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Page 1: I. Program Reflection and Description

Q1 Department(s) Reviewed:

Earth Science-Geology, Oceanography, and Geography

Q2 Lead Author and Collaborators:

Lead Author: Caitlin Tems, Collaborator: Kathryn Nette

Q3 Dean:

Pam Kersey

Instructional Comprehensive Program Review

Q4 Provide a list of the recommendations from your last program review and explain how you have addressed them. Previous years' program reviews can be found here, on the IPRPC Intranet site.

The goals and recommendations of the Earth Science program from last year's annual program update included (1) stabilize the Earth Science disciplines (2) update curriculum and degree development (3) rebuild the reputation of the disciplines (4) develop high quality, authentic research driven programs.

The first step in stabilizing the Earth Science disciplines was hiring a full-time faculty member to lead the Earth Science Program, which was accomplished in Fall 2016. The budget and resources of the Earth Science discipline were greatly diminished without a full-time faculty member leading the discipline, and the faculty member hired is encouraging the reinstatement of discipline funds. The Program Review Committee also supports the reinstatement of funds, which they commented upon in their evaluation of last year's Annual Program Update. To promote further stabilization of the program, Earth Science faculty meetings are being held throughout each semester to develop a cohesive and inclusive discipline that promotes collaborative improvements to the program.

The Earth Science curriculum had not been updated for ten years prior to hiring the new, full-time faculty member. The faculty member has developed the curriculum for all Oceanography (OCEA 112, 113) and Geology courses (GEOG 104, 110, 111, 122) and updated the course outlines and student learning outcomes (SLOs) for all Oceanography and Geology courses, in addition to SLO updates to most Geography courses (GEOL 120, 121, 122). The updated SLOs will now allow for the assessment of all SLOs each semester in a standardized, efficient manner which will lead to valuable data and promote improvements in course design and student success. The curriculum for the Geography regional field studies course has also been updated and cross-listed as a Geology course (GEOG/GEOL 122). The field course will run for the first time in 10 years this upcoming Spring 2019. With the curriculum of courses updated, it leads the way for future degree development in all disciplines.

The first step in rebuilding the reputation of these courses has been to update curriculum and develop classes that engage students, bring data and current research into the classroom, while also providing a strong background in the foundations of Earth Science. To promote the disciplines and enrollment in courses at the community level, the full-time Earth Science faculty member has been participating in New Student Success Day Events and the Got Plans College Fair, developed and runs a Gear Up for Earth Science Workshop at the beginning of the semester in collaboration with the long-standing geography adjunct faculty member, and developed and distributes flyers about the program and important geoscience community events such as the Great California ShakeOut. The full-time faculty member has worked with Grossmont College faculty members to make updates to district-wide curriculum and has participated in field trips organized by Grossmont College to promote unity of the Earth Science Programs within the district. The Geography adjunct faculty have participated in meetings with San Diego State University (SDSU) to brainstorm ideas about how to increase enrollment in geography in community colleges to promote transfer into the SDSU undergraduate program. Current plans are materializing to continue to build strong relationships with other local universities in the Geology and Oceanography disciplines.

The development of high quality research driven programs is also well underway in the Earth Science disciplines. Current areas of research are introduced to all courses, and analysis of data is incorporated into class activities and lab exercises. All courses also include a field component to promote students applying what they learn in the classroom into the field environment and to encourage active learning. The full-time faculty member has also developed a collaboration with an early career professor at the Virginia Institute of Marine Science (VIMS) to promote science communication, expose students to current oceanographic research, and encourage students to pursue scientific studies.

Q5 Provide a list of tenured/tenure track faculty and support staff in the program as of fall 2016.

Caitlin Tems, Ph.D., Tenure Track Faculty (Year 3)

Donna Olson, Laboratory Technician (shared between Earth Science, Physics, Astronomy and Engineering)

Instructional Comprehensive Program Review

Q6 Provide your program's mission statement.

The Earth Science Program does not currently have a mission statement on file, and thus a new mission statement has been created and will be submitted for approval.

Please see the new mission statement below:

To train both aspiring scientists and non-scientists to understand and appreciate the world around them, think like scientists, have a strong foundation in Earth Science and current issues facing the planet, and be active members of their communities.

Q7 Describe how your program supports the mission and goals of the College.

The Earth Science Program, like the mission of the College, serves a diverse community of students who benefit from a wide range of educational opportunities in the Geology, Geography and Oceanography disciplines. The program and faculty members provide support for students who would like to transfer to a four-year institution to continue their education in Earth Science disciplines, and a primary objective of the program is to develop degree programs to further support the needs of the students in the program. The curriculum of each class is developed to promote economic, civic and cultural development of the students by introducing students to jobs/careers in Earth Science fields, incorporating the intersection of Earth's system and human impact and culture, and encouraging active participation in civic responsibilities. The program is working on developing published guided student pathways, and students are currently supported by the full-time faculty member who mentors and provides guidance to Earth Science majors. Students are provided with feedback and encouragement, while courses in each discipline and program events promote student engagement and active learning. Curriculum updates, the addition of new courses and SLOs, and regular discipline faculty meetings are improving and promoting the organizational health of the program. Classes within the program support the acceleration of basic math and English skills by incorporating writing assignments and quantitative math problems in each course pertaining to the Earth's system both of which reinforce those necessary skills. Students are also supported through individual meetings with the full-time faculty member to promote academic success in Earth Science courses.

Q8 Provide the description of your program as it appears in the current college catalog, available here.

There is not currently a program description provided in the course catalog. As part of this comprehensive program review, a program description was developed.

Please see a new program description below:

Earth Science an interdisciplinary science that focus on understanding the processes and interactions of Earth's system. Disciplines within Earth Science include Geology, Oceanography and Geography. Geology is the study of Earth's origin, structure, history and processes. Oceanography is study of the oceans from a geological, chemical, physical and biological prospective. Geography is the study of the Earth and the interconnectedness of all natural and cultural phenomena. Students interested in obtaining an Associate's Degree or transfer degree should major in University Studies: Science and Mathematics (area D). Careers in Earth Science include scientific research, teaching, natural resource management, environmental consulting, energy industry, mining, meteorology, cartography, urban planning, and environmental agencies.

Instructional Comprehensive Program Review

Q9 Degree/Certificate #1

Currently no direct degrees or certificates are offered for the Earth Science Program due to the lapse in a full-time faculty member for the better part of a decade. The newly hired full-time faculty member has developed and updated the curriculum of the courses and program to pave the way for the development of certificate and degree programs in each discipline within the Earth Science Program. Goals of the program include the development of Geography, Geology, and Oceanography degrees in the future. Additionally, to fortify the program and promote student success this program review recommends offering an Earth Science Certificate. The Earth Science Certificate will provide substantiation of the students' knowledge, laboratory and field skills which will improve their ability to find an entry level job in an Earth Science field. In the past one year period (semester Spring 2018 and Fall 2018), more than fifteen students have self-identified as Earth Science majors within the fields of Geology, Oceanography, or Geography. One of these students transferred to Scripps Institute of Oceanography at University of California San Diego for the Fall 2018 semester to pursue his Bachelor's degree in Atmospheric and Ocean Science, and additional students anticipate transferring to local universities for Fall 2019. Students must currently follow the degree path for University Studies: Science and Mathematics (area D).

Earth Science students pursuing degrees in Geology, Oceanography, or Geology can pursue the degree path of University Studies: Science and Mathematics (area D). Degrees in each discipline are needed to ensure transfer into programs at four year universities and ensure adequate preparation for upper level university courses in each respective discipline. These degrees will be articulated with UC and CSU four year institutions. While the development of these degree programs is underway, it would better serve the needs of the students to offer an Earth Science Certificate to reinforce their specialization, which would promote the student's accomplishments within the Earth sciences and the ability to find work within her/his chosen career.

University Studies: Science and Mathematics (area D) requires students to complete 18 units of study in science and mathematics (6 units in science, 6 units in mathematics, and 6 units in either science or mathematics). Currently all Earth Science courses are offered at least once a year. This will need to be maintained, with additional sections to promote growth in the Earth Sciences to meet the needs of the students and ensure that they can take the courses they need to graduate within two years. Introduction to Oceanography (OCEA 112) and Oceanography Laboratory (OCEA 113) are offered in both spring and fall semesters. Typically, OCEA 112 runs three sections each semester, however, one section has been cut for the 2018-2019 academic semesters despite Census data from the previous year showing growth of the program and supporting the need for three sections for Spring 2019. The two sections of OCEA 112 offered are offered on a Monday/Wednesday schedule, which automatically eliminates students who are only able to take classes on campus on Tuesday/Thursday from taking the course. The cancellation of the Tuesday/Thursday class in Fall 2018 forced many students to enroll in Oceanography courses offered at different institutions (such as Grossmont College), despite their expressed desire to take the course will the full-time Cuyamaca College faculty member. Physical Geography (GEOG 120) and Physical Geography Lab (GEOG 121) are offered on a semester basis, however, multiple sections of the courses have been eliminated and need to be reinstated to promote growth in this area. Geology courses are offered on an alternating basis, Earth Science (GEOL 104) is offered in the fall, while Planet Earth (GEOL 110), Planet Earth Lab (GEOL 111), and Regional Field Studies in Desert Environments (GEOG/GEOL 122) are offered in the spring semester. To meet the needs of the students and promote growth of the program, it is essential that each course be offered once a year at a minimum. To enable growth within the program and Earth Science classes, there must be reasonable accommodations for the fill rate of growth sections.

