Earth Science Annual Program Review 2019

I. PROGRAM DESCRIPTION: In one or two paragraphs, provide a description of the primary goals of your program or service area. Attach an appendix to describe your program or service area in more detail, if needed.

Note: If no changes have occurred, copy and paste from last year's review.
If it exists, feel free to copy the brief description of your program from the college catalog:
http://www.smc.edu/CollegeCatalog/Pages/default.aspx

There are four diversified and yet, integrated, academic programs within the Earth Science department: Anthropology, Astronomy, Geography and Geology. We also have Career Education (CE; formerly CTE, Career Technical Education) programs housed within the Earth Science Department under the over-arching umbrella of the Sustainable Technologies Programs (STP): Solar Photovoltaic Installation (PV); Recycling and Resource Management (RRM); and Energy Efficiency (EE). Although we are a diversified academic department, housing four separate disciplines and our CE programs, we have many common objectives including fostering the following behaviors and attitudes in our students as they participate in our courses:

- Promote intellectual inquiry using the Scientific Method.
- Recognition of environmental and cultural diversity.
- Intellectual curiosity about the evolution of humankind, the Earth and the Universe.
- Develop basic discipline-specific literacy and currency in Anthropology, Astronomy, Geology, Geography, and STP.

The Earth Science Department has 11 full-time faculty and approximately 25-30 part-time faculty. The Earth Science Department has accomplished a great deal in terms of active involvement in college communities, engagement with the business community through our Advisory Boards and internship partnerships, and development of programs that are beneficial to our students.

We offer two state-approved Certificates in Achievement: 18-unit Recycling and Resource Management and 19-unit Solar Photovoltaic Installation. We also offer six departmental certificates: 8-unit Basic Solar Photovoltaic Installation; 14-unit Solar Photovoltaic Installation; 13-unit Energy Efficiency Specialist; 12-unit Recycling and Resource Management; 15-unit Geospatial Technology Certificate; and 12-unit Cultural Resource Management Certificate. We are in the process of developing a state-approved 18-unit Geospatial Technology Certificate of Achievement. There are also two Associate Degrees offered: AA/AS in Solar Photovoltaic Installation, and AA/AS in Recycling and Resource Management.

We have also created AA-T degrees Geography and Anthropology, and we are in the process of creating an AS-T degree in Geology. **(The investigation of a possible AS-T degree in Astronomy found no transfer model curriculum template at the California Community Colleges Chancellor's office website.)** Pathway models were recently created for Anthropology, Astronomy, Geography, Geology, EE, PV, and RRM.

II. PARTNERSHIPS:

(CE only):

Part 1:

Industry advisory meeting dates and attendance for 2018-2019. Insert additional rows as needed:

Date of meeting	# of SMC attendees	# of non-SMC attendees
Geospatial Technologies IAB Meeting: June 28, 2019	1	6
Sustainable Technologies Program: March 28, 2019	6	6

Part 2:

Employer partnerships/collaborations in 2018-2019 (insert additional rows as needed):

Employer Name	Type of partnership or collaboration: • Advisory attendance • Internship site • Donations • Job placement • Other	Optional: Additional information about partnership or collaboration
City of Santa Monica	Advisory attendance, Geospatial Other: curriculum consulting	Curriculum development contract with Joel Cesare in Office of Sustainability; SMC hosting Alt-Car Expo in Fall 2019, in planning now
LA Sanitation & Environment	Advisory attendance	
National Weather Service, NOAA	Advisory attendance	
Arup Los Angeles	Advisory attendance Internship site	Internship development anticipated in Fall 2019, deferred from this year

Grid Alternatives	Contractual joint training: roof PV installations; have placed ~10 students	Continuing relationship; reciprocal sharing of expertise; job fair marketing
JS Solar (Josh Sanchez)	Guest speaker	
USGBC-LA	Internship site (in 2019)	Collaborated for Greenbuild-LA (2017)
Sustainable Works	Other	Collaboration on outreach to high schools; STP faculty invited as judges for City's Sustainable Quality Awards

III. PROGRESS SINCE LAST REVIEW (LAST YEAR'S OBJECTIVES):

Identify the original objectives from your last review as well as any new objectives that have emerged since then (if applicable).

For each objective, determine status and explanation for status.

Objective #1 - GEOGRAPHY	Status	Status Explanation
Investigate the viability of developing a Geospatial Technology CTE program **Area/ Discipline/ Function Responsible:** GEOG: GEOGRAPHY **Assessment Data and Other Observations:** Other data or observed trends Examination of labor market data **External Factors:** Other Factors The department will work with the Workforce & Economic Development Program and the Career Technical Education Program to establish the Geospatial Technology CTE Program. **Timeline and activities to accomplish the objective:** March – April 2018: • Survey government agencies,	no longer pursuing	Although Jobs in geospatial technologies consistently rank among the top growth industries (U.S. Bureau of Labor Statistics, 2018), the positions in this field require a Baccalaureate degree (at a minimum) with a preferred Master's degree. CTE programs are designed to provide students skills for immediate employment in a field. Our Geospatial Technologies Certificate, while a valuable tool for students, cannot guarantee job placement with only the certificate and/or an AA/AS degree. We will instead create a state-approved 18-unit Certificate of Achievement on Geospatial Technology. We have obtained the latest labor data, and we are currently in the process of inviting more employers to serve on the advisory board and consulting current board members. We are expecting to submit the proposal at the end of June 2019.

industrial companies, non-governmental organizations, and non-profit organizations for employment opportunities and the highly demanded skills required by those employers. • Survey other local institutions to see how successful their Geospatial Technology programs are and how we can make the program in Santa Monica College distinguished from others. May – July 2018: • Form the employer advisory board based on the employer survey. • Design the program contents and outcomes that fulfill the employers' requirements. The program should be designed to avoid any unnecessary duplication of similar programs offered in the near institutions. • Submit the notice of Intent to Los Angeles Orange County Regional Consortium (LAOCRC) by the end of July. August – September 2018: • Finish the application form and other required materials; submit the application to LAOCRC by the end of September. **Describe how objective will be assessed/measured:** The objective will be assessed by the success of establishing the program, the success data of students participating the program, and the satisfaction of employers on the advisory board. **Comments:** An employer survey is being prepared by Institutional Research. Local employers are being contacted, as well as other community colleges that are offering Geospatial Technologies Certificates.		

