



Geology Department Fall 2022 Program Review

Submitted by:

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Guiding Questions from the dean are noted in **blue** and department responses in **brick**.

Dean's Comments on the Self-Study:

1. The Geology program's Self-Study is a comprehensive review of the program that covers the current curriculum, programmatic assessment, faculty contributions, and current program challenges. The last review for Geology was in 2003.
 - a. Geology program is unique in the nation because students have the opportunity to do field work on an active volcano. The program emphasizes meaningful laboratory and field components for both majors and general education classes.
 - b. The geology program follows a traditional curriculum using a cohort schedule teaching 300/400 level classes on an every other year basis. Both B.A. and B.S. degrees are offered with about 65% graduating with a B.S. degree over the past five years. Graduates find gainful employment and/or move on to graduate school.
 - c. Over the last five years, Geology has averaged around 8 graduates each year and a handful of minors. The Geology department supports the interdisciplinary Natural Science program that trains science students in one of four pathways.
 - d. Geology offers several service courses that cover the General Education program and Sustainability Certificate, and electives for Marine Science, Environmental Science, Geography, and Astronomy. Many of these offerings are paired with laboratory and field experiences that use Hawaii island as a living laboratory.
 - e. Geology has historically been staffed with four full time faculty members. Currently there are three tenured faculty members: Two Professors and one Associate Professor. In 2017 a Geology faculty member with expertise in Volcanology was appointed as interim VCAA and then retired. Department does not currently have a faculty member with expertise in Volcanology.
 - f. Faculty members are active in scholarly activities and have served on and chaired high level committees.
 - g. Under the coordination of Geology faculty, the lab space, facilities, and equipment are utilized by UH Hilo students, government agencies (USGS, HVO), and pre-college students (Science Fair.)
 - h. Geology partners with CSAV, Center for the Study of Active Volcanoes, and supports a half time APT.



2. The Geology department has three, long-term tenured faculty members.
 - a. Geology faculty have been recognized with recent awards for their Teaching, Faculty Achievement, Mentorship, and Innovation.
 - b. With the loss of Dr. Hon in 2017, the Geology program is without a faculty member with expertise in Volcanology.
 - i. Beyond volcanology, given anticipated retirements what areas of expertise does the geology department anticipate needing in the long term? Would a faculty member with a specific background be needed or would a generalist be preferable?
 - c. Faculty members work directly with government agencies and corporations (USGS, HVO, HVNP, PGV) on continuing research projects related to Geology.
 - d. CSAV staff member coordinates educational outreach at the K-12 level.
3. Two programs are offered within Geology: a Bachelor of Arts in Geology and a Bachelor of Science in Geology. The Geology program also coordinates the interdisciplinary Natural Science degree program. Geology program graduates are gainfully employed and are successful applicants to graduate programs.
 - a. The Bachelor of Science degree program is more prescriptive than the BA degree pathway.
 - i. While there are content differences, overall GEOL alpha unit requirements are similar between BA and BS. Are there ways to give more flexibility to BS degree requirements?

Department response:

This is an excellent question that requires more research and thought. The short answer is “generalist”. The small number of faculty automatically means that each faculty member must have a breadth of teaching expertise. The long answer is that we need to examine employment trends to refine our vision of what skills our graduates need and also what manner of emphasis will attract students. Ideally the new hire will have an opportunity to weigh in

Department explanation:

In cases where flexibility is acutely needed, typically the student switches to the more flexible BA. Graduate programs look at the courses taken, not whether the degree is a BA or a BS. In other cases there are liberal substitutions. This was recently done with a student that transferred from Manoa at the beginning of their senior year. We will also authorize liberal substitutions when a student has a particular career path in mind and we can tailor requirements to fit.



- b. BS degree program requires calculus based physics.
- i. [Biological Sciences in CNHS have moved to PHYS 151/152 or PHYS 170/272 requirements, but other CNHS physical science programs require calculus based physics. What impact would including a PHYS 151/152 option in the BS track have?](#)

Department response:

Algebra-based PHYS 151/152 has less strict math prerequisites than calculus-based PHYS 170/272. Switching to a choice of either track would streamline the course sequence so that students would have the option to take physics earlier, which is better for the physics department. We do not believe that taking 151/152 will hurt the chances of getting into graduate school. We are in the process of submitting a request for modification of degree requirements. So consider this done.

- c. Geology collaborates with other disciplines on campus with cross listed classes in Astronomy and Geography/Environmental Science.
- i. [Geology and Environmental Science overlap with cross listed classes. Is there a way to leverage this overlap more? \(e.g. GIS, Aerial systems.\)](#)

Department response: Good question. We are working with the geography/Env Sci department to convince them to change their prerequisites for their remote sensing and climate change classes so that geology and astronomy students can more easily take these courses. (Actually, the conversation has lapsed and needs to be picked up again.) Already our students sometimes take the geography GIS, remote sensing, and climate change classes. There are prerequisite barriers in both directions. When asked, we waive prerequisites so that geography/env students can take our GIS and environmentally-themed courses. It doesn't help that geography and environmental science students start with *either* introduction to environmental science *or* physical geography. Consequently, there is no prior background that can be assumed. Strong overlap between departments has both advantages and disadvantages. On the other hand, students gain scheduling flexibility by having a choice of the geology or the geography version.

