Program Review: Physical Science

Fall 2022

SOLANO
COMMUNITY COLLEGE

Program Review - Physical Science (2022)

SECTION 1: Program Overview

1.1 - Introduction - List the names of full-time and adjunct faculty in the program, along with any staff members and their titles/roles. Note major changes in personnel since the last program review.

Note: This program review covers the six-year period between 2015-2020, inclusive.

The following instructors teach courses within the Physical Science Program:

Dr. Trevor Gonzalinajec (Adjunct) received a PhD in Biophysics from UC Berkeley in 2015. He has been an adjunct at SCC since Spring 2018.

Dr. Joshua Mueller (Adjunct) received a PhD in Geography/Paleoecology from the University of Utah in 2018. He has been an adjunct at SCC since 2019.

Prior to the creation of the Physical Science Department in 2020, only one Physical Science course, PHSC 012, was taught at SCC. That course was taught by Dr. Mark Feighner, who retired from SCC in 2019. Consequently, this is the first Program Review for the Physical Science Department.

1.1a - Briefly summarize any large, substantive changes made to the degrees/certificates since the last program review, and what prompted those changes. Note also any organizational changes (for example, if the program is now in a different School/Division than before). If changes have already led to noticeable improvement, please describe.

Previously, the only course in the Physical Science program was PHSC 012, Introduction to Principles of Physical Science (4 units), was taught by Dr. Mark Feighner, who retired at the end of Spring 2019. There was no degree in this area.

The A.S. degree in Physical Science has been (formally) offered since Spring 2020. But our new courses PHSC 013 and PHSC 014 were first offered in Fall 2022. Our new courses PHSC 015 and PHSC 016 will be offered for the first time in Spring 2023.

This new A.S. degree provides students the opportunity to investigate methods of scientific inquiry, and to gain scientific knowledge, through specialization in one or more Physical Science disciplines that align with their personal interests, such as Physics, Chemistry, Astronomy, and Geology. Crucially, students taking this degree will also gain an understanding of the factors that affect the Earth's climate, and will thereby develop a deep understanding of

the important issue of Climate Change, which will allow them to be knowledgeable global citizens. Students will develop critical thinking skills, learn to communicate effectively in writing, and acquire an understanding of major scientific concepts. Through course options, students will employ methods of scientific inquiry to understand the world around them. Completion of the degree requirements will prepare students with the skills and resources needed to facilitate academic and career decisions.

Students who pursue the A.S. degree in Physical Science will be qualified to enter a teaching credential program, and will partially satisfy the requirements for transferring to many majors in the physical sciences, such as Earth Science, Geology, Astronomy, and Physics. Recipients of this new A.S. degree will also be employable in many entry-level jobs that require two years of college-level science and mathematics.

The Associate in Science Degree can be obtained by completing the 34-unit major, General Education, and electives as needed to complete a minimum of 60 units. All courses for the major must be completed with a minimum grade of C or a grade of P if the course is taken on a Pass/No Pass basis.

The Associate in Science Degree in Physical Science consists of sixty units of courses. The degree contains four required courses in Physical Science (PHSC 013 and PHSC 014), Mathematics (MATH 011), and Computer Science (CIS 001), which account for 11 units. The degree contains two options that each will provide a solid foundation in one specific physical science, either Chemistry of Physics. Option 1 requires CHEM 001 and CHEM 002, plus at least 13 units of technical electives chosen from a list of courses in Astronomy, Chemistry, Engineering, Geography, Geology, Physical Science, and Physics, or from those courses listed as required courses in one of the other options. Option 2 requires PHYS 002 and PHYS 004 (non-calculus-based physics), plus at least 13 units of technical electives chosen from the aforementioned list. The remainder of the sixty units must be filled by general education courses, such as are required for the specific university and major to which the student intends to transfer.

1.1b - CTE Programs: Describe the membership of the program's advisory board. Describe how the program requirements are influenced by the advisory board, accrediting institutions, and other external organizations. Note how the membership might be expanded to get more helpful, diverse voices in the field.

NA

1.1c - CTE Programs: Provide advisory board minutes from the past two years [upload to the blue folder in the upper right corner of Section 1]. If minutes are unavailable, please describe what meetings have taken place, noting dates if possible, along with attendees' names and professional positions.