Objective #2- Geology	Status	Status Explanation
Develop an AS-T of Geology	ongoing	Geology 5 Historical Geology with Lab was successfully edited and submitted to the curriculum committee. It was sent on with non-substantial changes to the Chancellor's office for approval.
Area/ Discipline/ Function Responsible: GEOL: GEOLOGY		Assuming that Geology 5 is approved, we will move forward to submit the AS-T in Fall 2019.
Assessment Data and Other Observations:		In the past, an AS-T for Geology was submitted and rejected in part because of missing C-ID's for Geology 5 and also for required Chemistry courses. The GEOL AS-T requires those Chemistry courses which do not have C-IDs at this time. We will submit the AS-T again once we have the C-ID for Geology 5.
Other data or observed trends		
Growth of demand of geology courses		
To help prepare students for Pathways		
External Factors:		
Other Factors		
Courses in the AS-T require a C-ID.		
Timeline and activities to accomplish the objective:		
Fall 2018: • Investigate what caused the AS-T in Geology to be rejected by the Chancellor's office in the past. • Coordinate with curriculum officer to ensure that all Geology courses in AS-T will meet state requirements for C-ID Spring 2019: • Update the GEOL 5 Historical Geology with Lab course outline to meet requirements for C-ID • Submit GEOL 5 to department for vote and then to curriculum committee • Present GEOL 5 to curriculum committee and answer any questions from members. Fall 2019: • Submit AS-T Geology to Chancellor's office for approval		

Describe how objective will be assessed/measured: The objective will be assessed by the success of submitting the course and the AS-T to the appropriate committees and offices. **Comments:**		

IV. ACHIEVEMENTS:

(Optional) List any notable achievements your program accomplished in the last year.

Anthropology:

- Creating two new distance education classes in anthropology (Anthropology 1 & Anthropology 2).
- Creation on Cultural Resource Management (CRM) Department Certificate.

Geography:

-Creation of two new distance education classes in Geospatial Technologies: GIS 26 (Introduction to Remote Sensing), and GIS 27 (Applications in GIS).

Vicki Drake was awarded "Educator of the Year," by the California Geographical Society in May 2019. This award is given to educators who go above and beyond regular teaching duties to truly make a positive impact on students, colleagues, and college through finding creative ways to make the material accessible to their students, staying up-to-date with best practices and applying for grants to help enhance instruction.

Developed the Geography Guided Pathway in Fall 2018 and are currently working on developing a Geospatial Technologies Pathway to be completed by end of Summer 2019.

Geology

Updated the course outline for Geology 5 and submitted it to the state for approval and C-ID.

Developed the Geology Guided Pathways in Spring 2019 and we are currently working on creating a Geology AS-T which we are prepared to submit as soon as we have the C-ID for Geology 5.

Lisa Collins submitted a field course for Global Studies Spring Break 2020 and the course was unanimously selected by the Global Citizenship Committee. She is awaiting final approval from the executive committee and the Academic Senate.

V. ASSESSMENT AND EVALUATION

Part 1: Outcomes and Evaluation Results

A. Reflect on the outcome assessment (PLO, SLO, UO) data that your program reviewed in the current year (2018-2019) that have yielded ***notable*** or ***actionable*** findings. Insert additional rows as needed.

Note: It is not required that you mention every outcome assessed in your program.

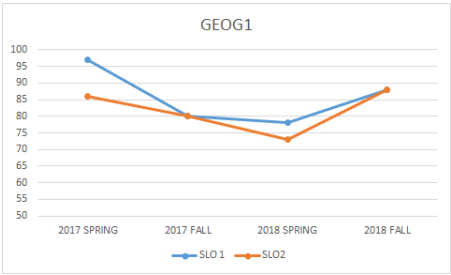
<table>
<tr><th>What outcome were you assessing?</th><th>How was the outcome assessed?</th><th>What were the results of the assessments?</th><th>Describe any changes that are planned or in progress to address the results</th></tr>
<tr>
<td>For 2018-2019, the Geography Program focused on SLO #1 and 2 for the Geography 1 and Geography 5 classes. Geography 1 (Introduction to Physical Geography) and Geography 5 (Physical Geography with Lab) are pedagogically the same class, except that Geography 5 also includes a lab section. The lab section of Geography 5 includes experiential learning as the students solve real-life problems, develop mapping skills, and learn to apply the geographical principles presented in lecture.

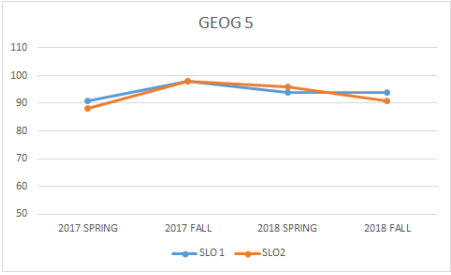
SLO # 1 Demonstrate an understanding of maps and the skills needed to manipulate spatially-oriented data in a map format.

SLO # 2:
Students will identify the processes and forces that are changing our atmosphere, lithosphere, hydrosphere, and biosphere and will realize that powerful</td>
<td>Specific exam questions are used to assess this outcome.

Additionally, projects and reports were also used as assessment tools.</td>
<td>The average success rates* on SLO 1 and SLO 2 for both classes were greater than 80%. However, the success rates on both SLOs were higher in GEOG 5 than in GEOG1:

<table>
<tr><td></td><td>GEOG 1</td><td>GEOG 5</td></tr>
<tr><td>SLO1</td><td>85.75%</td><td>94.25%</td></tr>
<tr><td>SLO2</td><td>81.75%</td><td>93.25%</td></tr>
</table>
*the average success rates are the average number of the four semesters: 2017 Spring & Fall, 2018 Spring & Fall

In terms of time, we see the success rates on the two SLOs in GEOG1 decreased in 2017 Fall and 2018 Spring, but increased in 2018 Fall
 

The success rates on the two SLOs in GEOG 5 are stable from 2017 Spring to 2018 Fall with slight variation.
 

</td>
<td>We think the relatively low success rates in GEOG 1 are due to the lack of the lab component, in which students have the time and opportunity to practice and apply the knowledge leaned in class to solve real-world problems.

Given the nature of GEOG1, a lecture course without lab, we will keep investigating effective pedagogies to improve the success rates. We have found class demonstrations, reading apprenticeship, and community building have improved the learning experience and outcomes in GEOG1 classes.</td>
</tr>
</table>

connections exist.			

B. Reflect on other effectiveness data you collected and analyzed for the program this year.

1a: Course Success and Retention (Instructional Depts Only)
After reviewing the course success and retention rates for your program, describe how these rates reflect the overall effectiveness of your program, and discuss any planned changes or actions your program plans to take to address the results (if applicable). *Access data in Tableau (http://tableau.smc.edu)*

Anthropology: Based on fall 2018 data, our retentions rates are slightly higher than the College (Anthropology = 83.7%; SMC = 82.7%). However, our overall success rate is lower than the College (Anthropology = 66.0%; SMC = 68.7%). The lower success rate differentially affects our African American and Hispanic/Latino students in a negative manner (see further discussion in section 1b below).