Q10 Degree/Certificate #2

Respondent skipped this question

Q11 Degree/Certificate #3

Respondent skipped this question

Q12 Degree/Certificate #4

Respondent skipped this question

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Q13 Please upload the awards data tables for your program. You can print that worksheet from the program review data report to PDF or copy and paste into a Word document the awards data table rows for your program from the college-wide program review data report, accessible here.

Respondent skipped this question

Page 3: III. Curriculum Review, Development and Assessment

Q14 Access the Five Year Curriculum Review Cycle. Have all of your active course outlines been reviewed within the last five years?

No

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Q15 Write a paragraph about any changes planned for the curriculum, both areas of revision and areas of development and growth.

The curriculum of all courses with the exception of two geography courses, World Regional Geography (GEOG 106) and Human Geography: The Cultural Landscape (GEOG 130), have been reviewed and updated according to the Five-Year Curriculum Review Cycle. The curriculum has been updated for every course offered in the Oceanography and Geology disciplines and for three of the five courses offered in Geography following the appointment of a full-time Earth Science faculty member in Fall 2016.

In Spring 2018, the curriculum for GEOG 122 Regional Field Studies was completely redeveloped and updated, with the course title updated and cross-listed as a Geology course (GEOG 122). This course will now focus on desert environments, and the addition of two more regional field studies courses centering around mountain and coastal environments are in the process of being developed. The regional field studies courses have not been offered at Cuyamaca College for more than a decade, and the revival of the course and development of additional field courses will support further development and growth of the Earth Science Program.

The curriculum for Oceanography and Geology classes has been revamped with the addition of a new full-time faculty member and the student learning outcomes have been rewritten and updated. The updated student learning outcomes reflect the curriculum updates and were developed to ensure the assessment of all student learning outcomes each semester. These changes will enable faculty members to collect useful data to assist in improving student learning in the courses. The course outlines of record for Introduction to Oceanography (OCEA 112) and Oceanography Lab (OCEA 113) were submitted and approved by the Curriculum Committee in Fall 2018. The curriculum and student learning outcomes have also been updated for Earth Science (GEOL 104), Planet Earth (GEOL 110), and Planet Earth Lab (GEOG 111) and will be submitted to the Curriculum Committee for approval this semester (Spring 2019).

The curriculum and student learning outcomes have been updated for three of the five Geography classes during Spring and Fall 2018. The Regional Field Studies course curriculum was completely redeveloped in Spring 2018, and the curriculum and student learning outcomes were updated for Physical Geography: Earth Systems (120) and Physical Geography: Earth Systems Lab (GEOG 121) during Fall 2018. Student learning outcomes for the Geography classes have been developed to allow for assessment of all student learning outcomes each semester, which will provide useful data in the assessment of student learning and show where improvement is necessary. Earth Science, GEOL 104, is a lecture course that also feeds into the Earth Systems Lab (GEOG 121). The process of cross-listing the Earth Systems Lab as a Geology course has begun, and the paperwork will be submitted the Curriculum Committee for approval early in Spring 2019 with the goal to have GEOG 121 cross-listed as GEOL 105 for the Fall 2019 semester. This update will allow for a more seamless transition for the students taking the Earth Systems Lab to compliment GEOL 104 and will promote enrollment in the laboratory course.

Updates to World Regional Geography and Human Geography: The Cultural Landscape were not given top priority because those courses are not offered this semester, Spring 2019. The curriculum and student learning outcomes of both courses will be updated this semester to ensure that they can be offered in future semesters. The promotion of these courses and the reinstatement of these courses will stimulate growth of the Geography discipline and the Earth Science Program at the college. Additionally, the development and implementation of a new Geographic Informational System (GIS) course into the Earth Science Program is planned. The implementation of this course will support the development of a GIS skill set to improve job placement and will also support the development of an Associate Degree in Geography. The ultimate goal is to cross-list this course with Surveying to also help meet the needs of the Surveying Program and promote enrollment.

Without the leadership of a full-time faculty member for the better part of a decade, the Earth Science Program has needed complete redevelopment. This redevelopment is well underway, and as a result students are more excited and enthusiastic about courses in the Earth Science Program.

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Q16 Do you have an assessment plan on file with SLOAC? If you have not already done so, you can submit your program's assessment plan to SLO Coordinator, Tania Jabour, at tania.jabour@gcccd.edu. **Yes**

Q17 Following that assessment plan, is your program's data up-to-date and complete in Nuventive/TracDat (including methods of assessment, results, dialogue/actions and follow-up)? If you are not sure, please contact Institutional Effectiveness Specialist, Erich Kevari, at erich.kevari@gcccd.edu to submit your assessment data. **Yes**

Q18 What student learning-related successes and challenges have SLO results revealed for your department? Note: If SLO data are not offering useful feedback regarding student learning, and are not currently informing program improvements, please instead discuss the specific steps you plan to take to make learning outcomes and assessments more meaningful.

The methods of assessment and collection of student learning outcome data has been refined in the past two and half years with the hire of a full-time Earth Science faculty member, and with consistent collection of data and standardized assessment methods SLO data has been useful in revealing areas of courses that need to be modified or updated. Official SLO assessment plans have been developed for each discipline that outline the SLOs that will be assessed for each course from Spring 2019 to Fall 2022. Prior to Spring 2019, an internal assessment plan was in place for the Earth Science Program. Under the direction of and in consultation with the Earth Science lead instructor, faculty assess two to five SLOs for each course they teach each semester. The number of SLOs for each course varies between seven and seventeen, thus the SLOs assessed each semester are assessed on a rotating basis to ensure the assessment of all SLOs every four years. Prior to the addition of a full-time faculty member, SLO data was reported by some instructors, however, the turnover in the disciplines made it extremely difficult to discern any significant patterns in the data. For the purposes of this review, SLO results will be limited to the past two and a half years. Overall, SLO assessment data has shown that the curriculum updates are benefitting the students with higher SLO assessment achievement rates across Earth Science Program courses in recent years. To show areas of improvement and patterns in SLO data, more details for each discipline is provided below.

Oceanography

In Fall 2016 three SLOs (#6, 8, and 10) were assessed for Introduction to Oceanography (OCEA 112) across all three sections taught. Both SLOs #6 and #8 were successfully achieved with an average success rate of 77.2% and 72.9%, respectively. Assessment of SLO #10 indicated a lower student success rate, 57.6%, and therefore the instructor adapted the approach and delivery of material on this topic by implementing more active learning techniques such as think-pair-share, gallery walks, one-minute papers and class activities that brought scientific data into the classroom. SLO #10 was evaluated again in Spring 2018, which showed that instructor adaptations and curriculum updates led to the achievement of this SLO with 78% of students passing the SLO assessment. Three different SLOs were assessed for OCEA 112 in Spring 2017. SLOs #2, #5, and #7 were assessed during this semester. SLO #5 was achieved with 73.3% of students passing the assessment, while SLOs #2 and #7 were slightly shy of the 70% pass rate with scores of 65.5% and 67.8%, respectively. The lack of success in these two SLOs was primarily driven by one section of the course that struggled despite being presented with identical information and adjustments implemented in the course to promote student success throughout the semester. To promote equity across the board, the instructor adapted instruction methods and incorporated additional active learning techniques and activities into the course to promote success. SLO #2 was reassessed in Fall 2017 and successfully achieved with 81.03% of students passing the SLO assessment. Likewise, SLO #7 was assessed again in Spring 2018 and students successfully achieved this SLO with 74.55% of students taking the course passing the SLO assessment. In Fall 2017, in addition to SLO #2, SLOs #4 and #12 were assessed and achieved with 86.27% and 90.91% success rates, respectively. Likewise, in Spring 2018 SLOs #1, #9, and #10 were also assessed and achieved with success rates of 74%, 78%, and 78% respectively. During Fall 2018, SLOs #2 and #3 were assessed and achieved with collective success rates of 84.6% and 79.5%, respectively. This shows that the improvements to the curriculum have led to continuous achievement of SLO #2. The updated curriculum for OCEA 112 Introduction to Oceanography has resulted in improved success in achievement of SLOs and data for the past year and a half has revealed consistent accomplishment of SLOs

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improved success in achievement of SLOs and data for the past year and a half has reveal consistent accomplishment of SLOs assessed each semester.

During the 2016-17 academic year, the SLOs for Oceanography Lab (OCEA 113) that were assessed include SLOs #2, 4, 5, 8, 9, 10. Students were successful in the majority of the SLOs with success rates of 58%, 80, 91.7%, 70%, 91.9%, and 80%, respectively. Students struggled more with SLO #2 which required them to analyze and interpret a specific data set, highlighting the need for students to have more training in critical thinking which was incorporated into the OCEA 113 curriculum as a result. SLO #2 was reassessed in Spring 2018 after modifications to the course were incorporated, which resulted in 93.33% of students passing this SLO assessment. During the 2017-2018 academic year SLOs 1, 3, 6, 9, and 12 were also assessed and students achieved all SLO assessments with success rates of 100%, 91.67%, 85.71%, 100%, 76.19%, respectively. In the most recent semester, Fall 2018, SLOs #5 and 9 were assessed with 100% success rates achieved for both SLOs. The curriculum and all laboratory exercises were redeveloped or updated by the full-time faculty member in Spring 2017 and, as the SLO assessment data shows, the redevelopment of this course has led to achievement of all SLOs assessed each semester and also indicates an increase in the percentage of students achieving the OCEA 113 SLOs.

