

2023-24 Program Review

Program Name: Geological Sciences

Program Contact: Katryn Wiese

Academic Year: 2023-2024

Status:

Updated on:

1. Description of Program (200-400 words)

Geology, paleontology and oceanography are all part of the geological sciences program. A lab course accompanies paleontology and geology, and will again for oceanography starting Fall 2024. All courses support the college mission of preparing students for transfer since all are CSU/UC transferable and fulfill GE requirements in science. All courses except for oceanography are required for the AS in Geological Sciences and the AS-T in Geology. The geology courses are also requirements for students majoring in anthropology at CSM and in the following programs at other colleges: geography, environmental science, civil engineering, construction management, and landscape architecture. Oceanography and geology are both part of Critical Pacific Islands and Oceania Studies Certificate of Achievement and the Interdisciplinary Studies, Option 3: Science and Society Associate in Arts Degree Program at CSM. The majority of the students who take the classes in our program are doing so as part of their general education and are not majors. The geosciences program aims to prepare these students as contributing members in a global society that depends on Earth's resources and that is subjected to its dynamic surface and geologic hazards.

The former full-time faculty member who managed this program, Linda Hand, retired in June 2023. Katryn Wiese was hired in May 2023 to replace Linda as the new full-time faculty member. Katryn also taught Fall 2022 as an adjunct for the program. Aligned with the CSM Statement of Solidarity, our faculty are committed to critically examining our policies and practices and continually assessing, modifying, and improving them to foster academic excellence and a meaningful educational experience. We are committed to creating an environment in the classroom where students work together, learn from each other, respect each other, see their place in the community of learning, and recognize the benefits and opportunities and strength that comes from working together.

Course modalities have typically been fully in-person except during the COVID pandemic. Since then, a few hybrid sections have been offered. We will be moving forward with a blend of in-person, hybrid, and online offerings, including full-term and late-start, to best meet the needs of students with varied schedules and timelines.

To improve student equity, the faculty employ a number of techniques that are shown to increase the success of all students, but especially those facing obstacles and personal challenges. Difficult topics are scaffolded. Extra resources are available for practice. Accessible class resources are made available electronically for all students. Office hours and tutoring and one-on-one appointments with the faculty are available and encouraged (both in person and through ZOOM). Introductory surveys completed by students solicit information about special needs or concerns as well as directing students to CSM resources such as counseling, financial aid, and how to change their preferred names. Textbooks are provided in multiple formats, primarily at no cost and online. DRC students are given accommodation. and students who think they might be eligible for accommodation are encouraged to register with the DRC. Faculty proactively reach out students who are having difficulties (either based on poor performance on class assignments or on poor attendance) to encourage meetings to find out what obstacles exist for the students and how to overcome them. Class time is interactive and group based, so that students can meet each other and help each other. Safety nets are embedded into the courses for students who are encountering emergencies (such as illness or family needs) during the semester. Faculty continually review student learning outcomes and our effectiveness at reaching our students and strategize ways to improve it. We are committed to continuous reflection and improvement.

2023-24 Program Review

Faculty have included non-white geoscientists (which are quite rare) of all backgrounds in course materials so students of color have a better chance of seeing themselves in the field of study. While the lack of diversity in the geosciences is seen as a problem nationally, it comes with the funding of many national mentoring programs and scholarships aimed at increasing diversity in students who pursue geosciences for a degree and career. Faculty are proud that the geoscience classes at CSM are quite popular with students of all backgrounds. We are pleased that the work we do to encourage and support our geoscience majors (who themselves are quite diverse) means we are increasing the overall diversity of the field.

We are continually keeping up with the ongoing efforts nationwide to improve the quality of undergraduate geoscience education. Embedded in our labs and lectures are the technology and data that are used across the field in research and education, and that students can access from their homes, including the latest satellite imagery and data sets from institutions such as NASA, NOAA, and the USGS.

QOTL/DE training has been completed by the primary faculty member in this department and will be updated regularly to ensure currency.

Free community college (SB893) has the potential to increase enrollment, and we are ready.

