

Program Review 2021-2022

Geology

Created on: 11/24/2021 03:42:00 PM PDT
Last Modified: 02/02/2022 06:01:14 PM PDT

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General Information (Program Review 2021-2022)

2021/22 Program Review

2021/22 PROGRAM REVIEW FORM

Form: 2021/2022 Program Review (See appendix)

Reference Section

MESA2030 COMPREHENSIVE MASTER PLAN

ROADMAP TO MESA2030: STRATEGIC PLAN 2021-2026

MESA DATA DASHBOARDS

Requests Forms

REQUEST PORTAL

Appendix

A. **2021/2022 Program Review (Form)**

Form: "2021/2022 Program Review"

Created with : Taskstream

Participating Area: Geology

Date submitted: 12/03/2021 1:20 pm (PDT)

2021/2022 Program Review

(REQUIRED) Name of Lead Writer and Manager/Service Area Supervisor

Don Barrie/Paloma Vargas

(REQUIRED) In what ways (if any) did changes to an online/remote modality due to COVID-19 impact student success and equity in your area/program? Please provide evidence.

We've implemented numerous practices since the last program review cycle that have likely contributed to the ongoing success of the geology program. Program instructors who haven't taught online before have received specialized, extensive training in online pedagogy and instructional techniques. For example, one of our longstanding adjunct instructors (Bas) completed a 40-hour online certification course early in the pandemic. Two instructors (Barrie and Bas) participated in a one- or two-semester sequence of workshops sponsored by the National Science Foundation with colleagues from across the country. These workshops focused on improving instructional quality in geoscience courses. In addition, all three program instructors (Barrie, Bas, Rector) have completed various District-sponsored, faculty-led workshops devoted specifically to geoscience instruction.

Program faculty have received additional training in the use of new software, including Zoom, and also Pronto, a Canvas-based texting ap. These trainings have been invaluable in helping faculty make the necessary transition to online instruction, particularly in terms of converting traditionally face-to-face (F2F) course sections to various online modalities.

Faculty have also created much new online content, including numerous captioned lecture videos. This benefits students because they now have another way to review the lecture material. Many students have reported that they prefer reviewing lecture materials in video vs. written format. Another advantage of making lecture videos available to students online is that such videos can be automatically captioned in Zoom or YouTube, which makes this process easier for instructors, promotes equity, and provides an benefit to all students.

Lab instructors have also developed much new material to benefit students, moving forward. As an example, two program instructors have each created complete sets of online labs in the GEOL 101 lab course. This has been particularly useful for students who miss on-campus lab meetings, but even students who attend class benefit from these new materials. In such cases, it's now become possible in some cases for such students to complete an online lab to substitute for the on-campus lab they missed. This allows students to derive valuable learning from a lab they'd otherwise have missed.

Students and faculty alike have benefited from additional instructional materials during the pandemic. Faculty applied for and received COVID-related funding to purchase high-quality rock/mineral sets for student check-out in the GEOL 101 lab course. We also procured funding to purchase additional microscopes for use in on-campus lab sections. These microscopes have been invaluable in improving instructional quality in GEOL 101 because they facilitate more detailed sample examination of small-scale features that can't be readily observed in hand specimen.

Another new practice we've implemented is a greater emphasis on active learning and student engagement in our standard lecture courses, including GEOL 100 and GEOL 104. Once again, this is a COVID practice we plan to continue in the classroom, beginning next semester. Several example practices follow: (1) program instructors have become much more aware of the need to break up

lectures into digestible bits, separated with hands-on activities, including Zoom polls, Kahoot quizzes, class discussions, short writing exercises, small-group discussion, and learning games, to promote student learning and engagement. Collectively, these practices have worked well in both the synchronous and asynchronous modalities, and with slight modification, they could also work well in an on-campus setting. For example, rather than using Zoom polls in the classroom, instructors can use Kahoot (which involves the use of cell phones to answer feedback questions) or even simply ABCD cards and think/pair/share. I emphasize that program instructors have been implementing these strategies in the classroom even before COVID, but COVID has taught us that we need to increase the frequency of such strategies--making use of them in every lecture. The advantage of doing this is that it greatly improves the quality of formative assessment, allowing instructors to better monitor student learning and also provide ongoing feedback to students, helping them to self-identify the strengths and gaps with regard to their grasp of course material.