Geology

In the Geology discipline, the courses taught are GEOL 104 (Earth Science), GEOL 110 (Planet Earth) and GEOL 111 (Planet Earth Lab). GEOL 104 is consistently taught in the fall semester while GEOL 110 and 111 are taught in the spring semester. In Fall 2016, SLOs #4, 8, and 13 were assessed and students fell slightly short of the 70% success rate on all accords. This course was completely redesigned in Fall 2017 and refined in Fall 2018 in response to the data. During Fall 2017, SLOs #2, 13, 14 and 17 were assessed and students successfully achieved all SLOs with success rates of 100%, 76.92%, 92.3% and 83.33%, respectively. In Fall 2018, SLOs #2, 12, and 15 were assessed and successfully achieved with success rates of 100%, 86.36%, and 100%, respectively. The data indicates that the redesign of the course, which focus on inquiry-based learning and incorporates active learning pedagogies, has increased student success rates in achieving student learning outcomes.

During Spring 2017, SLOs # 5, 7, 8 were assessed for GEOL 110 Planet Earth. Students successfully accomplished SLOs #5 and 8 with 83.3% and 87.5% of students passing the SLOs. SLO #7 was not quite accomplished with 66.67% of students passing this assessment. Additional activities have been incorporated into GEOL 110 to address this issue and to help solidify the concepts surrounding this SLO. In Spring 2018, SLOs # 2, 6, 7, 10 were assessed and successfully achieved with success rates of 100%, 91.67%, 83.33%, and 100%, respectively. The successful achievement of SLO #7 in Spring 2018 is due to improvements implemented as a result of the 2017 data.

During GEOL 111 Planet Earth Laboratory in Spring 2017, SLOs #4, 5, and 8 were assessed and successfully achieved with 70%, 70%, and 90% of students passing each SLO, respectively. In Spring 2017, the course centered around a previously used published laboratory manual that fell short of the needs of the class. Therefore, GEOL 111 was completely redesigned in Spring 2018, and the full-time faculty member wrote a new laboratory manual that focused on active and inquiry-based learning through laboratory experiments, exercises, and field trips. In Spring 2018, SLOs # 2, 3 and 7 were assessed and achieved with success rates of 77.78%, 70%, and 100%, respectively.

Geography

Without the leadership of a full-time Earth Science faculty member there was a significant lapse in consistent assessment of SLOs on a rotating basis and entering SLO assessment data into TracDat for courses within the Geography discipline. The full-time Earth Science faculty member has encouraged and supported efforts to assess multiple SLOs for each course offered each semester, for the data be uploaded to TracDat, and for the of redesign SLO assessments to better evaluate student learning.

During the 2016-17 academic year, World Regional Geography (GEOG 106), Physical Geography: Earth's System (GEOG 120), and Physical Geography: Earth's System Lab (GEOG 121) were offered. In GEOG 106, SLOs #4 and 9 were assessed and successfully achieved with success rates of 72% and 76%, respectively. In GEOG 120, SLOs #4, 8, 9, 10 were assessed with a success rates of 80%, 100%, 79%, and 100%, respectively. SLO #2 was assessed in GEOG 121 with 80% of students being successful. During the 2017-2018 academic year, in GEOG 120 SLOs 1, 3, 11 were assessed with average success rates of 93.33%, 68.5%, 86.49%, respectively. In Fall 2018, SLO # 1 was assessed and successfully achieved with an 83.33% success rate in GEOG 121 and SLO #10 was assessed and achieved with an 80.65% success rate in GEOG 120.

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Redesign of Student Learning Outcomes

Students are consistently achieving the SLOs of each Earth Science course, and when students struggle to achieve the SLOs, faculty use this feedback to improve the courses in these areas. When SLOs have not been achieved, they are reassessed the following semester to ensure that the changes to the course have had a positive impact on student learning. Changes in instruction in response to the data include complete redesigned of courses and the incorporation of more active learning techniques including think-pair-share, gallery walks, one-minute papers, the muddiest point principle, and class activities that encourage students to think critically about scientific data.

The faculty have been working within the constraints of previous SLOs developed by past instructors, which appear to be course objectives instead of student learning outcomes. The full-time Earth Science faculty member has been committed to updating the program's curriculum and SLOs for the courses within the three disciplines. The new SLOs have been written with a more holistic approach to learning and now focus on over-arching themes and skills the students learn in each course. Lecture courses now have six SLOs, labs have three SLOs, and field courses have seven SLOs to be assessed. The updates to the SLOs align with the goals of the College and greater community college community. All updated SLOs will be able to be assessed in any given semester a course is offered, which will provide useful data to help monitor and provide an accurate representation of student learning, discern significant trends over time in student learning, and show where improvement is needed in the courses. SLOS for GEOG 122 and GEOL 122 were approved by the Curriculum Committee in Spring 2018. SLOs for OCEA 112, OCEA 113, GEOG 120, and GEOG 121 were sent to the Curriculum Committee in Fall 2018. SLOs have been rewritten for GEOL 104, GEOL 110, and GEOL 111 and will be sent to the Curriculum Committee Spring 2019.

Q19 Do you have a PLO assessment plan on file with SLOAC? If you have not already done so, you can submit your program's assessment plan to SLO Coordinator, Tania Jabour, at tania.jabour@gcccd.edu. **Yes**

Q20 Please provide an analysis of your program learning outcomes (PLO) findings and what changes, if any were made as a result.

The Earth Science Program does not currently have program learning outcomes (PLO). New goals of the Earth Science Program include developing an Oceanography Transfer Degree and Geography Transfer Degree. Once the degrees are in place, PLOs will be developed for each degree pathway.

Q21 Is this a CTE Program? **No**

Page 4: CTE Programs Only

Q22 If a CTE program, provide a list of the committee members of your Advisory Committee, the chair's name, and the meeting schedule (e.g., twice yearly) **Respondent skipped this question**

Q23 Summarize the recommendations from the Committee. **Respondent skipped this question**

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Q24 Describe changes that have been made to the program as a result of the committee's recommendations

Respondent skipped this question

Q25 If a CTE program, please discuss your labor market information. You can access labor market information on the CTE Launchboard, CTE Program Reports that have been prepared for the Governing Board, or by contacting the IESE Office at brianna.hays@gccd.edu.

Respondent skipped this question

Page 5: IV. Program Data Analysis

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Q26 How has the program's student population changed over the past 5 years (e.g., student demographics, enrollment, etc.)? Note that you can access your program's data report and the college-wide data report [here](#).

Since the Earth Science Program encompasses three different disciplines, each discipline will be analyzed individually. In the Geology discipline, student demographics indicate that there has been a continuous increase in male students enrolling in classes and a greater fluctuation in the number of female students taking Geology courses. The majority of students taking Geology courses identify as Hispanic or white (of European and Middle Eastern descent). Enrollment of white students steadily decreased since Fall 2013 and is now beginning to stabilize with about 40% of students identifying as white. Enrollment of Hispanic students has shown more fluctuation, reaching a high point of 46% of students enrolled during the 2015-2016 academic year. Enrollment of Hispanic students is increasing again and is currently 24% of the students in Geology courses. The percentage of students identifying as a mixed race has been significantly increasing since Spring 2015, while the percentage that identify as African American, Native American, Filipino, and Pacific Islander are more slowly increasing (Figure IV 1A).

In Geography courses, the majority of students identify as either Hispanic or white. Over the last five years, on average 45% of students identify as Hispanic and 35% of students identify as white with overall variation between 30 and 54% of the total students enrolled. There has been inverse fluctuation in the two demographics, with the majority of students identifying as white between Spring 2014 and Fall 2015, identifying as Hispanic between Fall 2016 and Spring 2017, and again identifying as white Spring 2018. Students identifying as African American, Native America, Asian, Filipino, Pacific Islander, or of multiple races individually represent less than 10% of the students in geography courses (Figure IV 1B). There have been minor fluctuations the percentage of male and female students taking geography courses with an average of 48% of students identifying as female and 52% identifying as male.

Oceanography courses showed trends similar to Geography courses. In Oceanography courses, 49.9% of students identify as female and 49.3% as male. Like Geology and Geography disciplines, the majority of students taking Oceanography identify as either Hispanic (42%) or white (39%). The trends in the percent of students taking oceanography courses who identify as African American, Native American, Filipino, Asian or Pacific Islander show minor fluctuations but overall have relatively stable enrollment, with averages below 6% of the students. The number of students identifying as mixed races has increased in recent years and this group is the third most represented demographic of students (Figure IV 1C).

