2018-2019 Program Review Cycle

Instructional Programs

CAN Program Review (Instructional) - Earth Science (Odd Year)

Program Review Narratives

2018-2019

Instructional Program Review (IPR)

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Executive Summary

0. Executive Summary: Executive Summary

The Earth Science program at Cañada College introduces students to sub-disciplines of earth science and to the realm of scientific thinking. The courses require students to learn content, develop critical thinking skills, and practice thinking like a scientist. Most of our students are general education students, and for many it is their first college-level science course. The department is currently building degree programs to accommodate students interested in completing earth science-related degrees (e.g. earth science, geology, environmental science) and/or transferring in earth science-related fields. Our new degree programs will also help "catch" students who are not currently persisting in other STEM fields, as such they should increase degree completion and transfer rates. In 2019 we will begin to research and develop relevant and impactful Earth Science-related CTE programs.

Strengths of the earth science program include the broad range of disciplines offered (i.e. geology, oceanography, meteorology, environmental science, and geography) and opportunities to use remarkable local natural and human resources. Our local environment provides amazing opportunities for students to explore the concepts and processes they learn about in the classroom. Additionally, the United States Geological Survey Regional Office in Menlo Park is an excellent resource for seminars, guest-speakers, and internship opportunities. Further, there are strong earth-science related programs at several of our neighboring 4-year schools.

Underprepared students continue to be a challenge. Many general education students in our classes do not have college level reading, writing and/or math skills. Additionally, they may not possess the time management, organizational, and learning skills that make it easier to succeed. Further, many students are overextended and do not have a good understanding of the amount of time they need to dedicate each week to their classes. Earth science faculty work to help students gain the skills they need to succeed, and we continue to examine content and instructional methods to better match the background and abilities of students. In particular, we are looking at how to increase hands-on exploration and research opportunities in our classes. Additionally, we are beginning to work closer with the Learning Center and STEM Center to provide greater access to tutoring, recruit new students, and provide extra-curricular earth science opportunities.

To continue to improve the quality and reach of our program, we plan to:

1. Revise our current Environmental Science AS degree to distinguish it from our new ENVS AS-T, "catch" students not persisting in other related STEM fields, facilitate higher transfer rates in ENVS, and help address community labor needs in Environmental Science careers.

2. Create a Geology AS-T degree to facilitate student transfer in GEOL, "catch" students not persisting in other related STEM fields, and help address community labor needs in Geoscience and Hydrology careers.

3. Create a lab class (ENVS 101) to accompany ENVS 115.

4. Develop print and online marketing materials for Earth Science Department programs.

5. Explore the development of a CTE program for ENVS.

6. Collaborate with STEM Center to improve student success and develop pathways for first semester STEM students.

7. Improve student success by increasing hands-on activities and student research opportunities in our classes.

Program Context

1. Mission: Mission statement: The Earth Science Department endeavors to prepare students for successful transfer to 4-year institutions, provide the prerequisite earth science foundation for further study in earth science fields, foster critical thinking and active learning, and fulfill the needs and interests of students by having a well-rounded curriculum of lecture and laboratories.

Currently our program focuses primarily on transfer students. Most students take earth science courses to fulfill general education requirements and/or degree requirements for their 4-year degrees. We are working to grow our degree programs. Further, we see a need to develop pathways for earth science career/technical training, and we are beginning to research possibilities.

2. Articulation: There are no known curricular or degree requirement changes at the high school level that would impact our program, though we do acknowledge that our program would benefit from developing closer ties to the local high school programs.

The state of California approved a Transfer Model Curriculum (TMC) template for Environmental Science in Spring 2017. We anticipated the TMC by studying the draft that was circulated for review the previous year, so we were poised to immediately submit our program. Our ENVS AS-T was among the first two programs in the state to be approved, and it launched in 2018.

The state-wide TMC for Geology underwent 5-year review in 2016. No changes were made. Since 2016, we have planned to create a Geology AS-T. One new course (Historical Geology) must be created and then the degree template needs to be developed and submitted to our curriculum committee and the state. The course outline was started, but not finished. It stalled simply due to lack of faculty time.
We anticipate that both programs will stimulate additional interest in our department. Currently we lose a small number of geology students to our sister schools where the Geology AS-T is available.

3. Community & Labor Needs: Nationally, earth science jobs continue to outpace general employment growth. See attached data taken from the Occupational Outlook Handbook published by United State Department of Labor Bureau of Labor Statistics. All five of the earth science jobs profiled in the handbook are growing “faster” or “much faster” than the national average. Further, California has the highest or second highest employment level in all five jobs profiled. Additionally, several cities in our region are in the top 10 cities in the country for both employment level and pay in the two environmental science-related jobs profiled in the handbook.

Notably, we expect those employment trends to continue, as California (and the SF Bay Area in particular) has a heightened focus on water, energy, solid waste management, and climate change, and the local resource and economic needs related to those issues is only going to increase over the next decade.

Many, but not all, career opportunities in earth science-related fields require a 4-year degree. Further, in the SF Bay Area some of the technical jobs, which typically require 2-year degrees, are actually filled by people with 4-year degrees. This was especially true during the last recession. Thus, clearly it is important that we continue to develop and market our transfer degree programs.