- ii. [Would there be an opportunity to offer a cross listed class with Marine Science?](#)

Departmental response: Marine science has a policy against cross-listing their courses. Our "coastal geology" course is an



elective in MARE degree programs; MARE's "geologic oceanography" is an elective in the Geology BA and we informally allow this course to count as an elective in the Geology BS.

- d. Geology offers several classes that are placed-based and certified to meet general education requirements. (DP, Laboratory, GCC)
 - i. The UH System in collaboration with individual campuses are discussing a new GE program. How might Geology potentially fit into the proposed GE revision?

Departmental response: The department needs GE students to take our courses and will adapt our offerings accordingly, once we know what the new GE will be. We will push to keep place-based natural environment as an approved focus area in HAP classes. (The most recent proposal cuts out the natural environment as an approved focus area.) If the GCC requirement is changed to an Ethics requirement, we will adapt GEOL 100 and 300 to fit the ethics rubric. We hope to offer our own upper-division writing and oral communication courses (hopefully drawing from several STEM majors) rather than have students take additional English and communications courses. See below for discussion of the capstone course. If the second quantitative reasoning course is cut from GE, that could be the death of GEOL 170. However, it is hard to know if non-math quantitative reasoning courses could count for the proposed GE. The details of the new GE will be important.

- e. Transfer students sometimes struggle making timely progress in scaffolded degree programs.
 - i. Is there a common barrier for students in the curriculum? If so, is it the same for both BA and BS programs?

Departmental response:

Cohort scheduling has both advantages and weaknesses. The advantages are both social (strong peer groups) and pedagogical (scaffolding is a best practice). Nevertheless, sometimes cohorts run into scheduling issues. Most incoming transfer students who have had introductory geology and precalculus can graduate in two years. However, if transfer students start the geology program after the fifth semester, completion will take longer. This is particularly true for upper-classmen who have never taken a geology class and are behind in math. This is true for both the BS and the BA. Students who start late may run afoul of the



mineralogy (odd falls) - petrology (even springs) sequence or the structure (even falls) - field methods (odd springs) sequence. We cannot run these sequences every year because they may not fill and we do not have the staff. As discussed below, snafus involving the structure-field methods sequence can often be solved for BA students but not BS students. This is where switching from a BS to a BA may be the solution.

Cohort scheduling can be problematic for students who flunk required courses because they do not apply themselves. This was a particular problem in the pandemic. This is a tough nut because taking responsibility for assignments and projects is an essential component of a successful college career. Now that we are back in the classroom, being really strict about class attendance seems to be a successful strategy. We also work closely with students who are slipping to help them through.

ii. What may be possible to remove barriers for transfer students?

Departmental response:

One successful strategy has been proactive advising, that is, combing through every student's STAR record to make sure they are taking the courses they need. Unfortunately, the four-year plans meant to guide students are not, as currently implemented by administration, accommodating to alternating-year scaffolded programs.

Sometimes bottlenecks can be solved—at least in terms of graduating on time—by switching from the BS to the more flexible BA. Sometimes we are generous with substitutions. However, that is not possible if the bottleneck involves the mineralogy-petrology sequence because these courses are central to the degree and cannot be waived. Nor can petrology be taken unless mineralogy is taken first. The same is true for the structure-field sequence. The GIS bottleneck can be addressed by allowing students to take the GIS course in geography. If upper-division electives are in short supply, there are three courses in other departments that can be substituted. For any of these methods to work, strong advising is needed. We provide excellent advising, which is possible because we work closely with students in multiple classes.



- f. The 495A/B seminar is a senior seminar shared among the physical science departments.
 - i. **Has there been a discussion on how this class is delivered to meet programmatic and applicable core competencies for all programs?**
Department response: Problems with the senior seminar are acknowledged, although not everyone agrees with what the problem is. Geology, P/A, and Chemistry have begun discussions about revising the capstone. What is currently on the table is abandoning the physical sciences seminar in favor of the “communicating science” course (NSCI 476) which is the capstone course in the natural science major. With four majors requiring it, NSCI 476, which would be taught once a year, would make. The course content would have to be revised to include scientist-to-scientist communication. Advantages are that Chemistry majors would gain a within-major writing intensive class. Disadvantages would be addition of one-credit to degree requirements and long-term availability of an instructor.