Exploring trends in enrollment data over the five-year time period is subjective due to a variety of factors including not having a full-time faculty member for a number of years, changes in course offerings, and changes in the number of courses offered each semester. This review will focus on the patterns in the data from Fall 2016 to Spring 2018 and explore the reasoning behind the trends. Enrollment in Earth Science classes declined from 2014-2017, however, enrollment has started to increase in 2018 (Figure IV 1D). These results are not surprising, considering that the program was lacking leadership and a full-time faculty member for many years. The full-time faculty member was hired at for the Fall 2016 semester and was not provided with materials that had previously been used in classes, therefore, it is impossible to directly compare success rates prior and post Fall 2016. As the new courses have been implemented, the full-time faculty member has continuously revised them based on student and colleague feedback, which has led to increased enrollment in Geology and Oceanography courses in recent semesters. Oceanography enrollment has remained relatively stable overall and there have been minor fluctuations in Geology enrollment. Significant decreases in enrollment appear to be in Geography, and the full-time faculty member will make it a priority to promote Geography classes and therefore increase enrollment. Increased enrollment in the courses offered has also been observed in Fall 2018 and Spring 2019, despite the cancellation of classes and decisions to not offer additional sections based on incorrect data. In order to increase enrollment and support growth in the program, the course offerings must be managed based on correct institutional data and with a growth mindset.

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Q27 How does the program's student population differ from the College's overall student population, if at all? Note that you can access your program's data report and the college-wide data report here.

College-wide 53.8% of students identify as female while 45.4% identify as male. This is not vastly different from the composition of students taking Earth Science courses. Earth Science courses, specifically Geology and Geography, appear to attract a slightly higher percentage of males compared to females. Unfortunately, this is not out of the ordinary for science courses. A concerted effort will be made to promote female enrollment in the courses through promotion of the Earth Science Program.

The majority of the students college-wide identify as white (45.8% on average) or Hispanic (32.2% on average). The next largest majority is students of mixed races (8%), followed by African-American students (6%), Asian (3.2%), Filipino (2.7), Native American (0.4%), and Pacific Islander (0.2%) (Figure IV 2A). This indicates that students enrolling in Earth Science courses are generally representative of the college-student population, while there is a higher enrollment of Hispanic students in both Oceanography and Geography courses.

Enrollment at Cuyamaca College in the last few years has remained relatively stable with only minor increases in enrollment (on average the trend is an increase of 146 students per semester which is 0.7% increase in student enrollment) prior to Spring 2017 (Figure IV 2B). Enrollment with the Math, Science, and Engineering Division shows similar minor increases (an average of 186 students per semester) reaching a maximum of 7,232 students in Spring 2017. In the past academic year (2017-2018), there has been a 2% decrease in student enrollment college-wide. With the Earth Science Program lacking support for a significant period preceding the hire of a new full-time faculty member in Fall 2016, and without significant increases in enrollment college-wide, it is not unrealistic that the Earth Science Program enrollment decreased until 2018. By Spring 2018, the new full-time faculty member had taught Geology and Oceanography courses at least once and the curriculum had been updated and was then further adjusted to meet student needs. Efforts to promote the program at STEM campus events, New Student Success Day, college fairs, and the development and implementation of Gear Up for Earth Science Workshops have likely contributed to the improved enrollment. Recent increases in enrollment in Earth Science courses due to curriculum updates and stabilization of the program show excellent promise for future enrollment. Increases in Earth Science enrollment is a testament to the enormous effort to redevelop the courses and reputation of the program. It is impressive that Earth Science enrollment is increasing despite recent decreases in college-wide enrollment.

Q28 What are the implications for ensuring the program is addressing the needs of its student population?

The College and the Earth Science Program serve a diverse group of students, and it is critical to address the needs of all student populations participating in courses and the program. One of the primary goals of the Earth Science Program has been to promote diversity and create an inclusive and collaborative program. This is supported in the classroom through active learning, the development of low-stakes assignments that help students stay on track with course material, and frequent feedback from the professor about class progress and recommendations about how to succeed in courses. Students are also supported outside of the classroom through individual meetings with the Earth Science faculty to discuss educational goals, pathways through Earth Science, research and internship opportunities, and any course related questions.

The program will continue to promote inclusion and diversity through additional efforts. With a significant majority of students identifying as Hispanic it could be beneficial to provide tutors with a similar background who have been successful in the course. Research has shown that students who can identify with scientists in the field are more likely to pursue a field of study, thus there will be an active effort to incorporate the contributions of Hispanic, African American, and mixed race Earth scientists into courses.

Many students who attend Cuyamaca College and participate in the Earth Science Program are non-traditional students, who are balancing work and family responsibilities in addition to pursuing their academic studies. To address the needs of this population it is important to offer courses that are scheduled to take place in the evening. A Physical Geography course has offered in the evenings in past semesters and an Introduction to Oceanography course will be offered in future semesters to meet this need.

Instructional Comprehensive Program Review

Q29 If you would like to attach any charts or additional documentation (aside from the program review report prepared by the IESE Office), please upload it using the button below.

Program Data Demographic Analysis Figures.pdf(120.2KB)

Q30 How has the program's success rate across all courses changed over the past 5 years?

Without consistent instruction or standardization in Geology and Oceanography courses, it is difficult to discern meaningful patterns over the entire five-year period. A new full-time faculty member started at the beginning of Fall 2016 semester and was not provided with previous materials used in courses, therefore the curriculum and all course materials from scratch with three to six preparations each semester. Without having any knowledge of the courses taught prior to Fall 2016 or the materials used it is not possible to accurately compare data before this time. With the development of all new course materials, success rates in Geology initially declined, which is to be expected with a complete curriculum revamp. After the courses were developed, they have been continuously adjusted per student and colleague feedback, and success rates in Geology courses has substantially improved and are trending upward. A good example of this is represented in the Fall 2017 and Fall 2018 data. GEOL 104 was completely redeveloped in Fall 2017 to make the course center around inquiry based learning, which led to the development and implementation of many activities and new online homework assignments. Students who took the course that semester were very capable, however, many students did not submit assignments which had a negative impact on their grade. In Fall 2018, new homework assignments were implemented to promote student learning and success and student success skyrocketed, with 87% of students succeeding in the course (Figure IV 3). A complete redesign of Oceanography courses, OCEA 112 Introduction to Oceanography and OCEA 113 Oceanography Laboratory, also occurred during the 2016-17 academic year. This led to an initial decrease in student success, however, success in these courses has increased in the 2017-2018 academic year as the courses have been modified to meet student needs (Figure IV 3). While there has been some turnover in Geography adjunct faculty members, there has been one adjunct faculty member, Dr. Farano, who has taught in the program for many years. The continuity and consistent support of Dr. Farano has led to an increase in student success in Geography courses since Fall 2015 and is currently at 75% (Figure IV 3).

Q31 The College has set a 2024 goal of reaching a 77% course success rate (students passing with a grade of A, B, C, or P out of those enrolled at census) for the College as a whole. Consider how your will program help the College reach its long-term goal of increasing the course success rate to 77%. Your program may have a program-specific goal for program-wide success rate that differs from the college goal, based on historical or contextual data/information. This is intended to provide a goal for improvement only; programs will not be penalized for not meeting the goal. What is your program's one-year (2019/20) goal for success rate across all courses in the program?

The Earth Science Program supports the College goal of increasing success rates. Success rates are improving in Geology, Oceanography, and Geography disciplines after the development of new and improved courses. The one year goal of the Earth Science Program is to increase success rates to 70% for each discipline within the Earth Science Program.

Instructional Comprehensive Program Review

Q32 Which specific groups (by gender and ethnicity) have success rates lower than that of the program overall?

In Geology courses, there is a small difference in the rate of success of female versus male students. In the past five years, on average 81% of females have been successful compared to 76% of males. Success rates for students who identified as Hispanic or white did show more variation. White students had higher rates of success (average 76%), while Hispanic students had lower success rates (65.6%) (Figure IV 4A). Due to smaller numbers of students enrolling in courses that identified with other demographics, it is not possible to identify significant patterns between the semesters. The average success rates over the five-year period were as follows: African American students 68%. Native American students 66.7%, Asian students 75.3%, and mixed race students 79.33%.

The patterns in success rate based on student demographics in geography courses are similar to those observed in Geology courses. On average female students are more successful than male students with success rates of 67% and 59%, respectively. Students identifying as white have an average success rate of 64%, while students identifying as Hispanic have lower success rates of 58% (Figure IV 4B). Students identifying with multiple races and ethnicities have the highest average success rate with 69% of students being successful in geography courses. Due to fewer students identifying as African American, Native American, Asian, Filipino, or Pacific Islander average success data and trends in success data are less reliable for these groups.

In Oceanography courses, female and male students have similar success rates with minor variations over the past five years. On average, 66.5% of female students are successful and 66% of male students are successful. On average students identifying as white have higher success rates (70.8%) when compared to Hispanic students (62.3%), however, in recent semesters the trend is changing and a higher percentage of Hispanic students are successful (Figure IV 4C). Students identifying as Filipino have high success rates with 80.8% of students being successful. Students identifying as Native American have an average success rate of 75%, while Asian students have a success rate of 70%, and mixed ethnicities are successful 66.9% of the time. The outlier in the oceanography data is African American students who on average have been successful only 50% of the time in the past five years.