2. Results of Previous Program Review (200-500 words)

- a) Describe the results of your previous Program Review's action plan and identified equity gaps.
 - **Find a way to get the district to change the requirement to pay within 7 days of preregistration so that a longer time window for payment after registration doesn't disadvantage those who can't pay promptly.** The goal was written into the last Program Review to push on the district. Since then, free enrollment and coverage of fees has been enacted across the district. However, there are still students who haven't fully registered for that program or who are dropped for payment issues just as the semester starts. These students are being negatively affected by the payment requirement, so there's more to do. Note: this isn't a goal for our program specifically, but the college as a whole.
 - **Educate students about anti-racism** -- Require students to watch 12 episodes of Uncomfortable Conversations with a Black Man and then include questions about 3 of those episodes on unit tests. This was supposed to happen in Linda Hand's classes in Spring 2022. Since she has now retired, we cannot report on the results.
 - **Professional development** – AGI's Heads & Chairs: a conversation about the racial diversity of geoscience students. Linda Hand was going to review the results of these workshops to gain increased insight into recruiting and retaining students of diverse backgrounds. Again, since Linda Hand has retired, we can't report on the results.
- b) Explain any curriculum or programmatic changes since last program review
 - The biggest change was a return to in-person classes (post COVID). Meanwhile, over the last year, there have been some hybrid versions of courses offered by adjuncts (one per semester). One late-start class was also offered by an adjunct.
- c) Discipline-level and SLO (Student Learning Outcomes) assessment/Student Services and SAO (Service Area Outcomes) assessment:
 - In the last program review, Linda Hand made a plan to work on the goal of the national organizations for geoscience professionals: to increase the diversity in the geosciences. She planned to do that by creating an assignment that got students to research travel to National Parks, which had been surmised to be a way to inspire students to work in the geosciences. She felt it was a small step but a way to contribute positively.

2023-24 Program Review

- There are no other updates we can provide from past efforts due to the changeover of faculty. However, we do think that the past system of assessment of SLOs would benefit from a revamp and that will be part of our new goals going forward.

3. Current Program Review (200-400 words)

College Stats 2022-23	Ethnicity	First Gen	Age	Gender	Total
Headcount (unduplicated)	Latinx 32% White 26% Asian 20% Filipino 7% Multiracial 7% Black 3% Pacific Islander 2% Unknown 3% Native American 0%	45% of our students are the first in their family to go to college.	66% 24 yrs. and under 18% Ages 25-34 17% over 35 yrs.	49% Female 48% Male 3% Non-disclosed or non-binary	13,180 students
Enrollments (duplicated)	Latinx 35% White 26% Asian 16% Filipino 6% Multiracial 8% Black 3% Pacific Islander 3% Unknown 3% Native American 0%	47% of enrollments were by students who are the first in their family to go to college.	76% 24 yrs. and under 13% Ages 25-34 11% over 35 yrs.	48% Female 50% Male 2% Non-disclosed or non-binary	37,014 enrollments
Geological Sciences Stats 2022-23	Ethnicity	First Gen	Age	Gender	Total
Enrollments (duplicated)	Latinx 31.9% White 38.5% Asian 9.3% Filipino 2.7% African American 0.4% Pacific Islander 1.3% Other/Unrecorded (includes mutirace) 15.9% Native American 0%	40% of enrollments were by students who are the first in their family to go to college.	92% Under 24 yrs. 4% Ages 25-34 4% over 35 yrs.	42.5% Female 54% Male 3.5% Unknown	226 enrollments

a) Student population equity:

- First and foremost, because this program is small and has enrollments of just over 200/year, we would expect greater variability from year to year in certain statistics. The numbers in some subgroups are just too small. For example, in the academic year 2020 to 2021, there were only 3 students enrolled in a course in the program who identified as Black. The next two years after that had just 1 each. Therefore we will report only on subgroups that are 20 or larger (10% of our program). Even then, the data may not be statistically significant.
- Also, the multiracial category, which is a separate category for the college data, seems to be mixed with “other” in the data for the program, so it’s not clear how numbers in that category compare with the college as a whole.
- As for trends over the past three years, we’ve seen roughly the same number of enrollments of low income and first-generation college students. We’ve seen an increasing number of students who

2023-24 Program Review

have a disability status (from 5% of our students in 20-21 to 16% in 22-23). **Note: it would be nice to know how that compares to the college as a whole.**

