2017 semester, a part-time astronomy instructor was hired at the Main Campus. Face-to-face meetings between the full-time instructor and this adjunct were scheduled on a regular basis and thus substantial success was achieved in increasing dialogue and discussions.

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GOAL	OBJECTIVE	ACTIONS/TASKS REQUIRED TO ACHIEVE OBJECTIVE	OUTCOMES, MEASURES, and ASSESSMENT
<p><b>Objective #3:</b> One of the main obstacles for making progress on this objective has been the fact that most of the adjuncts in the program have been delivering their astronomy classes via distance learning modalities: either Online or at Ft. Irwin. The new goal will be to encourage our adjuncts who teach online and at Ft. Irwin to increase their involvement on the Main Campus and within the Program.</p>			

GOAL	OBJECTIVE	ACTIONS/TASKS REQUIRED TO ACHIEVE OBJECTIVE	OUTCOMES, MEASURES, and ASSESSMENT
<p><b>#3</b> Promote a high-quality Laboratory classroom environment for Earth Science learners with the appeal of a multi-faceted learning approach.</p>	<p><b>#1</b> To Utilize newer and more effective Tools and Supplies in the Earth Science courses.</p>	<p>Purchase new Laboratory Tools and Supplies for the Earth Science Program by submitting Requisitions to Academic Affairs Office.</p>	<p>Assessment of measurement of Course Level Outcomes (SLOs) and Program Level Outcomes (PLOs).</p>
	<p><b>#2</b> To Create more Learning Environments and Interdisciplinary Teaching experiences in the Program.</p>	<p>Discuss with other Science colleagues the possibility of team-teaching the PHSC 1 - Physical Science for General Education - course.</p>	<p>Increased Retention (Completion) Rates for the courses in the Earth Science Program.</p>
	<p><b>#3</b> To Provide more Multi-Media and Audio/Visual experiences for students in the Earth Science courses.</p>	<p>Purchase new Multi-Media and Audio/Visual Aids for the Earth Science Program by submitting Requisitions to Academic Affairs Office.</p>	<p>Increased Success Rates for the courses in the Earth Science Program.</p>

### Goal #3 Annual Update: (Assess progress made toward goal attainment)

**Objective #1:** Substantial progress has been made on this objective. Two years ago, the student computers in the T-14 Earth Science Laboratory Classroom were upgraded, and we now have students access the BCC Network and Computer Applications via two Servers. Not only this, but, where applicable, all of the Earth Science computer programs were upgraded with newer state-of-the-art versions of the interactive software applications. This has already made a positive impact on the effectiveness and stability of the computer learning experiences for our students in the Earth Science Program.

There is still a need for newer and more effective Tools and Supplies for the Geology and Astronomy Laboratories, so further requisitions will be submitted this year to upgrade and/or add to our existing inventory. At present there seems to be sufficient funding in our Instructional Supply and Equipment accounts in the Earth Science Program to handle the acquisitions.

**Objective #2:** Although no specific progress has been made on this Objective, there are still plans to create more Learning Environments and Interdisciplinary Teaching Experiences in the Program. Revitalizing the PHSC 1 course may be one of the first steps in this process. PHSC 1 – Physical Science for General Education is an interdisciplinary course in the Physical Sciences that ties together the basic principles of Geology, Chemistry, Meteorology, and Astronomy into one logical and meaningful structure. It is a four-unit



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GOAL	OBJECTIVE	ACTIONS/TASKS REQUIRED TO ACHIEVE OBJECTIVE	OUTCOMES, MEASURES, and ASSESSMENT
<p>Laboratory course and is already approved to transfer to the CSU/UC systems. The idea is to offer this course with two instructors team teaching. The recent hiring of a new Full-time Chemistry Professor may help to facilitate this sooner than later.</p> <p>Objective #3: During the last two years, we have acquired additional Multimedia and Audio-Visual Aids for the Earth Science Program. Specifically, we purchased new DVD's for the Oceanography Department as well as facilitating some new acquisitions by the Campus Library to be used in our Astronomy courses. Although progress has been made on this Objective, there are still deficiencies in a number of areas (such as Geology and Paleontology) that need to be addressed. Accordingly, additional requisitions will be submitted this year to add more Multi-Media and Audio/Visual aids to the educational resources in our Program. At present there seems to be sufficient funding in our Instructional Supply and Equipment accounts in the Earth Science Program to handle the acquisitions.</p> <p>Increased Completion and Success rates (See Section 1.B.) for the departments and courses in the program are an indication that we are making real progress in attaining our Objectives to satisfy this Goal.</p>			

### 3. Resources Required

List all significant resources needed to achieve the objectives shown in your action plan, 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.3.

**IMPORTANT:** A **BUDGET ALLOCATION PROPOSAL** must be completed and submitted for **EACH** new resource requested.

Goal #	Objective #	Resource Required	Estimated Cost	BAP Required? Yes or No	If No, indicate funding source
N/A	N/A	None Requested			
N/A	N/A	None Requested			
N/A	N/A	None Requested			