Q33 What program (or institutional) factors may be contributing to these lower rates of success for these groups of students?

Students are not traditionally exposed to Earth Science disciplines in much detail during their primary and secondary education (K-12). Thus, students taking these courses are typically learning all the information for the first time, which means that they can feel more overburdened by concepts introduced in the courses. It is critical to design classes to be approachable and modify classes to meet student needs and to provide resources for students on campus to support their success in the courses beyond the resources provided in the classroom. Resources to support Earth Science students outside of class were not in place prior to Fall 2016, when the program was without a full-time faculty member. When the full-time faculty member was hired, she supported and encouraged expanding the tutoring offerings at the STEM Achievement Center to bring on-board Oceanography and Geology/Geography tutors and also makes herself readily available during office hours to assist students.

Language barriers are a significant contributing factor that impact the differences in success rate of students that identify as Hispanic. There are no prerequisite classes required for students to take Earth Science courses, however, these are college level courses and it is imperative that students are able to read and write in English at a college level prior to taking any science courses. Due to the close proximity of the college to the US-Mexico border, students who have never studied in English are doing so for the first time when they begin their college careers at Cuyamaca, which is an impressive undertaking. These students also face other challenges including family members not being able to provide support in English at home, familiarity and guidance through the college system, and long commutes to and from campus. There need to be more resources available for this demographic of students to promote success.

Q34 What specific steps will the program take to address these equity gaps in the 2019/20 academic year?

Courses and student learning outcomes have been drastically redeveloped and curricula of each course is constantly assessed to provide well balanced classes that students are able to successfully navigate, which also helps them develop skill sets to help them establish their careers. Special efforts will be made to increase student success by incorporating innovative active learning techniques, promoting culturally responsive instruction, reducing textbook costs, increasing the accessibility of instructors during office hours.

Instructional Comprehensive Program Review

promoting equity, responsive instruction, reducing textbook costs, increasing the accessibility of instructors during office hours, bringing student tutors (from different backgrounds) on board, and providing individual mentorship as needed.

Active learning techniques are currently incorporated into all classes and their use will be expanded in upcoming semesters. The integration of techniques including think-pair-share, gallery walks, one-minute papers, jigsaws, class activities that bring scientific data into the classroom, and the muddiest point principle have helped engage students in learning while also promoting equity in the classroom by fostering the participation of all students taking the course. Faculty will also strive to actively incorporate more culturally inclusive instruction into courses. Research has shown that when students can identify with scientists who have made contributions to a field of study, it increases student motivation and engagement with the course content. An active effort will be made to include important discoveries and contributions from scientists with diverse backgrounds. New collaborative science communication activities have been developed with the Virginia Institute of Marine Science (VIMS) to connect Cuyamaca College Oceanography students with diverse graduate student researchers to learn about current research in the field and gain a better understanding of different careers and pathways in the geosciences. This project was implemented in one OCEA 112 section for the first time in Spring 2018 and received overwhelmingly positive feedback from students. Student surveys were conducted before and after the activity and the qualitative results show that the interchange between undergraduate and graduate students resulted in a better understanding of oceanography as an important component of Earth's system, helped students identify important areas of oceanographic research, and increased their understanding of how to use the scientific process to conduct a research project. The activity also resulted in students having a better understanding of possible career paths in science. The project is being expanded and will be incorporated into all OCEA 112 sections this Spring 2019.

A top priority of the Earth Science Program is to continue to integrate local field trips that align with specific learning objectives into each course. Taking the students out of the traditional learning environment of the classroom and showing them how information they are learning is applicable to the real-world environment allows them to see education in a new light. Introducing students to a new setting and a new way to learn helps neutralize stigmas students may associate with the classroom. Students are more open and responsive to their instructors and classmates when in the field, which helps bring less prepared students up to speed with their more prepared classmates. With this in mind, a new Regional Field Studies course, which is centered around two field trips, will be offered for the first time in a decade Spring 2019. The goal of this course is to promote student engagement in the Earth Science Program, while also helping students develop necessary skills for conducting scientific studies in a field environment. Two additional field courses are in the planning stages to offer a wide variety of field experience for Earth Science students, and to promote engagement and motivation in their studies.

To address equity gaps, the Oceanography and Geology laboratory courses have been redesigned in the past two years to focus on hands-on lab experiments, activities, and field trips and to encourage students to analyze and synthesize the data they collect to promote understanding of oceanographic and geologic concepts. Part of the redesign of the courses involved writing new laboratory manuals for each course, which significantly reduces textbook costs for the students and makes the course more accessible to students. The OCEA 113: Oceanography Lab Manual is printed for the students and available at the bookstore for approximately \$10. The GEOL 111: Physical Geology Lab Manual is made available to the students through Canvas, and thus textbook costs are limited to the cost of printing the lab.

A Gear Up for Earth Science Workshop has been created and will be run at the beginning of each semester to introduce students to their professors, teach students about possible career paths in the Earth Sciences, study skills and how to approach scientific textbooks, and increase familiarity with the campus through a field trip to the Water Conservation Garden. The purpose of this Workshop is to improve equity and increase success rates in classes.

The Earth Science Program has always offered a class in the evening to promote equity for students who are working full-time or have family responsibilities that inhibit their ability to enroll in courses offered on the more traditional schedule between 8 am and 5 pm. In the past, this course has been GEOG 120 Physical Geography. Courses within Oceanography have been flourishing, which is represented by the discipline consistently achieving the highest percentage of the maximum WSCH (weekly student contact hours) to FTEF (full-time equivalent faculty) when compared to geography or geology. Informal student feedback has also reinforced the need for an OCEA 112 offering that meets on a different schedule. Offering an evening course will increase accessibility of Oceanography courses and promote equity.

Q35 How do these activities inform the long-term program goals that you are setting in this comprehensive program review?

Analysis of success rates, enrollment, and student demographics has provided important feedback about areas of the Earth Science Program that need to be addressed. Increases in enrollment in recent semesters after the curriculum overhaul are promising and provide encouragement to faculty that their hard work to increase enrollment is working and should be continued and expanded. Monitoring success rates in classes has informed faculty when courses need be modified to promote increased student learning and higher rates of student success. Analysis of demographics and student success of demographics has shown that the majority of students taking courses are Hispanic, which tend to have lower success rates than other demographics. This has informed the program's goal to improve student success and equity, promote culturally responsive teaching, and provide additional resources for students.

Q36 If you would like to attach any charts or additional documentation (aside from the program review report prepared by the IESE Office), please upload it using the button below.

IV Program Data Analysis Success Rate.pdf(51.1KB)

Q37 Does your program offer any courses via distance education (online)? **No**

Page 6: Distance Education Course Success

Q38 Are there differences in success rates for distance education (online) versus in-person sections? **Respondent skipped this question**

Q39 If there are differences in success rates for distance education (online) versus in-person classes, what will the program do to address these disparities? **Respondent skipped this question**

Page 7: Strengths, Challenges & External Influences

Instructional Comprehensive Program Review

Q40 Please describe your program's strengths.

The Earth Science Program curriculum has been completely redeveloped in the past-two years to focus on inquiry-based learning and promote student success and equity in the geosciences, which is a great strength of the program. This includes ensuring the curriculum of each course is up-to-date with recent advances in the field, incorporation of innovative active learning techniques and technology into the classroom, development of class activities that bring scientific data into the classroom, the creation of hands-on experiments and lab exercises that promote the utilization of the scientific method, and the integration of field experiences into each course. Additionally, the incorporation of collaborative science communication activities in Earth Science courses that give Cuyamaca College students an opportunity to connect with diverse researchers in Earth Science fields is unique aspect of the Earth Science Program. The integration of a strong field component to courses and to the Earth Science Program is a great strength of the program. Field experiences provide students with the opportunity to apply what they are learning in the classroom to natural phenomena is the ultimate form of active learning. Additionally, new lab manuals have been written by the full-time faculty member to promote problem-based learning and utilization of the scientific process in all lab classes which ensures that the content taught is up-to-date and reduces the textbook costs for students.

The new full-time Geology/Oceanography faculty member and the long-term geography adjunct faculty member are assets that strengthen the Earth Science Program. Faculty are committed to rebuilding the program and its reputation at the college, which they have shown by redeveloping all courses to center around active learning, by promoting the program at all college events, New Student Success Days, and local college fairs, by distributing program and course flyers around campus, and creating an Earth Science Gear Up Workshop for students at the beginning of the semester to promote student learning.

The Earth Science Program also promotes the use of institutional data in planning and scheduling decisions. Data indicates that Earth Science lecture courses have the highest enrollment rates when they are offered during the 11 am - 12:15 pm and 12:30 -1:45 pm blocks. Almost all lecture sections (except for one evening class) are offered during these time blocks to promote enrollment and meet student needs. The laboratories, that complement each lecture and meet once a week, are scheduled to coincide with one of the course lecture days to accommodate students that are only able to take courses on campus two days a week (typically either a Monday/Wednesday or Tuesday/Thursday schedule).

Q41 Please describe your program's challenges.