NA

1.2 – Future Outlook: describe conditions (inside the college, or beyond) that may affect the future of the program in the coming years. For example, note what factors may put a strain on the program or give it a boost in the next five years.

Prior to the year 2000, SCC offered one meteorology course, METER 10, Elements of Meteorology. That course became dormant upon the retirement of the adjunct faculty member who taught it. Given the current crisis posed by global climate change, and the drastic effects of global warming and natural disasters such as the wildfires that have recently impacted SCC, it is urgent to revive this topic at SCC, and to expose students to the impact of the effects of climate change. This new degree is intended to fulfill this role.

We need to hire a full-time faculty member to lead this program. Proposals to hire a full-time Physical Science – Geography instructor were submitted to the Academic Senate in 2021, and in 2022, but were not approved for funding.

1.2a - CTE programs: Review the provided labor market data, including employment and wage projections for employees in fields related to the program [upload any additional data to the blue folder in the upper right-hand corner of Section 1]. Comment on any areas that appear especially relevant to the program and its graduates.

NA

1.3 Population - Address how the population of students majoring in the program and/or taking classes in the program differ from the college as a whole; note what demographics (age, race, gender, etc.), are more or less represented, if any.

The only PHSC course that has been taught during the reporting period of 2016-2022, was PHSC 012. According to the FactBook, 50 students took PHSC 012 during this period. The ethnic breakdown was 43% "two or more", 26% "white non-Hispanic", 17% "black non-Hispanic", and 13% "Asian or Pacific Islander (API)". For SCC as a whole, the ethnic breakdown was 27% "two or more", 26% "white non-Hispanic", 15% "black non-Hispanic", 15% "Asian or Pacific Islander (API)", 13% "Hispanic", and 3% "other". It seems that the percentages of black, white, and API students in our program were very close to those of SCC as a whole.

With regards to gender, 67% were female, and 33% were male. For SCC as a whole, the gender breakdown was 56% female, and 42% male, and 2% not-reported. These percentages are similar between our program and the College as a whole, although the percentage of females was actually somewhat larger in our program.

No age data are available from the FactBook.

1.3a – In the student survey, students were asked to identify why they were taking Program courses. Please summarize and briefly discuss the results.

The Student Survey was sent out in Spring 2022. No PHSC courses were taught in that term. (The responses in the Student Survey correspond to *other* courses that *could* be part of the PHSC AS degree. However, since the degree has not actually gotten underway, the responses registered in the Student Survey do no actually correspond to this degree.)

PROGRAM OVERVIEW – GOALS

Program Goals	Actions to be taken	Person(s) responsible	Priority (Important or Urgent)	Time frame (Short term or Long term)
Our main goal is to hire a full-time faculty member in this department.	Submit a full-time faculty request form each fall.	Melanie Lutz	Important	Long term

SECTION 2: COURSES IN DEPARTMENT (TABLE)

2.1 Course Offerings - Specify which courses in the department and/or degree/certificate have been deleted or added since the last program review, and what prompted those changes. If these changes have already led to improvement, please describe.

As explained in previous sections of this review, four new Physical Science courses have been added in 2020: PHSC 013, PHSC 014, PHSC 015, and PHSC 016. These courses were added in order to create a new A.S. degree that will address the most important crisis of our age – global climate change. Although the program is still in its very early stages, enrolments thus far have been very promising. Of those course PHSC courses that have been offered in the past year (PHSC 012, PHSC 013, and PHSC 014), enrolments have been roughly 20 students in each course. PHSC 015 and PHYS 016 will be offered for the first time in 2023. A fuller picture of the success of the new program become available during the next program review cycle.

The following table lists new courses that are included in the Physical Science A.S. degree. Four of the are in the Physical Science department, and two are in the Geology department.

Course No.	Course Name	Units	CSU-GE	IGETC
PHSC 013	Weather and Climate	3	B1	5A
PHSC 014	Atmospheric Science Laboratory	1	B3	5C

PHSC 015	Global Climate Change	3	B1	5A
PHSC 016	Natural Disasters	3	B1	5A
GEOL 006	Earth Science	3	B1	5A
GEOL 006L	Earth Science Laboratory	1	B3	5C

2.1a - Describe what new course or courses are planned and provide reasons for these new offerings, including how these courses might address issues of equity and student success. CTE programs: Note how advisory board input has led to planned course changes. Please add any new course plans to the Course Goals table at the end of Section 2.