Another practice we want to continue is to emphasize course humanization. By this, we mean working to create a friendly, welcoming classroom environment for all students as a way to help students feel comfortable. Again, program instructors have already been doing this; however, since COVID, we've had to think more explicitly and creatively about the strategies we employ to put our students at ease online, so that they're ready to learn. One example of this is that program instructors will occasionally engage in "small talk" at the beginning of their online synchronous courses as a way to help students appreciate that their instructor is a real person who thinks about many of the same things students do. These short small-talk sessions have also proven to be an effective, low-risk way to get students talking. It occurs to us as instructors that we could continue to do this upon our return to campus next semester. After all, who doesn't like talking about their pet, or about someplace interesting they've visited? Perhaps, if students can be persuaded to talk about themselves and their own experiences, they'll be more likely to contribute to class discussions about course material.

We plan to continue more frequent collaboration and communication. As a department, we've been meeting regularly in Zoom for our regular department meetings. Faculty seem to like this; in fact, we'll likely continue this practice after the pandemic ends. In addition, to the extent that we're able to, department faculty have been meeting once or twice a semester for social gatherings. This practice helps build community and gives us a chance to interact with others in a face-to-face setting, thus helping faculty not to feel so alone and isolated during the pandemic.

Although it's always difficult to attribute program improvements to specific practices when numerous practices are being employed simultaneously, we're happy to report that our program has continued to realize improvements during the pandemic.

For purposes of this discussion, we've found it helpful to distinguish pre-pandemic and pandemic conditions. The pre-pandemic condition consists of student data from the period, summer 2016-fall 2019, as obtained from Mesa College's Data Dashboards. We then compared this period with student success data for the period, spring 2020-Spring 2021, which represents pandemic conditions. For the four most recent semesters for which student data are available, including summer 2020, fall 2020, spring 2021, and summer 2021, all program courses were taught online--either online synchronous or online asynchronous. Data for the current, fall 2021 semester are not yet available.

[Tables 1 through 9](#) summarize key student data for the pre-pandemic and pandemic conditions. Based on these data tables, we draw the following conclusions:

Overall program success improved slightly during the pandemic in comparison with the pre-pandemic condition, whereas overall program retention remained unchanged ([Table 1](#)).

Overall program GPA, which tracks student performance, improved during the pandemic ([Table 2](#)).

Course success and GPA ([Tables 3 and 4](#)) improved during the pandemic in lecture courses (GEOL 100, GEOL 104) and remained roughly constant in the lab course (GEOL 101).

For the GEOL 100 course, the online modality showed slightly higher success rates than the F2F modality before the pandemic. During the pandemic, success rates in the online modality for this course increased slightly ([Table 5](#)).

For the GEOL 101 lab course, the online modality (during the pandemic) showed slightly lower success rates than for the F2F modality before the pandemic ([Table 5](#)).

For the GEOL 104 course, the online modality showed substantially higher success rates than the F2F modality before the pandemic ([Table 5](#)).

For the GEOL 100 course, the online modality improved during the pandemic in comparison with the pre-pandemic condition ([Table 6](#)).

For program lecture courses, the online synchronous modality showed the highest overall success rates and course GPAs, exceeding that for the asynchronous and F2F modalities ([Tables 6a and 6b](#)).

Program success and program GPA for lecture courses (GEOL 100, 104) improved for all ethnicities during the pandemic in comparison with the pre-pandemic condition. However, for the GEOL 101 lab course, program success and program GPA generally decreased slightly during the pandemic in comparison with the pre-pandemic condition ([Tables 7 and 8](#)).

For reasons unknown, fall 2021 program enrollment dropped significantly in comparison with the three previous semesters ([Table 9](#)).

Collectively, the above-referenced findings and supporting data tables demonstrate that although geology program enrollment has declined in fall 2021, geology students have performed well, overall, during the pandemic. For lecture courses, program/course success rates and GPAs generally show improvement in comparison with the pre-pandemic condition. This improvement extends across all ethnic groups. In addition, the online modality seems to be working well for lecture courses. In fact, since the beginning of the pandemic, course success rates and course GPAs for online courses are generally higher than for F2F course data before the pandemic.