Our department would like to also develop effective new pathways (i.e. certificates or degrees) for career/technical education related to earth science. The Occupational Outlook Handbook notes there is a demand for skilled environmental science technical workers in California and our region. Students with 2-year degrees are appropriate for these positions, and with the improved economy there are likely again opportunities for these students. The major industries for technical employment in environmental science are consulting, analysis labs, and local, state, and federal government. More research is needed on local industry demand, top local employers, and the programs already available at nearby institutions. We will work with the Director of Workforce Development to help develop our programs.

Looking Back

4. Curricular Changes: We no longer offer evening classes, due to their chronic low enrollment. Online classes have taken their place. Online enrollment continues to grow. For the last 4 years, METE and GEOG have been offered only online. For GEOG the addition of online classes, initially to grow the program, has resulted in an inability to fill face-to-face classes. This is not ideal, as the online format is not ideal for all students. We hope to successfully rebuild face-to-face GEOG sections (at least in GEOG 100), while still maintaining strong online enrollment. We will work with our dean to figure out creative scheduling ideas.

ENVS and OCEN have both online and face-to-face classes, and we feel strongly that they both need to maintain a face-to-face presence on campus. Currently GEOL is only offered face-to-face, and we have no immediate plans to change this.

5A. Progress Report - IPC Feedback: We have provided responses to previous program review below.

1. Executive Summary Recommendations: Summary of action plans. While strengths, opportunities and challenges are made clear, what will be done with these (e.g., specific action plans around these) is unclear. In particular, more information on specifics of action plan regarding degree and certificate creation would be helpful.
RESPONSE: We have included a summary of our action plan in the Executive Summary of our current program review. See Section 1 (Mission).

2. Community and Labor Needs Recommendations: Community needs, Employment needs, Impact on program.More specific information to support this section would be helpful. Are these trends also consistent locally? statewide? We encourage faculty to utilize campus research resources including PRIE and the Director of Workforce Development.
RESPONSE: We robustly addressed these recommendations in our current program review. See the Community and Labor Needs section and the attached document. See Section 3 (Community and Labor Needs).

3. Impact of Resource Applications Recommendations: Further description of new resources' impact on program, Further description of impact on students. General description of resources' impact on program and students provided.
RESPONSE: We addressed the impact of recent resources on our program and students in our current program review. Notably, we did not make a resource request last year, so the current program review addresses the resources we requested the previous year. See Section 6A (Impact of Resource Applications).

4. SLO Assessment - Compliance Recommendations: Evidence that SLOS are addressed at least once/4 years. Program acknowledges current lack of coordinated SLO assessment plan and will work on this during August Flex Days.
RESPONSE: We have now developed and posted a 3-year assessment cycle and are up to date with this plan and have posted assessment data in Trac Dat. We have two more adjunct instructors to train, and have plans to do so in spring. See section 9A (SLO Assessment - Compliance).

5. SLO Assessment – Impact Recommendations: Strategies implemented/plan to implement, Specific examples. In the future, please provide specific examples of course SLOs and strategies implemented as a result of their assessment.
RESPONSE: Faculty have discussed the current round of assessment and developed strategies based on reflection and discussion. See section 9B (SLO Assessment - Impact).

6. PLO Assessment – Plan Recommendations: Evidence of assessment plan, Further description of assessment plan. We are concerned that no PLO assessment plan currently exists for this program. All programs, regardless of focus (transfer, CTE, GE) must have PLO assessment plans.
RESPONSE: We have now input our PLO into TracDat and developed an assessment plan. Additionally we are on track with PLO assessment tasks in our 3-year plan. See section 11 (PLO Assessment).

7. Program Planning Recommendations: Research, training, equipment, or facilities improvements needed. Some program objectives (e.g., those for degree development) are thorough while others (e.g., CTE program development, equipment requests) are quite vague.
Although purchase of lab equipment/supplies listed as objective, no specific information provided on what equipment supplies are needed.
RESPONSE We have provided more robust information for all objectives and included at least rudimentary action plans for each objective. Notably, some of these objectives will likely not be completed without release time, as finding time to do all of this in addition to the normal overwhelming duties within a one-person department (with 6 disciplines) is not feasible.
5B. Progress Report - Prior Action Plans: 1. Create Environmental Science AS-T (transfer degree). Completed.
Degree launched Fall 2018. Now we need to address building awareness and marketing the degree both within Canada College and the high schools in our community.

2. Create Geology AS-T (transfer degree). In progress.
Lack of faculty time has stalled the creation of the one remaining course needed for the degree. This is still a very high priority for the department

3. SLO Assessment and TracDat Training: Significant progress.
The two faculty who teach the most classes are fully trained. Additionally, we developed a 3-year assessment plan. We are currently starting year 2 of the plan, and we are still on-track with assessments! In Spring 2019 we will train another faculty member, as according to our 3-year plan, her courses are up for SLO review. We have two additional courses with no assessment tools identified. One will be offered for the first time in 2019, at which time we will add assessment tools. The other has never been offered and will likely be banked.

4. Purchase lab equipment and supplies to improve student success: Completed and some orders put on hold.
Identifying and purchasing equipment and supplies to improve student success is an ongoing process. Two of the supply items listed on the previous report were purchased and are highly used in OCEN and GEOL classes. The other two items (classroom set of clearview base globes and a single full-swing meridian globe) were not ordered. We consecutively ordered globes from two different vendors, neither of whom were able to successfully complete our order. Since we have not recently offered GEOG classes in face-to-face setting, we put this order on hold. If we again offer GEOG classes face-to-face, we will likely again try to order globes.