4. Over the last five years, the Geology program has graduated around 8 students a year, and between 2-5 in the Natural Science degree program.
 - a. Geology is a major of discovery
 - i. **More classes are moving back to in-person instruction, how can Geology utilize this to attract students?**
Departmental Response: Geology is a major of discovery. In-person classes and experiences (labs, field trips) are much more engaging than distance learning. Beginning spring 2023, all our courses are in-person.
 - b. Following the overall decline of enrollment at UH Hilo, the number of Geology majors has shown a decrease from around 35 majors to around 25.
 - i. **Using the cohort style, what would be the ideal number of majors?**
The ideal situation is 18-20 students in the core courses. To achieve this, we estimate fifty students would be an ideal number. We would welcome consistent meaningful assistance from admissions in achieving this goal. Overall declining enrollment at UH-Hilo is a concern for many programs.

5. The Geology program effectively utilizes their facilities and lab space to deliver instruction.
 - a. One main classroom CH 110 and two lab spaces are typically used. The lecture classroom is equipped with a computer, projector, and polycom for distance



learning. Geology students utilize a conference room for a collaborative study space.

- i. Laboratory spaces are not fully equipped with updated technology. What kinds of technological equipment could be added that would enhance the instructional capabilities of the labs? (Computer, Projector, Video Microscope?)

Departmental response:

- A video microscope with a large monitor would be a significant help in teaching mineralogy, petrology, sedimentology, and volcanology.
- The tables in the main classroom (8 tables with 32 chairs) are 33 years old and are degrading from termites and normal wear. These should be replaced soon with something equally functional that will last. It would be really cool to build new tables using granite rock slabs. This would capture the attention of prospective majors and be a good teaching tool.
- The department's rock collection has grown and is spilling over the available storage space. Cabinets are needed to organize and store this valuable collection.

- ii. Petrographic microscopes were replaced in batches over the last few years and more Brunton compasses will need replacement soon. What other instructional equipment does Geology anticipate needing to deliver is laboratory and field classes?

Departmental Response:

- We have just replaced five of our professional-grade geologic compasses. An additional ten would complete replacement of the old instruments.
- Access to a four-wheel drive van would benefit our instruction; the college is currently looking into a van that would serve multiple departments.

- iii. The student space supports a collaborative study environment. Are there needs here that could enhance this area for students?

Departmental Response: We are pleased that students use the seminar room as a collaborative study space. Most students now have their own laptops. Students have asked for a printer and big monitors that can be used for collaboration.

- b. Geology has two passenger vans to use for field work.



Department comment. These vans are restricted to class-related trips and are generally sufficient for our needs.

Considerations:

1. Given the unique opportunities for UH Hilo students (both Geology and general population) and pending retirements, the Geology program should work with administration to increase faculty expertise in Volcanology. The Geology department should begin thinking about long term needs of faculty expertise.
2. Continue to develop programmatic assessments, both core competencies and SLOs, and utilize them to guide any changes. Review/identify where core competencies may be addressed.
3. Review curriculum to see if flexibility can be improved in the BS-GEOL pathway and if a PHYS 151/152 or PHYS 170/272 requirement is appropriate.
Department comment:. We have approved changing the physics requirement and are in the process of submitting the program modification request.
4. Monitor changes to UH and UH Hilo General Education and look for avenues to support any new areas. Identify new ways to promote visibility for Geology as a “major of discovery” within this new program.
Department comment:. We certainly plan to.
5. Work with other Physical Science departments in CNHS to review the Physical Science seminar: Does it fit into the SLOs and how it services the department’s core competencies.
Department comment:. This process has been started. However, the geology chair needs to prod the other departments harder to address SLOs and core competencies. See above.
6. Continue to build on the cohort model with an aim to maintain/improve already strong retention.
7. Identify large, one-time instructional needs (i.e. Brunton compasses) and work with the dean's office to help find funds for their procurement.
8. Continue working with community partners through CSAV and look for new, potentially fruitful partnerships that may increase enrollment. Utilize research partnerships with government and private agencies to support student instruction.



Strategic Goals for next Program Review

1. With unique opportunities for UH Hilo students (both Geology and general population) and pending retirements, the Geology program should work with administration to increase faculty expertise in Volcanology. The Geology department should begin thinking about long term needs of faculty expertise based on needs and new directions in the field.
2. Continue to develop programmatic assessments, based on both core competencies and SLOs, and utilize them to guide any changes. Review/identify where core competencies may be addressed.
3. Review the Geology program's cognate needs (e.g. Physics) and update requirements, where appropriate, to improve flexibility.
4. Monitor changes to UH and UH Hilo's General Education requirements and look for avenues to support new areas. Identify new ways to promote visibility for Geology as a "major of discovery" within this new program.
5. Work with other programs in CNHS to review the Physical Science seminar. Identify appropriate curricular changes taking into account programmatic needs as well as potential changes to general education.
6. Build upon the cohort model with an aim to maintain/improve already strong retention.
7. Identify large, strategic one-time instructional equipment needs (remaining Brunton compasses, video microscopes, large laboratory video screen, lab workstation/monitors, specimen storage) and work with the dean's office to help find funds for their procurement.
8. Continue working with community partners through CSAV and look for new, potentially fruitful partnerships that may increase enrollment. Utilize research partnerships with government and private agencies to support student instruction.