For the GEOL 101 lab course, the results are mixed. This course (along with all program courses) has been taught exclusively online since the beginning of the pandemic, through spring 2021. Although success rates for this course haven't improved in comparison with before the pandemic, neither have they decreased dramatically. Instead, they've only decreased slightly. Likewise, course GPAs since the pandemic have generally decreased or remained about the same for the GEOL 101 course. Overall, this is good news for a hands-on course that involves direct observation of physical specimens and frequent use of mathematics.

It's difficult to attribute program success in a straightforward way to specific practices. On the one hand, perhaps our courses became less demanding during the pandemic, thereby resulting in higher success rates and course GPAs. Program faculty don't feel that this is the case, however. Moreover, student retention data don't support this conclusion, because program retention rates are identical both before and during the pandemic ([Table 1](#)). If our courses became less demanding during the pandemic, one might expect that more students would remain enrolled vs. withdrawing.

On the other hand, perhaps students performed better in program lecture courses during the pandemic because they had more support, including better access to more instructional resources, as discussed above. Perhaps too, the extensive training that program instructors received, along with institutional support in terms of time given to instructors to transition their courses to the online modality, together with funding for much-needed equipment, contributed as well. It may also be the case that the transition to exclusively online modalities (both synchronous and asynchronous) during the pandemic allowed students to access course materials more easily, thus contributing to their success. Yet another possibility is that instructors became more accommodating during the pandemic in an honest effort to help students remain successful under difficult circumstances.

Perhaps, too, the pandemic has resulted in changes to the population of students taking our courses. Perhaps struggling students who found early-on during the pandemic that they couldn't be successful in the online environment have avoided program courses, resulting in course success rate and course GPA improvements due to attrition of such students.

A big lesson we've learned as a program is that students benefit from more emphasis on active learning and increased interaction in the online environment. Although more investigation is needed to confirm this, the online synchronous modality may represent the best of both the online and F2F modalities because it facilitates ease of access while students also benefit from a sort of mediated 'F2F' interaction with other students and the instructor via real-time class sessions conducted in Zoom. Of the various modalities offered for program courses, including F2F, online synchronous, and online asynchronous, the online synchronous modality exhibits the highest success rates and course GPAs, overall, for program lecture courses ([Tables 6a and 6b](#)). This warrants more serious consideration of the online synchronous modality for the geology program, moving forward.

(REQUIRED) What practices has your area/program implemented since the last program review cycle that you would like to improve/continue? Identify impacts on student success and equity.

We've implemented several new practices since the last program review cycle that we'd like to continue. First, program instructors have created much new online content, including numerous lecture videos. This benefits students because they now have another way to review the lecture material. Many students have reported that they prefer reviewing lecture materials in video vs. written format. In some cases, students are now asking for such materials ahead of time so they can review class material before an instructor delivers it live. Another advantage of making lecture videos available to students online is that such videos can be automatically captioned in Zoom or YouTube--an obvious benefit to many students.

Lab instructors have also developed much new material that can be used to benefit students, moving forward. As an example, two program instructors have each created a completed their own complete sets of online labs in the GEOL 101 lab course. Although these labs were originally meant for exclusively online delivery, program instructors are already modifying them for use in the classroom, moving forward. This has been particularly useful for students who miss on-campus lab meetings, but even students who attend class benefit from these new materials. In such cases, it's now become possible (for some labs, and only under special circumstances) for such students to complete an online lab to substitute for the on-campus lab they missed. This allows students to derive valuable learning from a lab they'd otherwise have missed. I emphasize that this has not become the standard practice for all labs, nor does it apply for all students in all situations. However, it's advantageous to have this option when the situation dictates.

Another new practice we've implemented is a greater emphasis on active learning and student engagement in our standard lecture courses taught every semester, including GEOL 100 and GEOL 104. Once again, this is a COVID practice we plan to continue in the classroom, beginning next semester. Several example practices follow: (1) program instructors have become much more aware of the need to break up lectures into digestible bits, separated with hands-on activities, including Zoom polls, Kahoot quizzes, class discussions, short writing exercises, small-group discussion, and learning games, to promote student learning and engagement. Collectively, these practices have worked well in both the synchronous and asynchronous modalities, and with slight modification, they could also work well in an on-campus setting. For example, rather than using Zoom polls in the classroom, instructors can use Kahoot or even simply ABCD cards and think/pair/share. I emphasize that program instructors have of course been implementing these strategies in the classroom even before COVID, but COVID has taught us that we need to increase the frequency of such strategies--making them a part of every lecture. The advantage of doing this is that it greatly improves the quality of formative assessment, allowing instructors to better monitor student learning and also provide ongoing feedback to students, helping them to self-identify the strengths and gaps with regard to their grasp of course material.