The Earth Science Program was without a full-time faculty member for six years (and many years prior due to the Geography full-time faculty member serving two consecutive terms as Academic Senate President before his departure from the college) before a new Geology/Oceanography full-time faculty member was hired in Fall 2016. Without someone to lead and support the program, the budgets for all disciplines were significantly and permanently reduced, the curriculum of the courses was out-of-date and not standardized between sections or semester, student learning outcome assessment was sporadic, and enrollment and student success in courses decreased. The new full-time faculty member has made it a top priority to rebuild the program, however, it is impossible for these challenges to all be remedied immediately upon the hire of a full-time faculty member. The curriculum is now up-to-date and has been standardized between semesters and sections, student learning outcomes have been updated and are assessed on a regular basis, and enrollment and student success in classes are beginning to increase.

Instructional Comprehensive Program Review

Q42 Please describe external influences that affect your program (both positively and negatively).

Geology, Geography, and Oceanography disciplines have limited funding, which makes it difficult to maintain the integrity of the programs. Increases in funding to previous levels would provide the needed support to ensure updates to classroom and lab equipment, and support field trips. Since this program has been entirely rebuilt and there must be room for growth for the program to flourish. In recent semesters classes, classes have been cancelled due the number of students enrolled being slightly less than the desired 78% fill rate, which has inhibited the growth of the program by turning away many students interested in taking the courses. It was also brought to the attention of the full-time faculty member that incorrect Census data was used to decrease the course offerings in the program, which needs to be rectified in future semesters.

The location of Cuyamaca College provides an excellent outdoor classroom for students to study the Earth Sciences first hand. Field trips are the ultimate form of active learning and have shown to increase student motivation and engagement in classes. Local field trips have been developed and implemented into each Earth Science course and a new regional field studies has also been developed to promote active, field based learning.

Page 8: V. Previous Goals: Update (If Applicable)

Q43 Would you like to provide an update for your previous Goal(s)? **Yes**

Page 9: Previous Goal 1

Q44 Previous Goal 1:

Stabilize the Earth Science Disciplines

Q45 Link to College Strategic Goal(s): **Student Validation and Engagement**

Q46 Goal Status **In Progress - will carry this goal forward into this year's comprehensive program review**

Q47 How was the goal evaluated? If the goal is "in progress," how will it be evaluated?

A full-time faculty member was hired in Fall 2016 to teach all Oceanography and Geology classes. All Geology and Oceanography classes have been redeveloped since the new faculty member was hired but supplies are limited due to the compromised budget. To stabilize and increase enrollment the discipline has been promoted at campus STEM events, New Student Success Days, the Got Plans College Fair and flyers have been distributed around campus to promote enrollment in courses. Faculty members meet regularly throughout the semester to establish an inclusive and cohesive program and to develop wide events to promote the Earth Sciences. New field courses have also been developed to encourage enrollment and promote interest in the program. Analysis of program data shows enrollment and student success has increased in recent semesters due to these efforts, and students are successfully achieving student learning outcomes in each course. The final step for stabilization of the program is to secure increases to the budget of the Geology and Geography disciplines in order to maintain supplies, keep courses current, and support field courses.

Instructional Comprehensive Program Review

Q48 Please provide the rationale for this goal:

To completely stabilize the Earth Science Program, the program needs to secure the funding for each discipline that they had previously.

Q49 Please provide the goal action steps for the year (previously "Activities"):

Funding to stabilize the disciplines will be requested in this Comprehensive Program Review.

Q50 Do you have another goal to update? **Yes**

Page 10: Previous Goal 2

Q51 Previous Goal 2:

Update Earth Science Curricula and Student Learning Outcomes

Q52 Link to College Strategic Goal(s): **Basic Skills Acceleration**, **Student Validation and Engagement**, **Organizational Health**

Q53 Goal Status **Completed**

Q54 How was the goal evaluated? If the goal is "in progress," how will it be evaluated?

The curricula and course materials have been redeveloped for all Oceanography and Geology classes. New activities and assignments have also been incorporated into Geography courses. Oceanography and Geology labs have been redeveloped by the full-time faculty member to create experiment based, hands-on learning experiences for the students. SLOs for courses have been rewritten to allow for all SLOs to be assessed seamlessly each semester and provide a holistic approach to student learning. SLOs of six courses have been approved by the Curriculum Committee (OCEA 112, OCEA 113, GEOG 120, GEOG 121, GEOG 122, GEOL 122) and the remainder of course SLOs are ready to be submitted to the Curriculum Committee the semester.

Q55 Please provide the rationale for this goal: **Respondent skipped this question**

Q56 Please provide the goal action steps for the year (previously "Activities"): **Respondent skipped this question**

Q57 Do you have another goal to update? **Yes**

Page 11: Previous Goal 3

Q58 Previous Goal 3:

Develop and Implement TMC for Geography & GIS Course

Q59 Link to College Strategic Goal(s)

Basic Skills Acceleration ,
Guided Student Pathways ,
Student Validation and Engagement

Q60 Goal Status

In Progress - will carry this goal forward into this year's comprehensive program review

Q61 How was the goal evaluated? If the goal is "in progress," how will it be evaluated?

This goal will be evaluated by the implementation of the GIS course into the geography curriculum and the approval for a TMC in geography. Quantitative data concerning success rate, retention, and degrees conferred will be used to further evaluate this goal in addition to qualitative data collected through student surveys at the beginning and end of the course.

Q62 Please provide the rationale for this goal:

Currently, there are not specific Geography, Geology or Oceanography degrees for transfer and thus students must enroll in University Studies: Science and Mathematics (area D) when they would like to specialize in these disciplines. By offering a TMC in geography, it enables students guaranteed transfer into the CSU or UC system in their chosen discipline. The new HSI STEM grant will also support the development of additional degrees including Oceanography and Geology. To achieve this goal, a Geographic Information System (GIS) course must be developed and implemented. Implementing a GIS course will have a positive impact on all students at the college, not only Geography, Geology and Oceanography students. GIS is a core technology in the sciences and has many business applications. Giving students the opportunity to incorporate this technique into their skill set will promote success in their academic studies and careers. This course also will serve to teach other potential students who want to come to the college to learn this specific technology to support their job goals and requirements.

Q63 Please provide the goal action steps for the year (previously "Activities"):

A GIS course needs to be added to the Geography curriculum to develop a degree in Geography. All other courses needed are in place. While this course still needs to be developed, an adjunct faculty member has the skill set to develop and teach this course. New equipment is needed to implement this new course. New computers were purchased in 2016 (and are used in all Earth Science classes) that are capable of handling Arc GIS software required for the course. The GPS units that the college currently has are not mapping grade GPS units and will not be adequate for teaching the GIS class to support Surveying, Geography, and Geology. Fortunately, the Science and Engineering Department was recently awarded a STEM Guided Pathways and Transformation Teaching Practices Grant which will support the purchase of the GPS units needed. We will need to purchase an Arc GIS license on a yearly basis for the course.

Instructional Comprehensive Program Review

Q64 Do you have another goal to update? **Yes**

Page 12: Previous Goal 4

Q65 Previous Goal 4:

Redevelopment and Implementation of GEOG 122: Regional Field Studies

Q66 Link to College Strategic Goal(s) **Basic Skills Acceleration**, **Guided Student Pathways**, **Student Validation and Engagement**

Q67 Goal Status **Completed**

Q68 How was the goal evaluated? If the goal is "in progress," how will it be evaluated?

The course outline of record was significantly updated to focus on Regional Field Studies of Desert Environments and approved by the Curriculum Committee in Spring 2018. GEOG 122 was also cross-listed as GEOL 122 in Spring 2018 to serve the needs of both Geography and Geology students in the Earth Science Program. The course is being offered for the first time in over a decade this semester, Spring 2019.

Q69 Please provide the rationale for this goal: **Respondent skipped this question**

Q70 Please provide the goal action steps for the year (previously "Activities"): **Respondent skipped this question**

Page 13: VI. New Goals

Q71 Would you like to submit any new goal(s)? **Yes**

Page 14: New Goal 1

Q72 New Goal 1:

Continue to Increase enrollment and Student Success Rates in All Courses

Instructional Comprehensive Program Review

Q73 Link to College Strategic Goal

Basic Skills ,
Acceleration
Guided Student ,
Pathways
Student Validation and ,
Engagement
Organizational Health

Q74 Please provide the rationale for this goal:

Enrollment and student success is increasing in courses in the Earth Science Program after the redevelopment of the program, however, the goal is to continue to increase enrollment and to increase student success to an average of 70% in each discipline to keep the program on track to meet the College goal of 77% success in classes by 2024.

Q75 Please provide the goal action steps for the year (previously "Activities"):

Faculty members have been actively engaged in increasing enrollment in the discipline by developing new courses and curricula, by promoting the Earth Science Program at STEM events, New Student Success Days, the Got Plans College Fair, and distributing flyers around campus to promote enrollment in courses. Success rates in courses are continuously monitored through analysis of program data. Courses are and will continue to be updated to meet student needs and promote student success. Additional efforts will be made to promote student success in all student demographics by developing new methods to promote diversity in course offerings.

Q76 How will the goal be evaluated?

Analysis of program data will occur on a continuous basis to assess short and long-term trends in enrollment, overall student success rates, and student success in different demographics.

Q77 Do you have another new goal?