We have tentative plans to add one new course, **PHSC 017, Geography Field Studies of the Bay Area.** The course will consist of 1 hour of lecture, and 3 hours of lab. This course has C-ID number GEOG 160.

This lecture and laboratory field course will study the cultural and physical geography in the western United States. Students observe and analyze the effects of weather and climate on natural vegetation; use topographical maps to interpret land use and terrain; explore economic and political systems of the region; and evaluate the interrelationships between the physical and cultural environment.

2.2 Scheduling, Sequencing, and Fill - Describe the student survey feedback related to course scheduling. What barriers to enrollment do students report? In terms of timing, location, and instructional format of course offerings, what changes are suggested by the survey responses?
(Be sure to add any goals which address these survey responses to the Course Goals table at the end of Section 2.)

The Student Survey was sent out in Spring 2022. No PHSC courses were taught in that term. (The responses in the Student Survey correspond to *other* courses that *could* be part of the PHSC AS degree. However, since the degree has not actually gotten underway, the responses registered in the Student Survey do no actually correspond to this degree.)

2.2a - For courses with low enrollment numbers, note possible causes (such as the type of class, scheduling, etc.).

All of the PHSC courses that have been offered thus far have had adequate enrolments. Specifically, they each meet the 60% minimum required fill rate, as specified in the contract. As the courses are all new, we expect that enrolments will grow, as students and counselors become more aware of this program.

2.2b - Note if there is a preferred sequence of classes that students should take in the department/degree/certificate, or if there is no preferred sequence, and how students are informed of your preferred sequence (if any). Describe any work done to support PACE/Guided Pathways and inform counselors.

The suggested sequence of course listed below is consistent with the Guided Pathway, as outlined in the Program Map that can be found on the Physical Science Department website. This Guided Pathway has been supplied to the Guided Pathways coordinator, and it also appears on the Physical Science Department website. Whenever a PHSC course is offered, the entire Counseling Department is notified by e-mail.

Course No.	Course Name	Units	Sequence
PHSC 013	Weather and Climate	3	Year 1, Fall
PHSC 014	Atmospheric Science Laboratory	1	Year 1, Fall
PHSC 015	Global Climate Change	3	Year 2, Fall
PHSC 016	Natural Disasters	3	Year 2, Spring
MATH 011	Elementary Statistics	4	Year 1, Fall
CIS 001	Introduction to Computer Science	3	Year 1, Fall
ASTR 010	General Astronomy	3	Year 1, Spring
ASTR 020	Astronomy Laboratory	1	Year 2, Fall
ASTR 050	Astronomical Optics	1	Year 2, Spring
PHYS 002	General Physics (Non-Calculus)	5	Year 1, Spring
PHYS 004	General Physics (Non-Calculus)	5	Year 2, Fall
GEOL 001	Physical Geology	3	Year 2, Spring
GEOG 004	World Geography	3	Year 2, Fall
ENGL 001	College Composition	3	Year 1, Fall
ENGL 002	Critical Thinking and Writing About	4	Year 1, Spring
COMM 001	Introduction to Public Speaking	3	Year 2, Fall
SPAN 001	First Semester Spanish	5	Year 2, Spring
HIST 002	World History to 1500	3	Year 1, Spring
ANTH 002	Cultural Anthropology	3	Year 2, Spring
KINE 005J	Beginning Body Conditioning	1	Year 1, Fall

2.3 Prerequisites, Course Advisories, and Placement. Review and summarize student survey feedback regarding prerequisites. Note how advisories and pre- and co-requisites might be changed to get students better prepared for classes in the program. Be sure to add any goals which address these survey responses to the Course Goals table at the end of Section 2.

The Student Survey was sent out in Spring 2022. No PHSC courses were taught in that term. (The responses in the Student Survey correspond to *other* courses that *could* be part of the PHSC

AS degree. However, since the degree has not actually gotten underway, the responses registered in the Student Survey do no actually correspond to this degree.)