5. Research and Develop Earth Science CTE Opportunities: In progress.
This is still a priority for us. We have researched labor data. (See section 3 and the attached file.) Additionally, we have identified local industries that are appropriate for further research and potential collaboration. We need to research programs at other local institutions, and we need significant further work with industry partners to understand the knowledge and skills needed for our student to successfully get these technician jobs. To accomplish this, we need to start to work more closely with the Director of Workforce Development.

6A. Impact of Resource Applications: Last year we did not make any equipment or staffing requests.

Most of our instructional equipment and supplies continues to support two classes, Oceanography Lab and Geology Lab. We believe that authentic hands-on exploration is likely to improve student success. Notably, the new materials allowed us to bring hands-on activities into lecture classes too (not just labs), and the GEOL and OCEN lab students were able to work in smaller groups and thus get more personal hands-on time doing real science. Geology lecture, Oceanography Lab and Geology Lab success rates all increase from Spring 2017 to Spring 2018. We can't attribute this increase simply to the purchase of a few more supplies, however (as stated above) more hands-on exploration is generally always good.... and seems to help increase retention and success.

The other major items on the equipment request were not ordered. As mentioned in Section 5B above, we tried two vendors and neither could fill our order. Since we have not recently offered GEOG classes in face-to-face setting, we put this order on hold. If we again offer GEOG classes face-to-face, we will again try to order globes.
6B. Impact of Staffing Changes: N/A

Current State of the Program

7. Enrollment Trends:
The Earth Science department census headcount, end-of-term headcount, FTES, load, and fill rates ALL INCREASED significantly EACH year from 2013/14 to 2016/17. For example, our census headcount and end-of-term headcount increases each year ranged from 12.8% to 27%, depending on the year and metric. During this same 3-year time period, the overall college census headcount DECREASED 3.0% (2013/14 - 2014/15), 2.8% (2013/14 - 2014/15), and 8.0% (2013/14 to 2014/15). We were pleased to be growing even during a period of decreased enrollment for the college. During this time-period, we increased departmental offerings from 16 to 20 sections. Department fill rates in 2016/17 were 92.4%.

From 2016/17 to 2017/18, our productivity measures all dipped slightly. For example census headcount dropped 2.1% and end-of-term headcount dropped 3.1%. During this same time-period, the overall college census headcount dropped 8.3% and the overall college end of semester headcounts dropped 8.8%. Our headcounts decreased less than the college average, but we are still concerned. Increased marketing efforts are likely needed within the college and to the local high schools. We hope our new degree programs will help as well. From 2016/17 to 2017/18, we also added 4 sections, so this contributed to a decline in load and fill rates. Notably though, department fill rates were still at 85.8%, still significantly higher than the college average of 81.5%.

We always see significantly greater headcounts in the spring semester, compared to the fall semester. During the last 5

academic years, these fall-to-spring increases in census headcount have increased each year from a 12% boost (F2013 to Sp2014) to a 56% boost (F2017 to Sp2018). Perhaps new incoming students are not taking science GE classes their first semester and/or students are putting off their GE science courses until the spring semester prior to transfer. However, it is unclear why the trend is intensifying. As a result of this phenomena, we offer more sections in spring, and even so we also generally have higher fill rates.

As we have opened more online classes, our face-to-face enrollment has generally decreased. For GEOG we have been unable to fill a face-to-face section of GEOG 100, which we see as a problem. We are being careful to balance the addition of online sections in ENVS and OCEN to ensure we don't destroy our face-to-face sections. We will continue to work with our dean for scheduling ideas.

Oceanography is traditionally our highest enrolled and most productive discipline. From 2013/14 to 2016/17, OCEN fill rates generally hovered around 100% and some sections were nearly 120%. Similarly OCEN loads are high, generally over 540 and as high as 690. In Fall 2017 and again in Spring 2017 we added additional OCEN sections, which has decreased the disciplines load and fill rates. We may have to decrease sections slightly in the future. Overall GEOL headcounts have been fairly stable, with a slight decline recently, perhaps partially due to the increase in OCEN. We plan to offer Geology Lab on Friday to enroll more Middle College students in both Geology lecture and Geology Lab. Middle College students have a hard time fitting lab classes into their afternoon high school schedule. ENVS headcounts are increasingly slightly. Fill rates in ENVS have been lower than our other disciplines, as we are trying to grow the program from one section to two sections per semester. We will continue to offer two ENVS sections each semester (one in-person and one online). Hopefully the degree program will help boost ENVS 115 numbers. Additionally, we plan to develop a lab (ENVS 101) to accompany ENVS 115. We think this will boost enrollment in ENVS 115, as students will be able to use ENVS 115/ENVS 101 to meet their UC/CSU lab requirement for transfer.

In summary, until the most recent year all of our productivity measures increased, despite the overall college enrollment decline. In the most recent year, all of our productivity measures generally declined, though not as significantly as the college average. This decline strengthens our resolve to better market our program, develop better connections with high school feeder programs, and increase the retention/success rates of our current students. Completion of the Geology and Environmental Science degree programs and the addition of an ENVS lab may help boost enrollment in our department disciplines.

8-A. Access & Completion: The Equity data packet suggest that our department has an 3.2% ACCESS gap for male students. We may be able to address this gap via our current work with the STEM Center. The idea is that perhaps some of the students who don't persist in engineering (due to interest or difficulties in higher math) might actually be interested in earth science fields, particularly environmental science and geology. Thus, the plan is to encourage first year Engineering and/or STEM students to take an ENVS or GEOL class, especially as many are not yet far along in math to take other advanced STEM classes. Perhaps some of these students will self-select earth science as a degree earlier, or at a minimum they will have another option available for transfer if they drop from the engineering path later. Since engineering and other STEM programs have a high percentage of male students, perhaps this strategy will help increase the number of male students in earth science classes.