- We've seen a decreasing number of female students (from 49% of our students in 20-21 to 43% in 22-23). The ethnicity identity of students of color (grouped together – nonwhite) has stayed roughly the same relative to white students, though white students do make up 39% of our classes, compared to 26% for the college as whole.
- Success rates for white students went from 84.6% during COVID to 71% for the two years afterwards. For Asian domestic, it was also 71% the past year. Note: greater than 70% success rates is acceptable, though we aim for higher.
- **For Hispanic students, success rates dropped from 73.4% in 10-21 to 56.9% in 22-23.** That's a huge concern. Combining all the other groups together (Black, Filipino, Pacific Islander, and Other -- mostly multiracial?), we get a 72% success rate.
- **Success rates for female students has dropped from 81% to 62%,** also a number that concerns us and that we'd like to address.
- Overall, the success rates in 20-21 (COVID year) were much higher than the last year: 22-23. Best analysis there is that students were more easily able to drop a course they weren't doing well in during COVID without a W, and many just left education at that point until things got better. Also, the Spring semester of 2020 encouraged a dropping of standards to just get the students passed through a difficult semester (no Fs allowed). Therefore, the focus of this program review is on the data from 22-23.
- **The success rate of younger students (19 or less), at 70%, is actually higher than that of the 20-24-aged students (63%).** That might be due to more middle-college students or more college-minded students straight out of college. Both of those groups are equally represented in numbers (105 vs. 103), so it's interesting that they have different success rates. Also, the older students are more likely to withdraw. That could also be due to the likelihood of whether the students have jobs and families that they are juggling (more common for the older students).
- Final note: the students who are deemed "unsuccessful" in our courses are those students who drop a course (which can be for a variety of reasons) and those receiving letter grades of D or F. We'd like to better understand why students are dropping so we can focus on helping them better at the start of the semester when they're choosing courses. But we should always expect a number of students to, after the drop date, withdraw then they realize they: don't have enough time for all they're trying to juggle in a given semester; or they have family or health issues that require they take a break this semester; or they have personal issues, such as moves or financial issues, that mean they need to drop out. It would be interesting to know what % of our students are in these categories vs. those students who drop because they don't want to receive a D or F. Then we'd like to better understand what are the reasons for the Ds and Fs and whether or not we can address those satisfactorily. College-level science classes do take a significant amount of time, especially for students weak in the skills used in these classes: reading, writing, critical thinking, and math. We encourage students to figure out right away if they are prepared and have the time required, so they can wait and come back to take our classes when they are ready. It is our experience that over 90% of students who are prepared and willing to put in the time are able to pass, especially when they seek out consultation with the instructor in office hours.

Finding 1: Compared to the college overall, the department enrollments have fewer students of color, fewer first-generation students, and fewer female students.

Analysis: Not sure what has contributed to these trends. As our courses are primarily general education physical and/or biological science, and all transfer students must take two of these courses to transfer, our guess is that it's mostly about perception of the field of study and what's involved in the coursework. This is the hypothesis used by the national professional organizations for geosciences when they try to explain the gaps in diverse representation for geoscientists working in the US.

2023-24 Program Review

Plans to Address Opportunity Gaps: We plan to continue to advertise our class content as broadly as possible so that students can see themselves in the disciplines. We will do that through hallway exhibits showcasing the content we teach and possible careers in the field, Family Science Day, and other outreach opportunities in the college to be sure students know what Geosciences is all about. We will also continue to consult with colleagues nationally on the efforts of the discipline overall to attract a more diverse workforce.

Finding 2: We've seen the success rates of Hispanic students drop from 73.4% in 2020-2021 to 56.9% in 2022-2023. We've seen the success rates of females drop from 81.3% in 20-21 to 61.5% in 22-23.

Analysis: The number is too low to be satisfied with it, and it's definitely an area where we want to apply our attention.

Plans to Address Opportunity Gaps: We plan to conduct one-on-one consultation with students who are in danger of failing or withdrawing from classes to see how we can help them and what resources we can connect them with. We hope that one-on-one connection can make the difference. Sometime the advice we provide to these students (those in danger of failing) could be waiting to take our courses until a time when they have sufficient time in their schedules and/or have completed their math classes. Sometimes it might be developing a new strategy for how to study and practice the material, which can be a new thing for many students who have had success in the social sciences or visual arts, but are more challenged by the sciences.

b) Modes of Delivery equity:

Changes since last Program Review: From Spring 2021 to Spring 2023, there were a total of 26 sections offered by the Geosciences. 11 were taught "synchronous", which likely means we were still in the COVID pandemic, when courses were remotely offered. 3 were offered as hybrid, and 12 as face-to-face.

Analysis of Gaps

- Based on data from Spring 2021 through Spring 2023 across the entire program, success rates seemed overall higher in distance ed than in face to face (73% vs. 65%). Retention rates were also higher, though both numbers are quite high to begin with: 92.5% vs. 85%.
- Success and retention were significantly higher for **disabled students** (45 student total in these data) in hybrid and synchronous classes when compared to face-to-face: 92% vs. 68% (retention) and 83% vs. 38% (success rates).
- **Female** students had higher success rates than male students in the distance education modalities (77% vs. 69%). That's an interesting finding considering it's the opposite in face-to-face classes where males have a success rate of 70% and females 60%.
- **Hispanic** students, like all students, had a higher success rate in distance ed classes (66% vs 59%), but the gap also increased from 7% points to 10 % points.
- It's hard to know what exactly the reasons are for what appears to be increased success and retention in the synchronous and hybrid classes overall, but especially for female and disabled students, because there are many factors involved, including the instructor's teaching methods, the interactions, the rigor of the course, the types of assessments, and the security of the assessments. But the data do support our plan to move toward a greater variety of class offerings, especially hybrid, which brings together potentially the best of both worlds. We look forward to gathering more data for future analysis.