Geography: One of the biggest challenges for Geography is to firstly, recruit Latinx and African-American students into our courses. Working with STEM and other campus programs, we are attempting to enroll more under-represented students into our courses. Once enrolled, under-represented students tend to need more support in terms of tutoring and other student services. Geography has had a tutor for its courses for the past several years, especially for the lab courses (Geography 5) as one means of closing the equity gap. Faculty have participated in SMC-sponsored workshops, including The Center for Teaching Excellence, to further close the gap through best practices.

1b: Racial and Other Equity Gaps for Course Success (Instructional Depts Only)
After reviewing the course success rates by ethnicity/race and other demographic variables, identify any equity gaps, and discuss any planned changes or actions your program plans to take to address the gaps (if applicable). *Access data in Tableau (http://tableau.smc.edu)*

Anthropology: Equity gaps continue to persist in the Anthropology Program. Our largest equity gaps are among our African American (Anthropology = -19.4%; SMC = -13.2%) and Hispanic/Latino (Anthropology = -10.1%; SMC = -7.1%) students.

In the fall, our department had a presentation by our data coaches that highlighted the equity gaps that continue to persist. The recognition of where we need to improve is an important first step in addressing equity gaps.

In the past few years, our full time Physical Anthropologist has implemented changes to address equity gaps. These include 1) following up with students that are absent or have not turned in class work, 2) providing exam make-up and extra credit opportunities, 3) adding more graded assignments so that students have more opportunities to improve their grade, 4) bring in new learning materials (worth over $60,000) that are accessible to students, 5) allowing students to select the office hours that are most convenient for them, 6) setting up four Physical Anthropology tutors at STEM Center and the Science Learning Resource Center, 7) making canvas more student -friendly and including a FAQ section, 8) walking students to the STEM, the SLRC and office on the first day of classes, 9) updating the syllabus to be more equitably minded and provide students with helpful resources, and 10) regularly attending equity-focused meetings to

share ideas and learn from colleagues across the campus. These equity-minded approaches provide a model for other classes and programs to follow.

Like many Programs on campus, we have a disproportionate ratio of part-time to full-time faculty. The hiring of more full-time faculty will go a long way to addressing equity gaps.

Geography: The Geography Program utilizes a variety of evaluation measurements to guide planning. Among the most important measurements we have is access to quantifiable data which includes student success and retention rates (in comparison to SMC college-wide data). Based on the data tables from the Data Dashboard (2017-2018), a few trends are noted including:

- Gender equity Gap
    - Slightly lower rates for female geography students, while a higher rate is seen for male geography students, was noted in comparison with college-wide trends.

      Female: Success 69.5% (-1.8% equity gap) - Retention 83.9% (-1.3% equity gap)

      Male: Success 73.2% (+1.9% equity gap) - Retention 86.6% (+1.4% equity gap)

- Age Equity Gap
    - Below 19: Success 72.6% (+1.34% equity gap) - Retention 85.8% (+0.7% equity gap)
    - 20-24: Success 87.2% (+2.0% equity gap) - Retention 73.3% (+2.1% equity gap)
    - 25-29: Success 70.1% (-1.2% equity gap) - Retention 82.6% (-2.6% equity gap)
    - 30-39: Success 52.9% (-18.4% equity gap) - Retention 72.5% (-12.6% equity gap)
    - 40-49: Success 61.3% (-10.9% equity gap) - Retention 71.0% (-14.2% equity gap)
    - 50+ : Success 76.2% (+4.9% equity gap) - Retention 90.5% (+5.3% equity gap)

The Geography program has made great strides in reducing the equity gap in Success and Retention rates for African-American students:

	Fall 2015:	Fall 2016	Fall 2017	Fall 2018
Success	-19.8%	-30.5%	-31.2%	-15.1%
Retention	-4.2%	-6-8%	-18.9%	-1.5%

However, there is more work to do to reduce the equity gap in Success and Retention rates for Latinx students

	Fall 2015:	Fall 2016	Fall 2017	Fall 2018
Success	-9.9%	-9.6%	**-14.7%**	**-13.6%**
Retention	-2.6%	-3.7%	-5.3%	-5.6%

Geology: The Geology Program is committed to eliminating equity gaps. As we look forward and determine how to best serve our students, we examine the trends in equity gaps and retention so far. Based on the data tables from the Data Dashboard (2017-2018), a few trends are noted including:

- Gender equity Gap
    - Slightly lower rates for female geology students, while a higher rate is seen for male geology students, was noted in comparison with college-wide trends.

Female: Success 78.6% (-0.8% equity gap) - Retention 90.0% (-1.3% equity gap)

Male: Success 80.0% (+0.6% equity gap) - Retention 92.7% (+1.5% equity gap)

- Age Equity Gap
  - Our age equity gaps are largest in our non-traditional or returning students
  - Below 19: Success 83.1% (+3.8% equity gap) - Retention 92.8% (+1.5% equity gap)
  - 20-24: Success 77.3% (-2.1% equity gap) - Retention 91.6% (+0.3% equity gap)
  - 25-29: Success 72.7% (-6.6% equity gap) - Retention 84.8% (-6.4% equity gap)
  - 30-39: Success 92.3% (+12.9% equity gap) - Retention 100% (+8.7% equity gap)
  - 40-49: Success 75% (-4.4% equity gap) - Retention 75% (-16.3% equity gap)
  - 50+ : **** no data from Fall 2018

The Geology program has seen a positive trend in a decreased equity gaps for Black students, although there is still a lot of work to do to eliminate the gaps all together.

	2015-15	2016-17	2017-18
Success	-16.0%	-18.9%	-8.9%
Retention	-4.7%	-11.5%	-6.8%

For our Latinx students, we have seen an even larger reduction of equity gaps. This data is exciting as we serve a larger percentage of Latinx students in Geology courses than the average SMC population.

	2015-15	2016-17	2017-18
Success	-6.2%	-4.9%	-0.6%
Retention	-2.1%	-1.9%	**+1.3%**

2: Degrees and Certificates (Instructional Depts Only)

After reviewing the numbers of degrees and certificates awarded by your program, describe how the data reflect the overall effectiveness of your program, and discuss any planned changes or actions your program plans to take to address the results (if applicable). *Access data in Tableau (http://tableau.smc.edu)*

Number of students receiving an AA/T degree in **Geography**:
2015-2016: 3
2016-2017: 3
2017-2018: 2

Number of students receiving **Geospatial Technologies Department Certificate**

2018-2019: 4

Astronomy:

The Astronomy Program is also committed to working towards a reduction in equity gap. As we refine our ability to best serve our student population, we have also studied the trends reported from the Data Dashboard (2017-2018). Even though the physical sciences have typically been stereotyped as male-dominated fields, the equity data for our astronomy program at SMC show a rising trend in the proportion of female astronomy students from 47% in 2013 to 50% in 2015 ahead to 53% by 2018. The aggregate astronomy student gender data for those five academic years in (2013-2018) show that female students have outnumbered male students in total by a 3% margin (51.3% to 48.4%.)