Yes

Page 15: New Goal 2

Q78 New Goal 2:

Develop an Earth Science Certificate

Q79 Link to College Strategic Goal

Guided Student ,
Pathways
Student Validation and
Engagement

Instructional Comprehensive Program Review

Q80 Please provide the rationale for this goal:

Currently, there are not specific Geography, Geology or Oceanography Associate Transfer Degrees or an Earth Science Certificate, and thus students interested in the Earth Sciences must enroll in University Studies: Science and Mathematics (area D) when they would like to specialize in these disciplines. Developing an Earth Science Certificate will allow students to specialize in the field and will provide verification of the geoscience skill set and knowledge the students have gained by participating in the program. Substantiation of their knowledge, laboratory and field skills will help students find employment in entry level jobs in the Earth Science field. Geology students at Cuyamaca College have run into obstacles finding entry level jobs in their field while pursuing their studies due to a lack of experience and the ability to show verification of their skills. Developing a Certificate will help support student success and employment by providing substantiation of their skills and knowledge.

Grossmont College, which is within the same community college district, implemented the development of multiple geography-based certificates this fall with the same intent of promoting employment in the Earth Science fields, setting a precedent for the development of certificate programs in the Earth Science Program. Certificates will also provide a tangible goal for students and will provide a way to recognize student achievement and success in the Earth Science Program. This idea has been discussed and is supported by other full-time faculty members in the Science and Engineering Department.

Students who intend to complete the Earth Science Certificate and/or be Oceanography, Geology or Geography major will be encouraged to join the STEM Majors Cohort program supported by the HSI STEM Grant.

Q81 Please provide the goal action steps for the year (previously "Activities"):

The development of an Earth Science Certificate will be investigated in the upcoming year with the goal of implementing the Certificate shortly thereafter. The Earth Science Certificate will be designed by determining the combination of courses required for completing the certificate. To accomplish the development of this certificate, certificates offered in other sciences and across the College will be analyzed to guide the development of the Earth Science certificate.

Q82 How will the goal be evaluated?

The first step of the plan is to investigate the implementation of a certificate. This portion of the plan will be evaluated by the completion and results of this investigation. The second part of the plan to implement an Earth Science Certificate, will be evaluated and determined successful when the Earth Science Certificate is approved by the Curriculum Committee and offered to students.

Q83 Do you have another new goal?

Yes

Page 16: New Goal 3

Q84 New Goal 3:

Develop Two Additional Regional Field Studies Courses Focused on Mountain and Coastal Environments

Instructional Comprehensive Program Review

Q85 Link to College Strategic Goal

Basic Skills ,
Acceleration
Guided Student ,
Pathways
Student Validation and
Engagement

Q86 Please provide the rationale for this goal:

Understanding how to apply what students learn in the classroom to the field environment is critical aspect of studying any of the Earth Sciences disciplines and field experiences increases student engagement and motivation in the disciplines. In the past when students could take a course more than once for credit, the GEOG 122 field course could be modified each semester to investigate a different region. This is no longer the case; therefore, each field course must have its own course number and course outline. GEOG/GEOL 122 was redesigned in Spring 2018 to focus on desert environments and the goal is to develop two additional field courses centered on mountain and coastal environments. This will give students comprehensive field experience in these three major environments.

Q87 Please provide the goal action steps for the year (previously "Activities"):

Two new courses will be developed and will be cross-listed as both Geology and Geography courses. New course outlines will be written and submitted to the Curriculum Committee with the appropriate paperwork for approval. Once the courses are approved by the Curriculum Committee, the courses will be incorporated into Earth Science Program course offerings.

Q88 How will the goal be evaluated?

The approval of the new course outlines by the Curriculum Committee and the implementation of courses into course offerings will be evidence of success of this goal.

Q89 Do you have another new goal?

Yes

Page 17: New Goal 4

Q90 New Goal 4:

Develop a Biological Oceanography/Marine Biology Transfer Degree

Q91 Link to College Strategic Goal

Guided Student ,
Pathways
Student Validation and ,
Engagement
Organizational Health

Instructional Comprehensive Program Review

Q92 Please provide the rationale for this goal:

All courses needed to complete a Biological Oceanography/Marine Biology Transfer Degree are offered at Cuyamaca College with the exception of an undergraduate seminar course in oceanography. The lower division courses required for Marine Biology Degree at UC San Diego include Calculus I-III; General Chemistry I-III; Physics based Mechanics, Electricity and Magnetism, Wave, Optics and Modern Physics; General Biology, Cellular Biology, and Organismic and Evolutionary Biology. These classes are offered at Cuyamaca College as MATH 180, 280, and 281; CHEM 141 and 142; PHYC 131, 190, 200, and 210; BIO 130, 230, and 240. Due to the proximity of UC San Diego, student would have the option of taking in the undergraduate oceanography seminar at UC San Diego while enrolled at Cuyamaca College or taking the course after transferring into the program.

Developing this degree pathway will also support the HSI STEM Grant that the Science and Engineering Department received in 2016. Students who intend to major in Biological Oceanography/Marine Biology will be encouraged to join the STEM Majors Cohort. The STEM Major Cohort program promotes equity by creating a support system and fostering the development of science skill sets to increase student success in courses and completion of degrees. The lead Earth Science faculty member is already involved in promoting the STEM Major Cohort at New Student Success Day Events, the Got Plans College Fair, and organized and facilitated a field trip for the STEM Major Cohort to La Jolla Biologics (a biotech firm) during Summer 2017. She is also currently co-teaching the SCI-100 course, Success in STEM, which has been developed for the STEM Major Cohort to promote student success and equity.

Q93 Please provide the goal action steps for the year (previously "Activities"):

This year we will investigate that the courses at Cuyamaca College do in fact serve as an equivalent course to the courses students are required to take at UC San Diego. Once this is confirmed, a degree pathway will be developed and sent to the Curriculum Committee for approval.

Q94 How will the goal be evaluated?

The first step is to evaluate if it is possible to implement this transfer degree pathway. The second step is to evaluate if the transfer degree has been implemented. Approval from the Curriculum Committee to implement the degree and subsequent implementation will determine if the goal is successful.

Q95 Do you have another new goal? **Yes**

Page 18: Resources Needed to Fully Achieve Goal(s)

Q96 Is the program requesting resources this year to achieve this goal? **Yes**

Page 19: VII. Faculty Resource Needs

Q97 Are you requesting one or more faculty positions to achieve this goal? **No**

Page 20: Faculty Position Request(s)

Instructional Comprehensive Program Review

Q98 Please remember to complete the Faculty Position Request Form (accessible here, under Staffing Request Information) for this position that you are requesting and upload it using the button below. The Faculty Position Request Form (In Word) can be located here (under Staffing Request Information). Brief Description of the Position Requested:

Respondent skipped this question

Q99 Faculty Position Request 1 - Related Program Goal(s):

Respondent skipped this question

Q100 Faculty Position Request Upload 1: Please upload the completed faculty request form using the button below. You can access the Word version of the Faculty Position Request Form here (under Staffing Request Information).

Respondent skipped this question

Q101 Faculty Position Request 2 (if applicable): Please remember to complete the Faculty Position Request Form (accessible here, under Staffing Request Information) for this position that you are requesting and upload it using the button below. The Faculty Position Request Form (In Word) can be located here (under Staffing Request Information). Brief Description of Position Requested:

Respondent skipped this question

Q102 Faculty Position Request 2 - Related Program Goal(s):

Respondent skipped this question

Q103 Faculty Position Request Upload 2: Please upload the completed faculty request form button below. You can access the Word version of the Faculty Position Request Form here (under Staffing Request Information).

Respondent skipped this question

Page 21: VIII. Classified Staff Resource Needs

Q104 Are you requesting one or more classified positions to achieve this goal? **Yes**

Page 22: Classified Staff Position Request(s)

Instructional Comprehensive Program Review

Q105 Classified Staff Position Request 1: Please remember to complete the Classified Staff Position Request Form (accessible here, under Staffing Request Information) for this position you are requesting. Brief Description of Position Requested:

We request a Science Lab Technician III CL-36 position to cover the first shift. Currently, Earth Science, Physics, and Engineering share one technician who works the second shift and covers 22 labs and 29 lecture sections across six disciplines supporting over 830 students and 15-20 faculty members. Lack of a first shift technician to support daytime labs disproportionately hurts disadvantaged students. This request is being jointly made with Physics and additional documentation has been submitted with the Physics Annual Update.

Q106 Classified Staff Position 1 Related Program Goal(s):

Stabilize the Earth Science Disciplines (Previous Goal #1), Develop and Implement TMC for Geography & GIS Course (Previous Goal #3), Continue to Increase Enrollment and Student Success Rates in All Courses (New Goal #1), Develop an Earth Science Certificate (New Goal #2), Develop Two Additional Regional Field Studies Course Focused on Mountain and Coastal Environments (New Goal #3), Develop a Biological Oceanography/Marine Biology Transfer Degree (New Goal #4)

Q107 Classified Staff Position Request Upload 1: Please upload a completed Classified Position Request Form using the button below. You can access the Word version of the Classified Position Request Form here (under Staffing Request Information).