COURSES – GOALS

Course Goals	Actions to be taken	Person(s) responsible	Priority (Important or Urgent)	Time frame (Short term or Long term)
Add new course PHSC017, Geography Field Studies of the Bay Area (2 units).	Create a new course proposal in eLumen	Dr. Melanie Lutz	Important	Long term

SECTION 3: ASSESSMENT OF PLOS & SLOS (TABLES)

PLOs in Department	Expected Performance	Performance
Develop and implement a plan of collecting and/or accessing experimental data, and performing data analysis (Active from Spring 2020)	70%	NA
Describe physical phenomena in multiple forms (verbal, pictorial, graphical, and mathematical). (Active from Spring 2020)	70%	NA
Qualitatively and quantitatively predict, analyze and/or explain the behavior of physical systems using fundamental physical principles and models. (Active from Spring 2020)	70%	NA

SLOs by Course in Department	Expected Performance	Performance
PHSC012 - Introduction to Principles of Physical Science		
SLO 1: Demonstrate familiarity with the	70%	NA

vocabulary of physical science and explain the concept of the scientific method. (Active from Fall 2019)		
SLO 2: Demonstrate familiarity with the major concepts and processes of the physical sciences. (Active from Fall 2019)	70%	NA
SLO 3: Recognize and apply principles of experimentation and develop skill in collecting and evaluating laboratory data. (Active from Fall 2019)	70%	NA
PHSC013 - Weather and Climate		
Describe the physical principles affecting Earth's atmospheric processes in multiple forms (verbal, pictorial, graphical and mathematical). (Active from Fall 2019)	70%	NA
Qualitatively and quantitatively predict, analyze and/or explain the behavior of the physical components of Earth's atmosphere and how they interact to produce weather . (Active from Fall 2019)	70%	NA
Analyze long-term weather data as climate. (Active from Fall 2019)	70%	NA
PHSC014 - Atmospheric Science Lab		
Retrieve, plot, analyze and interpret weather data in the form of maps, charts and numerical data. (Active from Fall 2019)	70%	NA

Diagram and explain how solar energy drives weather on the earth. (Active from Fall 2019)	70%	NA
Relate adiabatic and pseudoabiatic processes to clouds and weather stability. (Active from Fall 2019)	70%	NA

3.1 Program Learning Outcomes (PLOs) - Summarize the student survey feedback related to PLOs. To what extent do majors understand the PLOs, find the classes effective in preparing them to succeed in the PLOs, and feel they are able to achieve the PLOs?

The Student Survey was sent out in Spring 2022. No PHSC courses were taught in that term. (The responses in the Student Survey correspond to *other* courses that *could* be part of the PHSC AS degree. However, since the degree has not actually gotten underway, the responses registered in the Student Survey do not actually correspond to this degree.)

3.2 Student Learning Outcomes (SLOs) - Review the current status of SLOs in your program. Note if all course SLOs are written and up-to-date (at least two per course).
Identify which courses have not been assessed in over two years, and note which of these courses have not been offered in over two years.

All course SLOs are complete and up to date, and can be found in the Course Outline of Record (COR) within eLumen. The only course in this program that has been offered within the past two years is PHSC 012. No SLOs were assessed in this course during this period.

> **3.2a - Describe collaborative efforts among faculty to assess SLOs. For example, note if SLO assessments in online and face-to-face courses have been compared, and what these comparisons indicate. Note if rubrics have been used in different sections of the same course, or across courses, to aid SLO assessment.**
>
> None of the PHSC courses have multiple sections. These courses are only offered once each year. Each course has been taught by one faculty member.

SECTION 4: STUDENT SUCCESS (by RACE/ETHNICITY and GENDER – TABLES)

4.1 Student Success and Support - Describe the student survey feedback related to success. What barriers did students identify, and what did they find helpful? How did students address the question of equity and emotional safety?

The Student Survey was sent out in Spring 2022. No PHSC courses were taught in that term. (The responses in the Student Survey correspond to *other* courses that *could* be part of the PHSC AS degree. However, since the degree has not actually gotten underway, the responses registered in the Student Survey do no actually correspond to this degree.)