Over the same five-year period, our ratio of African-American astronomy students increased from 6% to 9%, while the subset of Asian and Hispanic students statistically maintained nearly constant levels of 11% and 40%, respectively. The data show that the astronomy discipline has had above average success compared with campus-wide efforts to extend the diversity of our students across the full spectrum of ethnic and gender identifications.

Anthropology:

The CRM Department Certificate was approved in the fall 2018 semester. Based on current student interest, we expect to award between 3-8 certificates in spring 2019, and another 5-10 certificates in the summer 2019 semester.

3: Additional Data Demonstrating Effectiveness (If applicable)
If available, describe the results of other data indicating the effectiveness of the program and discuss any planned changes or actions your program plans to take to address the results.

Examples of other data include: surveys, document reviews, observations, performance indicators, focus groups/interviews, advisory committees, labor market demand, license exam pass rates

Based on the Labor Market Data obtained from the Los Angeles/Orange County Center of Excellence for Labor Market Research (COE), the occupation demand for **surveying and mapping technicians (Geospatial Technologies employment)** is projected to increase by 5%. There will be nearly 150 job openings per year through 2022.

Exhibit 1: Occupational demand in Los Angeles and Orange Counties[1]

Geography	2017 Jobs	2022 Jobs	2017-2022 Change	2017-2022 % Change	Annual Openings
Los Angeles	788	831	43	5%	95
Orange	428	441	13	3%	50
Total	**1,215**	**1,273**	**58**	**5%**	**144**

However, the annual and three-year average number of awards conferred by nearby community colleges in Surveying (0957.30) and Geographic Information Systems (2206.10) are about half of the demand:

Appendix A: Regional community college awards (certificates and degrees), 2015-2018

TOP Code	Program	College	2015-16 Awards	2016-17 Awards	2017-2018 Awards	3-Year Award Average
0957.30	Surveying	East LA	2	-	4	3
		Santiago Canyon	15	11	46	24
		Subtotal/Average	**17**	**11**	**50**	**26**
2206.10	Geographic Information Systems	Cypress	7	1	12	7
		Rio Hondo	47	28	36	37
		Subtotal/Average	**54**	**29**	**48**	**44**
		Total/Average	**71**	**40**	**98**	**70**

We are assured that there is a space for our new Geospatial Technology Certificate program to grow. We have planned to create a state-approved Certificate of Achievement and to recruit more employers on the advisory board. We have changed two courses (GEOG/GIS 26 and 27) to online course in order to attract a broader range of students from greater Los Angeles area.

Given the wide applications of geospatial technology in various disciplines, we have reached out different departments within Santa Monica College for collaboration in the forms of developing lab modules, guest

lectures, co-advising student projects, and faculty grant projects. One of the outcomes from those collaboration is to raise the awareness of Geospatial Technology among students and faculty in other disciplines, and to encourage the enrollment of Geospatial Technology courses.

Part 2: Analyses of Results

This question is designed to bridge the results of your evaluation and outcomes assessment with next year's objectives (VI).

In one or two paragraphs, describe what you have learned about your program and how this knowledge will inform your plans for next year.

Anthropology:

Via an assessment of student interest, regional labor demand and employment opportunities, and working within the Pathway framework, the Anthropology Program has ascertained that the development of a CRM Certificate of Achievement is beneficial to students who desire to pursue careers in archaeology. A CRM Certificate affords students the opportunity to attain entry level positions on archaeology excavations - whether regionally, nationally, or internationally. Further, the coursework required to obtain the CRM Certificate is transferable (UC & CSU) towards a BA or BS in anthropology.

In the process of creating the Anthropology Pathway, we realized that our Anthropology PLOs were outdated, and do not accurately reflect the growth and changes with the Anthropology Program over the past decade. Additionally, the revision of these PLOs will be closely aligned with the recently created Anthropology Pathway.

Geography:

Based on the enrollment of Geography courses, we recognize that many of our Geography courses are highly demanded by students, especially those can be used to fulfill transfer requirements such as GEOG 1 and GEOG 5. However, we urgently need to recruit new faculty members to address the imminent retirement of one full-time professor at the end of Spring 2020.

As for closing the equity gap in educational outcomes among student groups, Geography program has made great strides in reducing the equity gap in Success and Retention rates for African-American students. However, there is more work to do to reduce the equity gap in Success and Retention rates for Latinx students. We will continue researching more effective pedagogies for such purposes, actively participating related training and workshops in SMC, and incorporating new instructional methods in our classes. We also will need to expand the Tutoring service to all subdisciplines in Geography, especially for human geography.

Based on the labor market demand data, we learned that there is a high demand for graduates with knowledge and skills on using geospatial technologies, and there is a space in Los Angeles area for our program to grow and thrive. This assures us that we need to keep strengthening our young program (established in 2017), including boosting enrollment, broadening the collaboration with other institutions and disciplines, connecting with employers to bring more working experience to students.

In the process of creating the Geography Pathway, we realized that there is no standard major preparation template for UC/CSU, which makes it challenging to map the course sequence in our program. We need to update the current

Geography AA-T program, including bringing in more useful courses and adjusting the categories, so that the program can better match major prep requirement of the targeted institutions.

Geology

Enrollment in Geology courses is consistently above 90% in our lecture courses and at 100% in our lab courses due to all our courses satisfying IGETC requirements. The high demand from students taxes the existing faculty members as well as our institutional resources. For the last three semesters we have had enough demand to add an additional lab section and we have not been able to do so due to lack of laboratory and classroom availability. We need to recruit an additional full-time faculty member in Geology to serve these demands as well as meet the 75/25 parity agreement.

We have made significant strides to closing equity gaps for black and brown students. This has been a concentrated effort by all Geology faculty and has included best practices such as incorporating scientist spotlights into our curriculum and adopting a student-centered pedagogy that meets students at their respective levels of academic proficiency. We will continue to research and implement practices that close equity gaps to ensure all our students succeed.

In Spring 2019, we created our Geology Pathway and in doing so, realized that many of the courses that the UC/ CSU campuses like to see for our students are not required parts of the AS-T. That exercise will help inform our AS-T creation so that our students are better prepared once they do transfer.