2018-19 Classified Position Request Form.docx(408.9KB)

Q108 Classified Staff Position Request 2: Please remember to complete the Classified Staff Position Request Form (accessible here, under Staffing Request Information) for each position you are requesting. Brief Description of Position Requested:

Respondent skipped this question

Q109 Classified Staff Position 2 Related Program Goal(s):

Respondent skipped this question

Q110 Classified Staff Position Request Upload 2: Please upload a completed Classified Position Request Form using the button below. You can access the Word version of the Classified Position Request Form here (under Staffing Request Information).

Respondent skipped this question

Page 23: IX. Technology Resource Needs

Q111 Are you requesting technology resources to achieve this goal?

Yes

Page 24: Technology Request(s)

Instructional Comprehensive Program Review

Q112 Technology Request 1: Please remember to complete a Technology Request Form for each request. You can access the online Technology Request Form here: [Technology Request Form](#).

Description:	Instructor laptop for the Earth Science classroom. The instructor laptop has not been working for two years and a student laptop is currently being used in place of an instructor laptop.
One time or On-going	One time
Amount Requested \$	924.04
Related Program Review Goal:	Continue to Increase Enrollment and Student Success Rates (New Goal #1), Stabilize the Earth Science Disciplines (Previous Goal #1)

Q113 Technology Request 2: Please remember to complete a Technology Request Form for each request. You can access the online Technology Request Form here: [Technology Request Form](#).

Respondent skipped this question

Page 25: X. Perkins and Strong Workforce Resource Needs

Q114 Are you requesting Perkins and/or Strong Workforce resources to achieve this goal?	No
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Page 26: Perkins Request and Strong Workforce

Q115 Perkins Request and Strong Workforce 1: Please remember to complete the Perkins Request Form and submit it via the annual Perkins/Strong Workforce request process/cycle.

Respondent skipped this question

Q116 Perkins Request and Strong Workforce 2: Please remember to complete the Perkins Request Form and submit it via the annual Perkins/Strong Workforce request process/cycle.

Respondent skipped this question

Page 27: XI. Supplies/Equipment Resource Needs

Q117 Are you requesting supplies and/or equipment resources to achieve this goal?	No
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Page 28: Supplies/Equipment Request(s)

Instructional Comprehensive Program Review

Q118 Supplies/Equipment Request 1: In the boxes below please provide information on your request. Supplies/Equipment requests will be considered on a one-time funding basis. Respondent skipped this question

Q119 Supplies/Equipment Documentation 1: Please upload any supplies/equipment quotes or additional documentation for this request. Respondent skipped this question

Q120 Supplies/Equipment Request 2: In the boxes below please provide information on your request. Supplies/Equipment requests will be considered on a one-time funding basis. Respondent skipped this question

Q121 Supplies/Equipment Documentation 2: Please upload any supplies/equipment quotes or additional documentation for this request. Respondent skipped this question

Page 29: XII. Facilities Resource Needs

Q122 Are you requesting facilities resources to achieve this goal? Yes

Page 30: Facilities Request

Q123 Facilities Request 1: Please provide the information below and remember to complete the online Facilities Request Form, accessible here: [Facilities Request Form](#)

Description:	Replacement of the old chalk board in the Earth Science classroom (H-224) with a white board
Amount Requested \$:	3000
Related Program Review Goal(s)	Increase Enrollment and Student Success Rates in All Courses (New Goal #1), Develop Two Additional Regional Field Studies Courses Focused on Mountain and Coastal Environments (New Goal #4), Stabilize the Earth Science Disciplines (Previous Goal #1)

Q124 Facilities Request 2: Please provide the information below and remember to complete the online Facilities Request Form, accessible here: [Facilities Request Form](#) Respondent skipped this question

Page 31: XIII. Professional Development Resource Needs

Instructional Comprehensive Program Review

Q125 Are you requesting professional development resources to achieve this goal? **Yes**

Page 32: Professional Development Request

Q126 Professional Development Request 1: Please provide the information identified below and follow the process for requesting professional development funds, outlined here.

Description:	Funding for the full-time faculty member to attend the Earth Educators Rendezvous
Amount Requested \$:	1500
Related Program Review Goal(s):	Increase Enrollment and Student Success Rates in All Courses (New Goal #1), Develop an Earth Science Certificate (New Goal #2), Develop Two Additional Regional Field Studies Courses Focused on Mountain and Coastal Environments (New Goal #3), Develop a Biological Oceanography/Marine Biology Transfer Degree (New Goal #4), Stabilize the Earth Science Disciplines (Previous Goal #1), Develop and Implement TMC for Geography & GIS Course (Previous Goal #3)

Q127 Professional Development Request 2: Please provide the information identified below and follow the process for requesting professional development funds, outlined here. **Respondent skipped this question**

Page 33: XIV. Other Resource Needs

Q128 Are you requesting any other resources to achieve this goal? **Yes**

Page 34: Other Resource Request

Instructional Comprehensive Program Review

Q129 Other Resource Request 1: Other resource requests will be considered on a one-time funding basis. Please fill in the information below.

Description:

Increases of \$1,000 to the Geology budget and \$600 to the Geography budget are needed to support the goal of stabilizing the Earth Science Program, maintain the courses that are currently in place, and support continuous the development of new courses and curriculum. Drastic budget cuts were made when the discipline did not have a full-time faculty member, and thus we need to recover some of the funds to help purchase new equipment for each discipline. Currently, Geology has a budget of \$500 and the Geography budget is \$900. New geology labs were developed Spring 2018 and due to reduced funding not all lab materials needed could be purchased during the 2017-2018 academic year. The Geology budget for the current academic year has been largely utilized to support the development of labs last year. The Geography lab course will be redeveloped in Fall 2019 and funding needs to be in place to support the implantation of new experiments and exercises that promote active learning in the lab. These additions will provide an annual budget of \$1,500 for each discipline.

Amount Requested \$:

1600

Related Program Review Goal(s):

Stabilizing the Earth Science Disciplines (Previous Goal #1), Develop and Implement TMC for Geography & GIS Course (Previous Goal #3), Continue to Increase Enrollment and Success in All Earth Science Courses (New Goal #1), Develop an Earth Science Certificate (New Goal #2)

Instructional Comprehensive Program Review

Q130 Other Resource Request 2: Other resource requests will be considered on a one-time funding basis. Please fill in the information below.

Description:

Additional funds are needed to support the GEOG/GEOL 122 Regional Field Studies of Desert Environments course and the two new field courses that are currently being developed. This course centers around two field trips, a local one-day field trip and a multi-day field trip farther afield. To provide transportation for the students and pay for campsites and park entrance fees additional funding from the College is necessary. Approximately \$800 is needed to rent two suburban vehicles for the field trips (3-4 days), \$100 for campsites, and \$100 for park entrance fees.

Amount Requested \$

1000

Related Program Review Goal(s):

Develop Two Additional Regional Field Studies Courses Focused on Mountain and Coastal Environments (New Goal #3)

Page 35: Executive Summary

Q131 Executive Summary

The mission of the Earth Science Program is to train both aspiring geoscientists and non-scientists to understand and appreciate the world around them, think like scientists, have a strong foundation in Earth Science and current issues facing the planet, and be active members of their communities. To achieve this mission the curriculum and courses in the Geology, Oceanography and Geography disciplines have been redeveloped in the last two years to focus on inquiry-based learning and promote student success and equity in the geosciences. This includes ensuring the curriculum of each course is up-to-date with recent advances in the field, incorporation of innovative active learning techniques and technology into the classroom, development of class activities that bring scientific data into the classroom, the creation of hands-on experiments and lab exercises that promote the utilization of the scientific method, the integration of field experiences into each course, the development of a regional field studies course, and the development of new student learning outcomes.

The Earth Science Program was without a full-time faculty member for six years (and many years prior due to the Geography full-time faculty member serving two consecutive terms as Academic Senate President before his departure from the College) before a new Geology/Oceanography full-time faculty member was hired in Fall 2016, which has created challenges for the program. Without someone to lead and support the program, the budgets for all disciplines were significantly reduced, the curriculum of the courses was out-of-date and not standardized between sections or semester, student learning outcome assessment was sporadic, and enrollment and student success in courses decreased. The new full-time faculty member has been working avidly to rebuild the program, which has led to increased excitement among students about Earth Science courses, and increased enrollment and student success rates in classes in recent semesters.

To maintain and foster growth of the Earth Science Program, it is important that the funds originally allocated to the Geology and Geography disciplines are reinstated and funding is made available to support regional field studies courses. Another challenge that the program is facing is cancellation of course offerings due to enrollment being slightly below a 78% fill rate and decisions to not schedule Earth Science courses based on incorrect institutional data. Since the program has been completely redeveloped in the last two years, it is critical that growth of the program is supported by the administration and there is room allotted to foster growth.

A major goal of the Earth Science Program is to continue to increase enrollment and student success rates across all demographics to keep the program on track to meet the College goal of 77% success rates by 2024. This will be supported by continuous updates to courses and curriculum to meet student needs, development of additional resources to support student success, and promotion of the program at the College and in the community. New courses, guided pathways, and degree programs will also be developed to support this goal.

Q132 Are you ready to submit your program review? If you click "No," you will be redirected to the start of the program review module. **Yes**