The Equity data packet suggest that our department has a 5.8% ACCESS gap Asian students. Asians are highly underrepresented professionally in most earth science fields. Better marketing material for our department will likely help, and we will keep this equity gap in mind as we develop marketing materials.

The Equity data packet suggest that our department has a 3.5% COMPLETION gap for Filipino students. To close the gap we need one additional completion for Filipino students. Basically, this gap results in part from having very few Filipino students in our programs. We would like to increase representation of all underrepresented minorities in our program.

Although our equity data packet does not identify many access or completion equity gaps for different ethnic groups, traditionally underrepresented minorities have been woefully underrepresented in earth science professions. Part of our department's role is to help fix this! We are pleased that our department does not have equity gaps for Hispanic or Black/African American students, but realistically it is still our goal to increase our numbers of all underrepresented groups in our program. As noted previously, our marketing material will address this. Additionally, we hope to reconstitute our tutoring program to increase student success AND to showcase some of our current high performing students. Additionally, we plan to work more closely with other campus support groups (e.g. EOPS, BTO, Promise, etc…)

8-B. Completion - Success Online: Notably, the online vs face-to-face data was not easily accessible in our data packets. The totals were by semester, but the online and not-online classes were lumped together in the totals. We simply compiled the data on our own, but we suggest that next year totals are separated out for online and not online.

Our departmental has taught online classes for several years, and we have managed to increase our success and retention rates for online classes to the point that there is no longer a significant consistent difference between the online courses and face-to-face courses.

2016/17:
Face to Face Retention Rate: 87%
Face to Face Success Rate: 77%

Online Retention Rate: 89%
Online Success Rate: 81%

2017/18:
Face to Face Retention Rate: 89%
Face to Face Success Rate: 82%

Online Retention Rate: 86%
Online Success Rate: 78%

In 2016/17, the college average retention and success rates were 81.6% and 68.4%, respectively. Collage goals for retention and success are 84% and 70% respectively. We are above the college averages and goals.

Importantly, even though our departmental retention and success rates for online classes are high, we do still have some courses that need to improve both retention and success. For example, we would like to see our (very demanding) online ENVS class improve in both areas.

9A. SLO Assessment - Compliance: We have developed a 3-year assessment plan and posted it on Trac Dat. We are currently in year 2 of the plan, and we are still on track with inputting assessment data! (This is a huge step for our department!) Our plan for each discipline is shown below (and on the attached Earth Science ASsessment plan.) Basically we have a two year cycle where all courses are accessed. Each term a different discipline is accessed.

OCEN: Assessed Fall 2017. Only one of our two OCEN instructors was involved in assessment last year, so only the face-to-face section was assessed. We assess OCEN every other fall. Our plan is to train the online instructor in TracDat this spring at our beginning-of-the semester professional development day (PD Day) and assess both online and face-to-face classes in Fall 2019, as scheduled.

GEOL: Assessed Spring 2018. There was one section of GEOL 100 and GEOL 101 last spring. Both courses were assessed. GEOL 121 is a new class that has not yet been offered, and thus has no assessment methods listed in TracDat. We will add it to our assessment plan at our spring PD Day workshop.

METE: Our lone METE course was not offered last summer. We will amend our plan during our spring PD Day workshop.

ENVS: Both the online and the face-to-face sections of ENVS 115 will be accessed Fall 2018. ENVS 130 was not offered and has never been offered (and thus has no assessment methods listed in TracDat). We will amend our assessment plan after we determine if we are banking this class.

GEOG: All three GEOG classes are scheduled to be assessed Spring 2019. We will train adjunct instructors to use Trac Dat at the spring PD day. At this time we will also add assessment methods to the two courses that lack assessment methods. All sections will be accessed.
9B. SLO Assessment - Impact: It has taken our department a while to get on track with assessment, but we made it! We appreciate the new 3-year assessment plan, and we are up-to-date with our plan. Our next step is to coordinate routine dialogue regarding the assessment.

Last year 4 of our courses were assessed in two disciplines (GEOG and OCEN). The two Geology instructors discussed assessment results, and two of the three OCEN instructor discussed results. We plan to share the GEOL and OCEN process/results with the other instructors at the PD day the beginning of spring semester, as this is also the time we have set to train our two remaining un-trained adjunct faculty.

For GEOL 100, the criteria were not met for the specific SLO measured, but the instructor learned that the wording on the

question was confusing to students. Additionally, we noted that success rates increased from Spring 2017 (77.8%) to Spring 2018 (82.1%). Perhaps this is related to an increased effort to bring rock/mineral samples and maps into the lecture classroom for more hands-on activities.

For GEOL 101, assessment discussions revealed that the current lab manual (used just one semester) is not working well. The rigor or our course is not well-supported by the lab manual. We will likely go back to a previous manual.

For OCEN 100, the assessment discussions quickly became focussed on underprepared students and (relatedly) students that fall behind and thus are not successful or drop the class. The instructor has implemented more "check points" for semester-long assignments and continues to review assignment deadlines for improvement. Additionally, faculty decided to increase the recommended preparation in English on the course outline of record to stress the need for higher reading and writing skills in OCEN 100.