Astronomy

Students in the Astronomy Program at Santa Monica College are situated at a very special crossroads in time and space with one of the past, present, and future epicenters of the global aerospace community. LA County is home to major university hubs in Astrophysics such as Caltech and UCLA, as well as two important NASA space centers, and dozens of world-class industrial headquarters including SpaceX, Raytheon, Boeing, Northrup Grumman, Lockheed Martin, and the Aerospace Corp. According to a recent report by the LA County Economic Development Corporation (LAEDC) these facilities support a total space science related workforce of over 250,000 jobs including at least 90,000 requiring education in STEM. These represent tremendous technical employment opportunities for our students to target for internships and local career advancement. Astronomy is a quintessential interdisciplinary STEM field of study as our subject draws heavily upon background knowledge in physics, chemistry, math, computer science, geology, engineering, and many other disciplines. We have built partnerships with internship program at Jet Propulsion Laboratory in Pasadena and UCLA on the Westside via the NASA and STEM programs. Many students have expanded their horizons with participation ranging from one day to one week to an entire semester! We will continue to look toward building more bridges between our students and these communities.

Our retention rates and fill rates in Astronomy courses are consistently above 90% in our lecture courses and above 95% in our lab courses as they are very popular for IGETC transfer students. For the last three years, we have had enough demand to add several additional lab sections and we have not been able to do so due to lack of laboratory and classroom availability as well as a reluctance to award us additional WTH units. We also desperately need to recruit an additional full-time faculty member in Astronomy to replace one who recently retired in order to serve these demands as well as meet the 75 percent law.

VI. NEXT YEAR'S OBJECTIVES:

Itemize any specific strategies or projects you plan to accomplish next year to improve the effectiveness of your program. *Limit 3 objectives.*

Objective	**Rationale for Setting Objective** ***Link to data, if applicable.***
Objective #1: Convert 12-unit CRM Department Certificate into an 18-unit Certificate of Achievement.	The 18-unit Certificate of Achievement will more closely align with regional employment opportunities, and with the creation of our Anthropology Pathway.
Objective # 2: Revision of Anthropology PLOs.	In the process of creating the Anthropology Pathway, we realized that our Anthropology PLOs were outdated, and do not accurately reflect the growth and changes with the Anthropology Program over the past decade. Additionally, the revision of these PLOs will be closely aligned with the Anthropology Pathway.
Objective # 3: Convert 12-unit Geospatial Technologies Certificate into an 18-unit state-approved Certificate of Achievement.	The 18-unit Certificate of Achievement will more closely align with the employment opportunities in GIS and other Geospatial Technologies. We have obtained the latest labor data, and we are currently in the process of inviting more employers to serve on the advisory board and consulting current board members. We are expecting to submit the proposal at the end of June, 2019

VII. CURRENT PLANNING AND RESOURCE NEEDS:

Part 1: Narrative

Broadly discuss issue or needs impacting program effectiveness for which institutional support or resources will be needed for the coming year.

As the department as grown, it has been forced to offer an ever-increasing percentage of its courses outside of its dedicated room allocation. The space difficulties experienced by the Earth Science Department are clearly a pattern that many departments are facing, however it is inappropriate for a science department to be teaching outside of its allocated space. Science classes must extensively utilize equipment, hands-on material, and various demonstration materials in lab and lecture courses. Transporting these materials to various locations on campus presents a burden for the instructors, a terrible toll on the equipment and a diminishment of the quality of the class for the students.

If the amount of dedicated room space is compared among the science departments on campus, it is extensively clear that Earth Science space is not even close to the standards of Life Science and Physical Science departments. Earth Science has a massive 54 WTH per dedicated teaching space whereas 32–34 WTH per teaching space is the norm in the other sciences. Additionally, course enrollment in the Earth Science Department has increased over the past five years. On-ground Course Enrollment per Department indicates clearly that over the past five years, the Earth Science Department has instructed a large number of the students in our limited lab and lecture space. Our enrollment numbers are significantly higher than the Physical Science Department, and slightly less than the Life Science Department.

Furthermore, Earth Science courses have greater numbers of students enrolled/section than the other two science departments at SMC.

The Earth Science Department is enthusiastically awaiting our move to the new Science/Math Complex ("Phase 2"). We hope to centralize the elements of Earth Science, teaching labs, prep room, GIS lab, lecture rooms, planetarium, observatory, environmental center, elements of the Sustainable Technologies Program (such as specific courses in Recycling and Resource Management and Energy Efficiency) and faculty/staff offices into one location that will unite us with our science colleagues on campus. However, the department faces an immense dilemma waiting for the expected facility expansion for the Science Complex.

The central problem is laboratory space. We currently have two teaching labs on the first floor of Drescher Hall, the Geography lab/lecture room in HSS, and our shared GIS classroom in the Business Building (B250). The teaching labs are engaged with laboratory classes or lab related classes from 8 am to 10 pm throughout the week. The shared GIS classroom in Business is small, only 24 seats, and only classes using the computers are scheduled there. Moreover, the dedicated lecture rooms are also entirely occupied from morning to night leaving some Earth Science classes to wander the campus. Transporting these materials to various locations on campus presents a burden for the instructors, a terrible toll on the equipment and the hands-on material (i.e., the osteological remains in Anthropology 1, lab carts, etc.), and a diminishment of the quality of the class for the students. Even lecture classes in Physical Anthropology need to be taught in either the Drescher lab rooms or lecture rooms – the materials cannot be transported across campus.

The utilization percentages for classrooms range from 100% in higher demand time slots to 86.7% at lower demand time slots. In order to teach science classes effectively, equipment, demonstration materials and laboratory space are essential. This limitation in space effectively stops the Earth Science Department from expansion, diversification and healthy growth. We, indeed, recognize that we are not the only department across the campus to experience this impaction in facilities and space. However, we are probably the only science department with this critical space problem.

In the interim while we wait for the extension and completion of the Science Complex, the Geography program moved their lectures and labs into new rooms in HSS building. The Geography Lab is fully functional, with hot plates, instead of gas, for experiments. Students and faculty alike appreciate the additional lab space which means the Geography program can offer four lab sections per semester, in addition to all the other geography courses. The moving of almost all the Geography program courses has opened up the labs in Drescher Hall, allowing Anthropology to expand its lab offerings to four sections per semester. Additionally, both the labs in Drescher Hall have undergone renovation in terms of installing overhead projection systems and teacher stations. These new teaching devices have enabled Anthropology, Astronomy and Geology professors to enhance their lectures and labs by accessing and employing a variety of media to present course material to the students. However, we are still needing to juggle lab classes between the disciplines.