4.2 Success by Population - Review the student success rates in the program/department, if available. If possible/applicable, review student success in general education classes (across specific populations) with student success in degree-specific courses. Note if certain groups are significantly more or less successful than their peers, and if there have been any clear trends upward or downward since the last program review. Provide possible reasons for higher or lower success rates.

The only time that PHSC 012 was offered during the time interval was Fall 2017. That term, the success rate was 18/18, or 100%. Hence, the success rate was the same for all genders, all races, and all age groups.

4.3 Degrees/Certificates Awarded (if applicable). Review the number of degrees and certificates awarded over the past five years, if available, and address any clear upward or downward trends. If students are leaving the program before earning the degree/certificate, note whether certain courses are a stumbling block, or if students don't need all the courses in the program to achieve their goals. If possible, note if certain populations of students are having greater difficulty completing the program.

No A.S. degrees have been awarded yet, as per timing of course roll-outs, as described above.

4.4 Preparation for the Future - Describe how students are informed about future options, such as the kinds of schools they might transfer to, the kinds of employment available in their field, and what further degrees might be useful to get into a particular profession. CTE programs: Note also if any agreement or MOU exists with employers to place graduates.

The PHSC A.S. degree fully articulates to the Earth Science B.S. degree at CSU Sacramento. SCC counselors are aware of this, as it is explained in the degree Narrative.

4.4a CTE programs: Note if there are any statewide, local or national tests that students should take, after leaving your program, in order to get employed or be more competitive in the job market. Note also if students need additional study or coursework

(not provided by the college) before they are ready to take those tests. Explain how students are informed about these requirements.

NA

SECTION 5: OUTREACH

5.1 Outreach for Equity - Describe outreach efforts since the last program review to attract and retain under-represented populations (such as diversified curriculum or guest lecturers).

As there is no full-time faculty member teaching in this department, and courses are taught exclusively by adjuncts, it has not been possible to conduct outreach. This is yet another reason that a full-time faculty member needs to be hired in this department.

5.2 Outreach on Campus - Describe how the program has connected with the campus community. Include any cross-discipline collaborations, student clubs, or other activities that connect students in the program to the college as a whole. Note whether there is currently need for more coordination with Counseling.

As there is no full-time faculty member teaching in this department, and courses are taught exclusively by adjuncts, it has not been possible to conduct outreach. This is yet another reason that a full-time faculty member needs to be hired in this department.

5.3 Outreach to the Community - Describe how the program has connected with the larger community. Provide examples of activities, field trips, and community/classroom partnerships since the last program review. Note who has been brought into the classroom, and where students have been brought, beyond the classroom.

As there is no full-time faculty member teaching in this department, and courses are taught exclusively by adjuncts, it has not been possible to conduct outreach. This is yet another reason that a full-time faculty member needs to be hired in this department.

OUTREACH GOALS

Outreach Goals	Actions to be taken	Person(s) responsible	Priority (Important or Urgent)	Time frame (Short term or Long term)
If and when we hire a FT faculty person,	A FT faculty person needs to	Melanie Lutz, Joe Ryan	Urgent	Short term

they will prioritize outreach efforts to spread the word about our new program, both within SCC and the Solano County community.	be hired.			

SECTION 6: RESOURCES

6.1 Human Resources - Describe the current staffing levels in the program, and whether they are currently adequate to meet students' needs. If the program has been functioning for a while without needed faculty/staff, note how long has this position been needed, and how this gap has affected the program's health.

Currently, all of the courses in the Physical Science Department are taught exclusively by adjunct faculty, Trevor Gonzalinajec and Joshua Mueller. We need to hire a full-time faculty member to lead this program. Proposals to hire a full-time Physical Science – Geography instructor were submitted to the Academic Senate in 2021, and in 2022, but were not approved for funding.

6.1a - Note what gaps will need filling within the next year, and within the next five years, and why new or replacement faculty/staff will be needed.

There are no immediate gaps in the short term, since all courses are currently taught by adjuncts. However, in the medium to long term, we need to hire a full-time faculty member, who can provide leadership and oversight to this program.

Hiring Goals	Actions to be taken	Person(s) responsible	Priority (Important or Urgent)	Time frame (Short term or Long term)
We need to hire a full-time faculty member in this department.	Submit a full-time hiring request form each fall.	Melanie Lutz	Important	Long term

6.2 Technology - If the program has been functioning for a while without needed technology (IT, software, hardware), note how long the technology/equipment has been needed, and how this gap has affected the program's health.