For OCEN 101, based on previous assessment, the instructor rewrote several of the labs to include more basic information and reordered the material to improve the flow of the labs. Recent assessment results suggest that her changes were helpful.

Notably, our OCEN 100 and OCEN 101 SLOs changed due to course outline revisions after the instructor had already assessed the SLOs. It appears that inactive SLOs were assessed, though in reality they were active when the assessment occurred.
10. PLO Assessment: Our program has 3 PLOs, and we have developed an assessment plan. (See attached Earth Science Assessment Plan.) We intend to assess PLOs by mapping them to SLOs. Thus far, we have input our PLOs into TracDat and mapped them to SLOs for several (but not yet all) of our courses. Our 2017-18 PLO was assessed through the assessment of one of our GEOL SLOs.

So far we have learned that we don't fully understand the process. E.g. Do we need to include PLO assessment methods if we have mapped SLOs? How do we account for different PLOs for different degree programs within our department? Or should the PLOs be the same? We plan to get more training on PLO mapping and assessment. During our spring PD workshop, we hope to at least get all the mapping completed. Further, at that point, we will develop a timeline for when we will finish unfinished tasks and when departmental faculty will meet to discuss PLO findings and related strategies to improve our program.

Looking Ahead

11. Program Planning: To continue to improve the quality and reach of our program, we plan to do the following:

1. Revise our current Environmental Science AS degree.
The current AS degree was designed prior to the approval of our ENVS AS-T, and now the two degrees are redundant. The new ENVS AS degree will have slightly less required science courses and more skill-based electives. The degree will be designed to facilitate transfer to our local CSU ENVS programs, some of which require fewer classes than indicated on the ENVS AS-T. As noted in section 3 above, there is a need in California (and our local area in particular) for workers with 4-year degrees in ENVS. Further, (as noted in section 7 above), our ENVS AS-T and ENVS AS degrees may be able to help "catch" students who do not persist in some of the other STEM fields. This objective will be completed when we launch a revised ENVS AS degree.

2. Create a Geology AS-T degree.
A Geology AS-T degree will help us attract and retain students, and importantly it will help facilitate student transfer to 4-year schools. Currently, we lose interested students to other schools. Students who know they have an interest in geology are less likely to attend Canada, and students who find a passion for Geology after taking a class are likely to move on to a school that offers an AS-T. Additionally, as with our two Environmental Science degrees, a Geology AS-T degree program can likely help "catch" students who are not persisting in other STEM fields (e.g. engineering). (See section 7 above.) Many second or third semester engineering students would already have all but one of the required Geology AS-T courses completed. The Geology AS-T has few classes, so it is a relatively easy degree to complete and it facilitates successful transfer. Additionally, as noted in section 3 above, there are significant job opportunities in California (and our local area in particular). Interestingly, in many cases professional geologists work alongside professional engineers in consulting firms and at construction sites. This objective will be completed when we launch a Geology AS-T degree.

3. Create a lab class (ENVS 101) to accompany ENVS 115.
ENVS 115 is a versatile class for completing GE requirements, as it counts for either a Life Science OR a Physical Science for both IGETC and CSU GE. However, since the class does not have a lab, it limits the number of student who will take the class. Adding an optional co-requisite lab would increase enrollment. Additionally, as several 4-year programs require students to complete a lower division ENVS lab, this course would aid in transfer. Further, importantly this lab would increase our ability to get students involved in hands-on activities and authentic research, which will likely increase student success (see sections 6B and 7 above).

4. Develop print and online marketing materials for Earth Science department programs.
We need to showcase our program and course offerings, and we especially need to advertise our ENVS and GEOL degree programs. (See section 7 above regarding warding off declining enrollment.) Thoughtful marketing materials and a recruitment plan will help increase underrepresented minority students in our classes and degree programs. (See section 8A above.) Recruitment needs to be done on campus and at our local feeder high schools. (See section 1 above.) We also need further collaboration with our college recruiter and our campus support programs (e.g. EOPS, BTO, Promise, etc..)

5. Explore the development of a CTE program for ENVS.
Labor statistics indicate there is demand for Environmental Science Technicians in California and especially in the SF Bay Area. Much more research and community networking is needed in order for us to develop a successful program. (See section 3 above.) We will work with the Director of Workforce Development to help develop our programs.

6. Collaborate with STEM Center to improve student success and develop pathways for first semester STEM students.
We need to establish in-person and online tutoring in all of our disciplines. This will improve student recruitment, retention and success. (See section 8A above.) Additionally, we plan to work with the STEM Center to develop pathways that include GEOL or ENVS for first year STEM students. This can simultaneously help identify students interested in earth science, provide an option for students who later do not persist in some of the other STEM fields (See section 7 above), and also increase the number of male students taking our classes. (See section 8A above.)

7. Improve student success by increasing hands-on activities and student research opportunities in our classes.
Hands-on activities in our lecture classes increase student interest and success. (See sections 6A and 9B.) Further authentic research opportunities based on student interest are also likely to increase interest and success. To facilitate more hands-on activities and research opportunities we need to purchase laboratory equipment and supplies. We are primarily in need of supplies for water testing and microscopes.

This fall we purchased water-testing equipment with departmental funds, however we need additional supplies (outside of our normal budget) in order to use this equipment routinely and effectively. The water testing kit is used in our Oceanography and Environmental Science classes. It will likely also be used by honors students throughout our department.