Planetarium needs:

The Digistar 2 projector in the Drescher Planetarium was installed in 1998 and uses a 1990's-generation computer for operation. It is already experiencing fatigue and failure and finding replacement parts is becoming more difficult. The eventual retirement of this system is inevitable. Whether we decide to purchase upgraded digital equipment or revert to a more durable opto-mechanical planetarium using multiple low-cost digital projectors, this is an expenditure that needs to be planned for in the future.

Sustainable Technologies Program:

In terms of space requirements, the STP is given a dedicated classroom and one storage closet for learning materials and construction materials. When the program was created in 2009, the STP was allocated two dedicated classrooms

and a storage room. Subsequently, one of these classrooms was removed from use of the STP by administration, which has had negative impacts on the program through limiting potential course offerings. As the program has matured, demonstration models and display materials have been created and have started to impact an already overcrowded classroom situation. An expected expansion or accommodation is necessary to continue to provide high quality programming in a safe and engaging manner.

Programmatically, Sustainable Technologies Program brings together a number of training programs under one umbrella and provides an overarching structure by which students can pursue educational and career opportunities in the various green fields. By including these programs under one umbrella, SMC is recognizing and embracing the interconnectedness of these various fields and encouraging students to think of green careers as outside the traditional silos of STEM programming. Each of these program tracks will prepare students for immediate employment upon graduation, as well as provide them with the resources and support that they need to transfer to a baccalaureate institution.

Weekly teaching hours put CTE and Transfer classes in competition: The STP program faculty, administrators and Industry Advisory Board are interested in offering more classes and growing the sustainable technologies program. However, the Earth Science department is limited in the number of WTH provided. Not only does this make it difficult to offer the entire sequence in a timely manner, it also is a disadvantage for growing institutional support for the program as faculty are reluctant to give up transfer courses for CTE.

The Solar PV and Energy Efficiency courses are currently offered at the SMC Airport Arts Campus. The STP program lost space when the Academy of Entertainment Technology used the campus as swing space as the newly branded Center for Media and Design's campus was completed. The STP continues at the Airport Arts Campus, but the large pieces of equipment (i.e., mock roofs, solar modules and inverters, solar panels, blower door test kits, etc., and most recently worktables) are still constrained in inadequate and even inappropriate (carpeted) classroom space, with no definitive direction or funding given to bring the facilities up to true lab standards.

While resources to purchase more materials and equipment are available, those advances are mismatched with inadequate infrastructure, and a location that has been identified as detrimental to program success.

Full-time Astronomy Instructor:

We are urgently requesting a new full-time Astronomy faculty position due in substantial part to the retirement of Professor Gary Fouts in 2017. It has been nearly 20 years since the last full-time Astronomy hire at SMC. Gary was an indispensable member of our program, teaching a large share of the high-demand (> 90% fill rate in 2018-2019) laboratory courses Astro 3 (Stellar Astronomy with Lab) and Astro 4 (Planetary Astronomy with Lab), as well as other core courses including Astro 1 (Stellar Astronomy), Astro 2 (Planetary Astronomy), and notably Astro 6 (Archaeo-Astronomy) a relatively new Global Citizenship course that he pioneered. Gary also played an important role for over 25 years in the Astronomy Club. He also helped with the research and development for our observatory and planetarium construction plans for the new Science Building (Phase 2) currently in the process of implementation. In order to help our program succeed in realizing the full potential of connecting our students to the world-class university and aerospace community in the LA area, it is essential that SMC support the hiring of a new Astronomy faculty member who has a strong set of lab and technical skills as well as the outreach vision and experience to help shepherd the construction and operation of a new observatory and planetarium into effective assets for STEM development, in line with the SMC strategic plan. We believe that SMC would be best served by recruiting a new professor from these pools of highly-talented astronomers with strong foundations in laboratory optics, experimental design, image-processing techniques, observatory operation, computational simulation, and research-oriented coding as well as public outreach.

During the last decade, we have introduced *six new Astronomy courses* as well as adding *online offerings* of our most popular classes, Astro 1 and 2. These represent a ***200% increase*** in our original four-course offerings. These new courses have greatly diversified and bolstered the robustness of our program to support transferring Astrophysics majors via traditional undergraduate and graduate pathways, as well as provide popular general education astronomy lectures and labs for IGETC non-science majors. Gary's retirement leaves the two remaining full-time astronomers (who also serve as advisors on NASA student internship programs as well as Distance Education, Faculty Association, and Technology Committees) to optimize the breadth of offerings in the academic program. In the Fall 2018 – Spring 2019 academic year, the percentage of Astronomy courses taught by full-time instructors still fell well below the targeted 75% threshold at a level of only 59%. As a result, since Gary's retirement, we have had to drastically reduce the breadth of courses offered, compromising the fullness of program offerings for our most ambitious students.

In the previous spring semester of 2018, we were able to add two new completely full lab sections of Astro 4 *after the semester began* in response to nearly ***70 students requesting additional sections*** above and beyond our allocated WTH level. To put things in clear perspective, over the last decade while we have ***tripled*** the number of astronomy course offerings, we now find ourselves with only ***two-thirds*** the number of full-time Astronomy faculty. Our committee rank for the faculty hiring was very high compared to our objective rank, and we believe there may be a significant disconnect between these two ranking systems. We urge the administration to support us in our request for a new faculty member so that the Astronomy Program can continue to make an outstanding contribution to student success and Intergalactic Citizenship at SMC and far, far beyond!

Full-time Physical Anthropology Instructor:

Since 1999, the Anthropology Program has maintained a staff of four contract anthropologists (two physical anthropologists, one archaeologist, and one cultural anthropologist). Dr. Suellen Gauld, retired at the end of the Spring 2017 semester. Her retirement greatly impacted our program, especially since her position has not been replaced with another full-time hire. When full-time physical anthropologist Dr. Jan Austin retired in 2015, her position was replaced as the college acknowledged the importance of this program. Since Dr. Gauld's position has not been replaced, the Physical Anthropology Program has been left with only one full-time faculty. This will obviously make it difficult to maintain the high-quality Physical Anthropology program that is currently in place at Santa Monica College, a program that has taken decades to develop.

Full-time Cultural Anthropology Instructor:

The Earth Science Department offers more sections of cultural anthropology courses than any other (sub)discipline in our department. Yet, we only have one full-time cultural anthropologist on staff at our college. Fall 2018 & Spring 2019 data of WTHs for our Anthropology Program's one full-time faculty member vs adjunct WTHs indicate a 45%-54% ratio of full-time to adjunct WTHs = well below the 75% full-time/25% adjunct WTH ratio agreed upon by the Board.

All our cultural anthropology courses transfer to both UCs and CSUs. Four of our cultural anthropology courses are Global Citizenship Courses, and we offer one Scholars course in cultural anthropology (Anthropology 2). Anthropology 2 fulfills the IGETC social science requirement for a wide range of majors, thus serving the college student population at large. The Anthropology Program needs, at the very least, one additional full-time cultural anthropologist to meet student demand on our campus.