A third practice we want to continue with is to emphasize course humanization. By this, we mean working to create a friendly, welcoming classroom environment for all students as a way to help students feel comfortable. Again, program instructors have already been doing this; it's just that since COVID, we've had to think more explicitly and creatively about the strategies we employ to put our students at ease online, so that they're ready to learn. One example of this is that program instructors will occasionally engage in "small talk" at the beginning of their their online synchronous courses as a way to help students appreciate that their instructor is a real person who thinks about many of the same things students do. These short small-talk sessions have also proven to be an effective, low-risk way to get students talking. It occurs to us as program instructors that we could continue to do this upon our return to campus next semester. After all, who doesn't like talking about their pet, or about someplace interesting they've visited? Perhaps, if students can be persuaded to talk about themselves and their own experiences, they'll be more likely to contribute to class discussions about course material.

(REQUIRED) What practices has your area/program implemented since the last program review cycle that you would like to change/discontinue? Identify impacts on student success and equity.

The main practice we hope to discontinue beginning next semester is that of confining instruction and student research to exclusively online modalities. Although student success and equity data demonstrate that our students have adapted well to online learning necessitated by the pandemic, particularly in lecture courses ([Tables 1-8](#)), geology remains very much a field-based science. Soon, we hope to begin offering F2F instruction, field trips, and field-based student research experiences again. An effective undergraduate field experience can inspire and prepare students for scientific careers by facilitating skills in self-efficacy, science identity, and competence (Boyle et al. 2007). Moreover, field and research experiences have been shown to help retain students in the geosciences, as well as improve geoscience identity, helping students maintain interest in the Earth and influencing their decision to major in the geosciences (Kortz, Cardace, and Savage 2019).

References Cited

Boyle, A., Maguire, S., Martin, A., Milson, C., Nash, R., Rawlinson, S., Turner, A., Worthmann, S, and Conchie, S., 2007, Fieldwork is good: the student perception and the affective domain, *Journal of Geography in Higher Education*, v. 31, Issue 2, May. <https://www.tandfonline.com/doi/abs/10.1080/03098260601063628>

Kortz, K., Cardace, D., and Savage, B., 2019, Affective factors during field research that influence intention to persist in the geosciences, *Journal of Geoscience Education*, v. 68, p. 133-151, September. <https://www.tandfonline.com/doi/abs/10.1080/10899995.2019.1652463>

(REQUIRED) What college-wide practices implemented since the last program review cycle have affected your area/program positively or negatively? Identify impacts on student success and equity.

As discussed above, program faculty have received additional software training, including Zoom, Canvas, and also Pronto. In addition, our program received substantial financial support during the pandemic, allowing us to purchase much-needed supplies for student use, including rock/mineral kits and microscopes. In addition, there's been a college-wide push to engage in deeper conversations about student engagement and pedagogical practices in online courses. This emphasis has trickled down to the department level. Faculty in our department now regularly engage in conversations about student engagement, student success, and online pedagogy. Collectively, these trainings and conversations have been invaluable in helping faculty make the necessary transition to online instruction, particularly in terms of converting traditionally face-to-face (F2F) course sections to

various online modalities. Although it's difficult to attribute gains in student success since the pandemic directly to such institutional efforts, it seems clear that our program has benefited from such support, as discussed above (also see [Tables 1-8](#)).

A college-wide practice that helped contribute to student success was the ease of availability of funds to facilitate the changes necessitated by COVID. As faculty, we appreciated that the process of applying for these funds was relatively efficient and didn't require inordinate amounts of time. Having access to these funds really helped the geology program by allowing us to purchase extra rock/mineral boxes and extra microscopes. The extra rock/mineral boxes made it possible to check out individual boxes to all lab students when we were entirely online. Additionally, the extra microscopes allowed us to provide each lab table with a microscope once we could offer the lab course on-campus again. Having more microscopes allowed students to maintain social distancing more easily.