Additionally, our microscopes are ancient and no longer usable and lately we have borrowed scopes from Life Sciences and/or omitted activities. This is not sustainable and does not serve students. The scopes are used in Geology and Oceanography classes and will also be used in our future Environmental Science Lab. Additionally, we are requesting one instructor scope where the view field can be seen digitally and projected on the screen. This scope will allow visually impaired students to use the microscope and fully participate in the lab activities as well. Lastly, we are requesting wifi enabled camera for students to upload and share images for student analysis. The camera will also allow the instructor to easily project any students work on the projection screen.

Notably, tasks 1-5 above have been very high priority for years, but are progressing slowly (or not at all) primarily due to lack of time by the faculty. Two semesters of 20% release time would likely result in completion of all 5 tasks. Otherwise, it could take years.

Program Review Narrative Status: Complete
Related Documents:
Earth Science Labor Market Summary.xlsx
EarthScience 3-Year Assessment Plan.pdf

Objective: Revise Environmental Science AS Degree

The current AS degree was designed prior to the approval of our ENVS AS-T, and now the two degrees are redundant. The new ENVS AS degree will have slightly fewer required science courses and more skill-based electives. The degree will be designed to facilitate transfer to our local CSU ENVS programs, some of which require fewer classes than indicated on the ENVS AS-T. As noted in section 3 of our program plan, there is a need in California (and our local area in particular) for workers with 4-year degrees in ENVS. Further, (as noted in section 7 of our program plan), our ENVS AS-T and ENVS AS degrees may be able to help "catch" students who do not persist in some of the other STEM fields. This objective will be completed when we launch a revised ENVS AS degree.

CAN Program Review (Instructional) - Earth Science (Odd Year)

Objective Status: 1 - New (PR)
Objective Year: 2019-2020, 2020-2021
Estimated Start Date: 06/03/2019
Estimated Completion Date: 12/31/2020
Please select the college goals with which this objective aligns.: Student Completion/Success - Provide educational and student services programs that highlight inclusivity, diversity, and equity in their mission to help students meet their unique educational goals and minimize logistical and financial barriers to success., Community Connections - Build and strengthen collaborative relationships and partnerships that support the needs of, reflect, and enrich our diverse and vibrant local community.
Please select the districct goals with which this objective aligns.: District Goal #1 - Develop and Strengthen Educational Offerings, Interventions, and Support Programs that Increase Student Access & Success, District Goal #2 - Establish And Expand Relationships With School Districts, 4-year College Partners, And Community-based Organizations To Increase Higher Education Attainment In San Mateo County

Action Plans

2019-2020 - 1. Review 3 or more local CSU ENVS program degree requirements.
2. Develop curriculum outline for the degree.
3. Input into Curricunet and go through the curriculum review process.
4. Work with articulation officer to submit to state. (Active)

Who's Responsible for Completing this Action Plan?: Susan Mahoney
Estimated Completion Date: Fall 2021

2019-2020 - Consider developing a reassign time request to complete program objectives 1-5. Several of these objectives have languished for years due to lack of time. (Active)

Who's Responsible for Completing this Action Plan?:
Estimated Completion Date:

Objective: Create Geology AS-T degree

A Geology AS-T degree will help us attract and retain students, and importantly it will help facilitate student transfer to 4-year schools. Currently, we lose interested students to other schools. Students who know they have an interest in geology are less likely to attend Canada, and students who find a passion for Geology after taking a class are likely to move on to a school that offers an AS-T. Additionally, as with our two Environmental Science degrees, a Geology AS-T degree program can likely help "catch" students who are not persisting in other STEM fields (e.g. engineering). (See section 7 above.) Many second or third semester engineering students already have all but one or two of the required Geology AS-T courses completed. The Geology AS-T has few classes, so it is a relatively easy degree to complete and it facilitates successful transfer. Additionally, as noted in section 3 above, there are significant job opportunities in California (and our local area in particular). Interestingly, in many cases professional geologists work alongside professional engineers in consulting firms and at construction sites. This objective will be completed when we launch a GEOL AS-T degree.

Objective Status: 1 - New (PR)
Objective Year: 2019-2020, 2020-2021
Estimated Start Date: 06/01/2019
Estimated Completion Date: 12/31/2020
Please select the college goals with which this objective aligns.: Student Completion/Success - Provide educational and student services programs that highlight inclusivity, diversity, and equity in their mission to help students meet their unique educational goals and minimize logistical and financial barriers to success., Community Connections - Build and strengthen collaborative relationships and partnerships that support the needs of, reflect, and enrich our diverse and vibrant local community.
Please select the districct goals with which this objective aligns.: District Goal #1 - Develop and Strengthen Educational Offerings, Interventions, and Support Programs that Increase Student Access & Success, District Goal #2 - Establish And Expand Relationships With School Districts, 4-year College Partners, And Community-based Organizations To Increase Higher Education Attainment In San Mateo County

CAN Program Review (Instructional) - Earth Science (Odd Year)

Action Plans

2019-2020 - 1. Create Historical Geology course with lab.
2. Use Geology TMC to create Geology AS-T.
3. Input into Curricunet and go through the curriculum review process.
4 Work with articulation officer to submit to state. (Active)

Who's Responsible for Completing this Action Plan?: Susan Mahoney
Estimated Completion Date: Fall 2020

2019-2020 - Consider developing a reassign time request to complete program objectives 1-5. Several of these objectives have languished for years due to lack of time. (Active)

Who's Responsible for Completing this Action Plan?:
Estimated Completion Date:

Objective: Create a lab class (ENVS 101) to accompany ENVS 115.