Full-time Geography Instructors:

Vicki Drake will be retiring as of Spring 2020. Assuming a stable base of 82 WTH per semester, the percentage of classes taught by fulltime (FT) faculty will be just 37% upon Drake's retirement following the Spring 2020 semester. With the addition of one FT faculty member, this figure increases to 55%. With the addition of two FT faculty members, this figure

increases to 73%. Due to high student demand, we have added at least two geography lab sections (6WTH each) each semester for the past two years, which is against the current trend of programs cancelling classes across campus. However, without the new positions, every added section will further increase the number of courses taught by adjuncts (approximately 69%, fall 2018).

The first position we are requesting is a **physical geographer**, to teach our core courses Geography 1 (without lab) and Geography 5 (with lab), which satisfy IGETC subject area 5 and CSU-GE area B. This new full-time faculty member also would be expected to teach Geography 3 (weather and climate), and since climate change lies at the center of the twenty-first century's most pressing global issues, they would contribute to the college's programs in Environmental Science and Environmental Studies, including teaching Geography 7 (cross-listed as Environmental Studies 7).

The second position we are requesting is a **human geographer**, who would teach Geography 2, which satisfies IGETC subject area 4 and CSU-GE area D, Geography 8 (urban), Geography 11 (world), and/or Geography 14 (California), as well as contribute to college interdisciplinary programs such as Global Studies and Ethnic Studies.

Given that geospatial technologies have become a core part of geography, the new faculty members would be expected to teach classes in our Geospatial Technologies Certificate program. Jobs in geospatial technologies consistently rank among the top growth industries (U.S. Bureau of Labor Statistics, 2018). Modern geographers around the nation and world are using the technologies to help solve problems ranging from natural hazards preparation to environmental-social justice, from sustainable socio-economic development to climate change and mitigation.

Our geography and environmental studies courses and faculty play important roles in high demand campus programs that make our students successful, including our Center for Environmental and Urban Studies, IDS, Scholars, Teacher Academy, Global Citizenship, and field research. Our full-time faculty have been the most reliable resources to contribute to those programs. However, with Drake's retirement we will only have two full-time geography faculty left, which will have a significantly negative impact on the faculty's ability to participate in campus committees and future initiatives.

We need the two full-time geographers to strengthen the program after Drake's retirement to assure that our students succeed and meet their own educational goals, and that SMC achieve the goals as set forth in SMC's 2017-2022 Strategic Initiatives and Objectives and SMC's Mission and Vision statement.

Full- time Geology Instructor:

The Geology section of the Earth Science department requests a new full-time faculty hire to meet the rising demand in our course offerings, especially in our lab- based courses. In order to fulfill our Pathway, we will be offering an AS-T in Geology and request a faculty member who can teach Historical Geology (which is a required course for the AS-T).

Currently, 33% (fall 2018: 15 WTH/ 45WTH) of our courses are taught by adjunct faculty. The previous three semesters (spring 2018, fall 2018, spring 2019) student interest in GEOL 4 (Physical Geology with Lab) was high enough to open an additional section (above the 15 WTH already taught by adjuncts). Unfortunately, we have not been able to secure an additional adjunct at such a late date (i.e. the first week of the semester).

The new hire would be expected to teach both physical and historical geology with lab classes as well as physical geology lecture classes. In addition to the specialized historical geology class, the new hire would contribute to continued development of the geology curriculum. In a small department such as ours, the new person would be a welcomed addition to both department and college committees and encouraged to participate in new initiatives at SMC.

Full-time Planetarium Administrator/Director:

Previous Program Reviews suggested the department should investigate the possibility of training someone to maintain the Digistar planetarium and identify a potential trainee. We request a position of Earth Science Lab Technician be created. Such a person would be trained to help maintain the Digistar, as well as expand the public program to more time periods, possibly including Saturday shows, and assist in the setup and take down of Geology, Astronomy, Geography and Anthropology labs. The Planetarium is reaching a point where it needs someone dedicated to maintaining the Digistar and investigating new equipment options.

The Drescher Planetarium is an integral part of the Earth Science Department serving three basic groups: SMC faculty and students; Santa Monica and surrounding Los Angeles community residents; and school groups – both public and private from pre-school through college level. Additionally, Earth Science faculty and staff have worked with planning committees from other colleges interested in building their own planetarium who want to see how SMC's Planetarium works.

The Earth Science Department had a full-time Planetarium Director who unfortunately passed away. Subsequent requests to replace the Planetarium Director were unsuccessful due to budgetary constraints. The position "Planetarium Staff Administrator" was re-established in 2006 and revised in 2008 (see attached SMC Classified Specification Bulletin). Although this Classification Specification Bulletin will need to be updated to accommodate changes in the technology (for example, we no longer use 'slides' in presentations), it is an excellent tool for illustrating the type of works that are NOT being performed for the Planetarium, and certainly highlights the urgency we feel for preserving the generous gift from the Drescher family in establishing the Planetarium and providing the funding for its initial development.

The request for a Planetarium Director/Lab Technician has become a pressing matter for a number of reasons. First, the new Science Complex addition will include a new Planetarium, as well as an observatory. SMC is committed to provide a first-rate Planetarium and a dedicated Planetarium Staff Administrator is crucial to assure the new Planetarium is optimized, and to ensure quality control in all areas: equipment, design, function, marketing, programming, maintenance, utilization, scheduling, and more.

Additionally, the Drescher Planetarium is currently using 1990's computers to run the Digistar 2 projector: the oldest of this type of system still operating and, as a result, is now showing significant signs of aging. There are very few spare parts still available for this projector. SMC has already spent large sums of money shoring up this projector, but without a dedicated Planetarium Director, routine maintenance and monitoring of the equipment is not possible.

Our attendance at Planetarium shows, while steady in terms of school programs, is not growing in terms of Friday night public shows. When we had a dedicated Planetarium Director, our public and school show audiences grew significantly through extensive marketing and promotion, with most shows "sold out". Additionally, we were able to attract top-flight scientific lecturers from local institutions including Cal Tech, JPL, and UCLA. These guest lecturers would draw crowds too large to fit in the Planetarium and would be held in the Science Building lecture halls. Without a full-time Planetarium Staff Administrator, our Planetarium shows are limited in scope, dependent upon an hourly lecturer who is only compensated for the time he is presenting the shows. There is no allowance for him to perform maintenance or monitoring of the Planetarium, beyond his contracted shows. He is constrained in his ability to expand the program, to develop new shows, to provide adequate marketing of the Planetarium, or even to having access to the Planetarium outside his scheduled presentations.