NA.

6.2a - Note what new or special technology will be needed in the next year, and the next five years, and why it will be needed.

NA.

Technology Goals	Actions to be taken	Person(s) responsible	Priority (Important or Urgent)	Time frame (Short term or Long term)
None	-	-	-	-

6.2b - Describe survey feedback describing students' experiences with technology in the classroom.

NA.

6.3 Facilities & Equipment - Note what classrooms, buildings, and other facilities the program currently uses/occupies. Describe how the existing facilities/equipment serve the program's needs, and in what ways the existing facilities are inadequate to meet students' needs. If the program has been functioning for a while with inadequate facilities/equipment, note how this has affected the program's health.

Currently, all PHSC courses are taught either online, or in Room 301, in Building 300. This room is perfectly suited to the needs of this program.

6.3a - Note what new facilities/equipment will be needed in the coming years.

In our long-term plans, we hope to move this program into the new STEM Center.

Facilities Goals	Actions to be taken	Person(s) responsible	Priority (Important or Urgent)	Time frame (Short term or Long term)
None	-	-	-	-

6.3b - Describe survey feedback describing students' experiences with the Program's facilities/equipment.

The Student Survey was sent out in Spring 2022. No PHSC courses were taught in that term. (The responses in the Student Survey correspond to other courses that could be part of the PHSC AS degree. However, since the degree has not actually gotten underway, the responses registered in the Student Survey do no actually correspond to this degree.)

6.4 Library and Student Support Resources - Note how the program uses tutors and other specific support for student learning. Include any plan to change or expand student support in the goals list below.

This program does not currently use tutors or other specific support. As the program grows, we may develop a cohort of potential tutors.

Student Support Resource Goals	Actions to be taken	Person(s) responsible	Priority (Important or Urgent)	Time frame (Short term or Long term)
None	-	-	-	-

6.4a - Review the college's discipline-specific library resources with a librarian. Summarize the current status of the library resources and plans to supplement the collection. Upload the librarian's collection evaluation form to the blue folder in the upper right-hand corner of Section 6.

PHSC 012 uses the following textbook: Hewitt et al., Conceptual Physical Science, 6th ed., Pearson, ISBN-13: 978-0134060491. This book is not currently held in the SCC library. The instructor of this course is planning to contact the publisher for a desk copy, and will donate it to the SCC library.

6.5 Other Resources - Note the program's routine or special costs not addressed above, such as regularly contracted services. Note whether any of the funds for these goods/services come from a special source; if so, note if the funding will run out or will continue for the foreseeable future, and potential impact on the program.

NA

6.6 Resources Leading to Improvement - Using specific examples, describe how changes to staffing, faculty, technology, equipment, facilities, library collection, student support, and/or funding have led to an improved experience for students and greater student equity. CTE

programs: Address specifically any improvements funded by Perkin's money or other sources.

We have recently hired a new adjunct (Joshua Mueller) to teach our new PHSC courses (013, 014, 015, and 016). This will allow these important courses on climate change and the environment to be offered for the first time.

END OF SECTION 6

SECTION 7: CONCLUSION

7.1 Need for Improvement and Support - Summarize the program's top two or three areas most in need of improvement and support.

1. The main need of this new program is a full-time faculty member who can take the helm, and lead the program into the future.

2. Any publicity that can be provided by JamesThomasMedia would greatly help attract new students to this program. Climate change is acknowledged as the most pressing problem of the day, and this is the only degree at SCC that focuses on this topic. We need to make the community more aware of these courses, and this degree.

7.2 Improvement, Success, and Strength - Summarize the program's top two or three areas of improvement, success, and strength.

The main success of this program is that we have created four new courses, and a new AS degree, in the important new area of climate change and the environment. We have also hired an adjunct to teach these new courses.

7.3 Signature Page - The following faculty in the program (or in a related program) have read this self-study report and have had the opportunity to provide feedback:

Dr. Melanie Lutz
Dr. Trevor Gonzalinajec (adjunct)
Dr. Joshua Mueller (adjunct)