ENVS 115 is a versatile class for completing GE requirements, as it counts for either a Life Science OR a Physical Science for both IGETC and CSU GE. However, since the class does not have a lab, it limits the number of student who will take the class. Adding an optional co-requisite lab would increase enrollment. Additionally, as several 4-year programs require students to complete a lower division ENVS lab, this course would aid in transfer. Further, importantly this lab would increase our ability to get students involved in hands-on activities and authentic research, which will likely increase student success (see sections 6B and 7 above). This objective will be completed when we launch ENVS 101.

Objective Status: 1 - New (PR)
Objective Year: 2019-2020, 2020-2021
Estimated Start Date: 06/03/2019
Estimated Completion Date: 12/31/2020
Please select the college goals with which this objective aligns.: Student Completion/Success - Provide educational and student services programs that highlight inclusivity, diversity, and equity in their mission to help students meet their unique educational goals and minimize logistical and financial barriers to success., Community Connections - Build and strengthen collaborative relationships and partnerships that support the needs of, reflect, and enrich our diverse and vibrant local community.
Please select the districct goals with which this objective aligns.: District Goal #1 - Develop and Strengthen Educational Offerings, Interventions, and Support Programs that Increase Student Access & Success, District Goal #2 - Establish And Expand Relationships With School Districts, 4-year College Partners, And Community-based Organizations To Increase Higher Education Attainment In San Mateo County

Action Plans

2019-2020 -
1. Research current C-ID descriptors and ENVS lab course content at UC/CSU schools/
2. Develop the course outline.
3. Determine equipment and supply needs to support the course (likely minimal)
4. Submit the course to college curriculum committee
5. Work with articulation officer to submit to 4-year schools
(Active)

Who's Responsible for Completing this Action Plan?: Susan Mahoney
Estimated Completion Date: Fall 2020

Objective: Develop print and online marketing materials for Earth

CAN Program Review (Instructional) - Earth Science (Odd Year)

Science department programs.

We need to showcase our program and course offerings, and we especially need to advertise our ENVS and GEOL degree programs. (See section 7 above regarding warding off declining enrollment.) Thoughtful marketing materials and a recruitment plan will help increase underrepresented minority students in our classes and degree programs. (See section 8A above.) Recruitment needs to be done on campus and at our local feeder high schools. (See section 1 above.) We also need further collaboration with our college recruiter and our campus support programs (e.g. EOPS, BTO, Promise, etc..)

Objective Status: 1 - New (PR)
Objective Year: 2020-2021
Estimated Start Date: 08/01/2020
Estimated Completion Date: 12/31/2020
Please select the college goals with which this objective aligns.: Student Completion/Success - Provide educational and student services programs that highlight inclusivity, diversity, and equity in their mission to help students meet their unique educational goals and minimize logistical and financial barriers to success., Community Connections - Build and strengthen collaborative relationships and partnerships that support the needs of, reflect, and enrich our diverse and vibrant local community.
Please select the districct goals with which this objective aligns.: District Goal #1 - Develop and Strengthen Educational Offerings, Interventions, and Support Programs that Increase Student Access & Success, District Goal #2 - Establish And Expand Relationships With School Districts, 4-year College Partners, And Community-based Organizations To Increase Higher Education Attainment In San Mateo County

Action Plans

2020-2021 - Create marketing materials for Earth Science Department programs, specifically the ENVS AS-T, ENVS AS, and GEOL AS-T. Start and completion dates are contingent on completing the degree programs. Also, we need lots of help from Marketing, as we know little/nothing about creating promotional materials. (Active)

Who's Responsible for Completing this Action Plan?: Susan Mahoney... and help from Marketing
Estimated Completion Date: Fall 2021

2019-2020 - Work with college recruiter to reach out to local feeder schools. (Active)

Who's Responsible for Completing this Action Plan?:
Estimated Completion Date:

2019-2020 - Consider developing a reassign time request to complete program objectives 1-5. Several of these objectives have languished for years due to lack of time. (Active)

Who's Responsible for Completing this Action Plan?:
Estimated Completion Date:

Objective: Explore the development of a CTE program for ENVS.

Labor statistics indicate there is demand for Environmental Science Technicians in California and especially in the SF Bay Area. Much more research and community networking is needed in order for us to develop a successful program. (See section 3 in our program review.) We will work with the Director of Workforce Development to help develop our programs.

Objective Status: 1 - New (PR)
Objective Year: 2020-2021, 2021-2022
Estimated Start Date: 01/01/2020
Estimated Completion Date: 12/21/2021
Please select the college goals with which this objective aligns.: Student Completion/Success - Provide educational and student services programs that highlight inclusivity, diversity, and equity in their mission to help students meet their unique educational goals and minimize logistical and financial barriers to success., Community Connections - Build and strengthen collaborative relationships and partnerships that support the needs of, reflect, and enrich our diverse and vibrant local community.

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Please select the districct goals with which this objective aligns.: District Goal #1 - Develop and Strengthen Educational Offerings, Interventions, and Support Programs that Increase Student Access & Success, District Goal #2 - Establish And Expand Relationships With School Districts, 4-year College Partners, And Community-based Organizations To Increase Higher Education Attainment In San Mateo County

Action Plans

2019-2020 - Contact Director of Workforce Development for assistance on how to move forward. (Active)

Who's Responsible for Completing this Action Plan?:
Estimated Completion Date:

2019-2020 - Consider applying for reassign time to research and develop this program (Active)

Who's Responsible for Completing this Action Plan?:
Estimated Completion Date:

Objective: Collaborate with STEM Center to improve student success and develop pathways for first semester STEM students.