Lab Technician:

Qualified and trained lab technicians would be a great asset for the class room and lab sessions. It is very difficult to monitor 30-35 students who are working on a variety of lab exercises both inside and outside the classroom. Having a

lab technician would greatly benefit the overall safety of the lab classes, as well as providing another resource for students who are working through their assigned tasks. It is critical that a fulltime Earth Science Lab Technician be hired in the immediate future.

Additionally, we are the only science department on campus that does not have a lab technician to help set up and take down labs. Anthropology labs set up and take down require a minimum of 25 minutes. This cuts into the overall time faculty have to prep for each lab class. Having a full-time technician who is trained in setting up and taking down the lab materials will allow faculty more time to meet with students, prepare lectures and labs, and increase efficiency of the lab.

The additional costs incurred would be the salary and benefits for the individual (40 hours/week) for 11 months. Historically, the salary and benefits were shared between the Earth Science Department and Events. The Earth Science Department does not receive any of the revenue generated by the school or public shows in the Planetarium: all revenue from the Planetarium is allocated to the Events. Hiring a full-time Planetarium Staff Administrator will most likely result in an increase in the revenue generated by offering more public shows. The increase in revenue can be utilized to offset some of the salary.

We have office space in the Earth Science Department office that is available for the Planetarium Staff Administrator/Lab Technician. A computer and phone will be necessary to assist the Planetarium Staff Administrator in scheduling school shows, designing new Planetarium shows, accessing and updating the Planetarium webpage, accessing and responding to the Planetarium voicemail system and other administrative duties.

Part 2: List of Resources Needed

Itemize the specific resources you will to improve the effectiveness of your program, including resources and support you will need to accomplish your objectives.

While this information will be reviewed and considered in institutional planning, this information does not supplant the need to request support or resources through established channels and processes.

Resource Category	**Resources Description/Item**	**Rationale for Resource Need (Including Link to Objective)**
Human Resources	<u>Faculty:</u> • Physical Anthropology Professor • Cultural Anthropology Professor • Astronomy Professor • Geography Professors • Geology Professor <u>Lab Technician:</u> <u>Planetarium Director:</u>	1) All academic programs in the Earth Science Department (Anthropology, Astronomy, Geography, Geology) are under the 75%/25% ratio of full-time to adjunct WTH, that was agreed upon by the Board. 2) Faculty retirements in Physical Anthropology (2017) and Astronomy (2017) have not been replaced thus, increasing the % of WTH from adjunct faculty. In these science disciplines it has become increasingly difficult to find qualified adjuncts to teach in these disciplines. The few qualified, and experienced adjuncts

		we find, are increasingly being hired by other Southern California CCs. Retirement of full-time Geography instructor, Vicki Drake, in spring 2020 will reduce the percentage of classes taught by fulltime (FT) faculty to 37%. With the addition of one FT faculty member, this figure increases to 55%. With the addition of two FT faculty members, this figure increases to 73%. Due to high student demand, we have added at least two geography lab sections (6WTH each) each semester for the past two years, which is against the current trend of programs cancelling classes across campus. However, without the new positions, every added section will further increase the number of courses taught by adjuncts (approximately 69%, fall 2018). 3) *Lab Technician & Planetarium Director:* See rationale written above in VII. Part 1.
Facilities *(information inputted here will be provided to DPAC Facilitates)*	Independent computer lab room(s) for Geospatial Technology courses	We are now teaching ALL the five Geospatial Technology courses in the computer lab room in Business Building Rm 250. The room only have 25 seats, and we also must share the room with other classes offered by the Business Department. This has been a significant limiting factor in the development of the program.
Equipment, Technology, Supplies *(information inputted here will be provided to TPC)*	Updated computers for our Geospatial Technology courses	Geospatial Technology software is constantly being updated with more demands made on computers, their computational power, memory, graphics ability, and more. Our Geospatial lab computers must be able to properly run the updated software.
Professional Development	Separate funding for important discipline conference	Each discipline has important state-wide and nation-wide conferences/meetings for faculty to stay current with the new development in the discipline. For

		example, American Association of Geographers (AAG) has their annual meeting to allow geographers from nearly 100 countries and almost all geography institutions nation-wide to share interests in the theory, methods, and practice of geography. Missing the conference means also means missing many opportunities to collaborate with other institutions to strengthen our programs. However, the professional development funding in SMC is limited and first-come-first-served. This limits faculty's opportunity to participate such important discipline conferences and will have negative impact on the long-term development of the programs.

VII. CHALLENGES:

(Optional) List significant challenges your program faced in the past year (optional)

Decreased departmental budget for classroom supplies.

Retired faculty positions not being replaced (Physical Anthropology & Astronomy) along with the loss of a full-time Geography position in 2020. The Earth Science Department has lost and is losing key faculty who have played an important role in campus activities, including serving on a variety of Academic Senate committees and participating in grants and other campus initiatives. Our Department is moving backward in terms of the 75-25 ratio of full-time to part-time instructors. We had 13 full-time instructors in 2017, are down to 11 as of 2019, and will have only 10 full-time instructors by the end of 2020, greatly increasing the number of adjunct instructors who will need to be hired to teach classes.

Increasing difficulty finding qualified and experienced adjuncts in the sciences.

Increased, and continually changing, work demands of Pathways movement taking away from other faculty duties and needs (teaching, student advising, course revisions, program revisions, professional development etc.)

Lack of lab technician requiring faculty to do work of set-up and take-down of lab material. The Earth Science Department is the only science department on campus that does not have a full-time lab technician.

Continued challenges in meeting the expected enrollments for the Sustainable Technologies Program courses:
The Sustainable Technologies Program has been inconsistent in its ability to meet the "minimum" requirement of 18 students in its courses, especially those offered at the satellite Airport Arts Campus (Energy 1,2, and 3, and PV11, PV12 and PV4, the Solar Photovoltaic offerings. Joel Shoemaker, a peer director with CREATE (an NSF Center in the Midwest) provided an evaluation of the program suggesting the potential need to relocate the program to the main campus to build awareness and benefit from synergies with the courses included in the certificate offerings, and suggesting other initiatives such as articulation with 4-year programs (CSUN offers an engineering curriculum that has accepted the PV

course credits). The program has been successful in obtaining funding for material resources, professional development, and marketing and outreach. As yet these resources have not translated to increases in enrollments. Most recently, Southern California Edison, the local utility, has awarded nearly $50,000 to broaden the solar training to include battery storage strategies and tactics for storing solar electricity for the benefit of demand shifting or back-up power. There is expectation that this improvement to the program, including more opportunities for internship development, may yield higher enrollment rates.