Plans to Address Opportunity Gaps

Offer students more options in class modality going forward as well as semester length. Keep gathering data.

(c) Challenges and Opportunities:

- It has been more equitable to have department meetings through ZOOM and recorded. It has allowed our adjunct faculty to attend meetings they otherwise couldn't. And it helps all faculty see what they missed when the inevitable double-scheduling occurs.

2023-24 Program Review

4. Planning

a) **Discipline-level and SLO (Student Learning Outcomes) assessment/Student Services and SAO (Service Area Outcomes) assessment for 2023-2025:**

- Note: we do not have ethnicity, age, or gender information (how students identify) for our individual students, so when we assess learning, it is independent of these elements. And yet, we do not have any SLO assessment data from the past to review (due to change in faculty). Our primary work for 2023-2025 will be on gathering data each semester so we can review it across our courses.

Outcome assessment: All course SLOs

Plan: We plan to update course outlines of record to ensure that SLOs are aligned for all our courses to cover the same overall learning outcomes: critical thinking, application of the methods of scientific inquiry, communication of scientific principles, synthesis and application of multiple data sets or tools to solve problems in the geosciences. These are higher-level skills that we see as outcomes for all general education physical and biological sciences. We look forward to assessing this element of learning for all our students and comparing it with overall success and retention data. **No additional resources are needed.**

Outcome assessment: All course SLOs

Plan: End-of-semester comprehensive exams and final assignments will have questions that link to and demonstrate the course SLOs. We will use these to assess one SLO each semester for all students. Those will inform the implementation of new strategies for the classroom, and we'll document all those in our next Program Review. The focus will be first on the SLO for evaluating the evidence behind the geologic and oceanographic theories and principles we are teaching. Collections of materials and demos will be augmented to ensure evidence of the principles being discussed is available each week for students to work with. We look forward to considering the questions of how and what students are learning. **No additional resources are needed, as long as the current budget for the program remains.**

b) **Program goals**

Goal 1: Improve the success rates for our Hispanic and female students.

Actions: Identify from week 1 students in these demographics who appear to be struggling. Encourage one-on-one appointments and connect them with resources available in counseling departments and tutoring/help with the instructor. Keep a follow-up tracking of these students as the semester progresses and note whether the interventions have made a difference. Increase the modality offerings to better meet student needs. Gather SLO data each semester to add more data points to this conversation especially in regards to student learning.

Measurable Outcomes: Increase the success rates of our Hispanic students so they are closer to that of our white and Asian students (less of a gap) and female students compared to male.

Timeline: Start: Fall 2023 with one-on-ones and tracking. Fall 2023 for updating SLOs in course and program outlines and then tracking success on these SLOs at the end of each semester for all courses of all modalities.

Responsible Party: Katryn Wiese

Support needed: This work has to be done in collaboration with counselors, who will also work with students who are not prepared for the workload or the math to help them get the preparation and resources they need, either for a given semester or a future one. This work cannot be done by one person alone.

Goal 2: Increase the enrollments of women and Asians and other underrepresented groups in our courses (and thus overall enrollment).

Actions: Increase our advertising to ensure students know what the geosciences have to offer for their general education. That includes revamping bulletin boards to advertise our programs and participating in Family

2023-24 Program Review

Science Day each Fall as well as other outreach events. Increase online and hybrid offerings as well as late-start offerings. Add OCEN 101 back into the schedule (Oceanography lab).

Measurable Outcomes: Increase the representation of women and Asians and other underrepresented groups in our courses so they are closer to the overall college numbers. Increase overall enrollment in the geoscience classes (full classes with waitlists).

Timeline: Fall 2023: Family Science Day; Fall 2023: Reinstate OCEN 100; Update SLOs in course and program outlines and then track success on these SLOs at the end of each semester for all courses of all modalities. Spring 2024: Outreach to counselors and participation in college-wide open houses. Upgrade QOTL training for primary instructor.

Fall 2024: Offer OCEN 100

Responsible Party: Katryn Wiese

Support needed: This work has to be done in collaboration with counselors and other science departments as well as the college's outreach coordinators.