We need to establish in-person and online tutoring in all of our disciplines. This will improve student recruitment, retention and success. (See section 8A above.) Additionally, we plan to work with the STEM Center to develop pathways that include GEOL or ENVS for first year STEM students. This can simultaneously help identify students interested in earth science, provide an option for students who later do not persist in some of the other STEM fields (See section 7 above), and also increase the number of male students taking our classes. (See section 8A above.)

Objective Status: 1 - New (PR)
Objective Year: 2019-2020, 2020-2021
Estimated Start Date: 01/01/2019
Estimated Completion Date: 12/31/2019
Please select the college goals with which this objective aligns.: Student Completion/Success - Provide educational and student services programs that highlight inclusivity, diversity, and equity in their mission to help students meet their unique educational goals and minimize logistical and financial barriers to success., Community Connections - Build and strengthen collaborative relationships and partnerships that support the needs of, reflect, and enrich our diverse and vibrant local community.
Please select the districct goals with which this objective aligns.: District Goal #1 - Develop and Strengthen Educational Offerings, Interventions, and Support Programs that Increase Student Access & Success

Action Plans

2018-2019 - Attend STEM Center Staff meeting and/or otherwise connect with STEM Center on this issue. (They are already working on it.) (Active)

Who's Responsible for Completing this Action Plan?:
Estimated Completion Date:

2019-2020 - Contact Learning Center and STEM Center to inquire about how to set up tutoring. (Active)

Who's Responsible for Completing this Action Plan?:
Estimated Completion Date:

Objective: Improve student success by increasing hands-on activities and student research opportunities in our classes.

CAN Program Review (Instructional) - Earth Science (Odd Year)

Hands-on activities in our lecture classes increase student interest and success. (See sections 6A and 9B.) Further authentic research opportunities based on student interest are also likely to increase interest and success. To facilitate more hands-on activities and research opportunities we need to purchase laboratory equipment and supplies. We are primarily in need of supplies for water testing and microscopes.

This fall we purchased water-testing equipment with departmental funds, however we need additional supplies (outside of our normal budget) in order to use this equipment routinely and effectively. The water testing kit is used in our Oceanography and Environmental Science classes. It will likely also be used by honors students throughout our department.

Additionally, our microscopes are ancient and no longer usable and lately we have borrowed scopes from Life Sciences and/or omitted activities. This is not sustainable and does not serve students. The scopes are used in Geology and Oceanography classes and will also be used in our future Environmental Science Lab. Additionally, we are requesting one instructor scope where the view field can be seen digitally and projected on the screen. This scope will allow visually impaired students to use the microscope and fully participate in the lab activities as well. Lastly, we are requesting wifi enabled camera for students to upload and share images for student analysis. The camera will also allow the instructor to easily project any students work on the projection screen.

Objective Status: 1 - New (PR)
Objective Year: 2019-2020
Estimated Start Date: 06/01/2019
Estimated Completion Date: 07/31/2020
Please select the college goals with which this objective aligns.: Student Completion/Success - Provide educational and student services programs that highlight inclusivity, diversity, and equity in their mission to help students meet their unique educational goals and minimize logistical and financial barriers to success.
Please select the districct goals with which this objective aligns.: District Goal #1 - Develop and Strengthen Educational Offerings, Interventions, and Support Programs that Increase Student Access & Success, District Goal #3 - Increase Program Delivery Options, Including the Expanded Use of Instructional Technology, to Support Student Learning and Success

Action Plans

2018-2019 -
1. Purchase equipment for 2019/2020 academic year.
2. Work with honors students, regular students, and other faculty to develop individual or group research projects in our classes.
2. Document use of new equipment.
(Active)

Who's Responsible for Completing this Action Plan?: Susan Mahoney and Kimberly Kirchoff-Stein
Estimated Completion Date: Spring 2020

Resource Requests

Labware: 12 beakers (600 ml), 2000 ml beaker, 24 wheaton amber rounds w/caps, 10 polypropylene funnels, stir rods - supplies for water testing kit

Type of Resource: Supplies (Items less than $5000)
Cost: 230

LaMotte Easy Read Titrators - supplies for water testing kit

Type of Resource: Supplies (Items less than $5000)
Cost: 100

Motic Moticam X Wi-Fi Camera - Allows wifi from microscope to any Bluetooth enabled device. Students can easily project and download their microscope images.

Type of Resource: Supplies (Items less than $5000)
Cost: 405

CAN Program Review (Instructional) - Earth Science (Odd Year)

Wolfe 7-45x Zoom Stereomicroscopes ($554.00 each + tax and shipping; need 6) - Our current scopes are so outdated (20-30 years old?) we don't use them. We have taken our classes to the Biology Lab to work, but that is not a sustainable solution.

Type of Resource: Supplies (Items less than $5000)
Cost: 4100

Wolfe DigiVu DVM 10 Digital Stereomicroscope - For instructor to project on attached viewscreen or projector. Also useful for visually impaired students who previously have not been well-accommodated during microscope activities.

Type of Resource: Supplies (Items less than $5000)
Cost: 1400