ACADEMIC PROGRAM REVIEW FORM

All academic programs and units at UAA are required by Board of Regents Policy P10.06.010 to engage in program review on a seven-year cycle. University Regulation R10.06.010 sets out the minimum requirements for program review, including centrality of program mission, quality, demand, program productivity, effectiveness, and efficiency. Exceptional reviews may be conducted, per University Policy and Regulation, and with the provost's approval. The UAA process integrates information about student learning outcomes assessment and the improvement of student learning, as well as progress on student success measures and the closing of equity gaps, aligning program efforts and resources with institutional priorities. Final decisions include commendations and recommendations, which guide future program efforts. The results of cyclical Academic Program Review are reported to the UA Board of Regents annually and are published on the UAA Academic Program Review website.

This form is composed of four parts: the Program Section, the Dean Section, the Program Optional Response Section, and the Provost Section. Guidance for submission is provided in each section.

Using the Form: The form is pre-loaded with information specific to each program and sent by the dean to the program. The program should download and save their form to begin using it. The form is locked, so instructions are viewable and the only sections of the document that can be edited are the form fields. To ensure the fillable fields function correctly, the form must be completed in Microsoft Word. It will not function properly in Google Docs. Programs that wish to record collaborative discussion of the report might consider creating a separate document to take notes, prior to entering final responses in the official fillable form.

The form uses narrative boxes, text only, and drop-down boxes. Narrative boxes have a character limit, which includes spaces. To undo an answer, press “Control-Z” or “Command-Z.”

Responses are to be narrative text only, and must be ADA and FERPA compliant, and must not include the names of any current or former employees. Do not embed any tables or links, including to webpages or other documents. To be FERPA compliant, do not include the names of any current or former students. Rather, use statements such as, “In AY22 four program graduates were accepted to graduate programs in the field.” Programs with specialized accreditation or other external recognitions must comply with restrictions regarding what may be published, as per the accreditor or external organization. Do not include appendices. Appendices to this form will not be accepted.

Data: Each program is provided a datasheet, along with this pre-loaded form. For questions about the data, please contact Institutional Research (uaa.oir@alaska.edu).

Assistance: For technical assistance with this form, email Academic Affairs (uaa.oaa@alaska.edu).

Program(s) in the review: MS Applied Geological Sciences

Specialized Accrediting Agency (if applicable): N/A.

Campuses where the program is delivered: ☒ Anchorage ☐ KOD ☐KPC ☐MSC ☐PWSC

Year of last review: AY20

Final decision from last review: Continued Review

PROGRAM SECTION (Due on March 1)

The program review committee chair and committee members are assigned by the dean. All program faculty should be included in the review process, including faculty on the community campuses. After completing the Program Section below, the program review committee chair will enter their name and date, and email this form to the dean, copying all committee members. If the program is fully delivered on a community campus, copy the appropriate community campus director(s). The program review committee chair's name and date lines are at the end of the Program Section.

Program Review Committee:

Lee Ann Munk, Professor, Geological Sciences, *Chair*
Jennifer Aschoff, Associate Professor, Geological Sciences
Claudia Cannatelli, Assistant Professor, Geological Sciences
Eric Klein, Assistant Professor, Geological Sciences

1. Demonstrate that the program has responded to previous recommendations.

Recommendation 1: Explore with industry opportunities for an endowed professorship and sustainable financial support for the long term.

How do you know the recommendation has been successfully achieved? *(2000 characters or less)*

The Department of Geological Sciences has not pursued an endowed professorship. However, the ongoing internationally recognized critical minerals research in the Department has been funded primarily by industry for 13+ years indicating sustained financial support from industry. Additionally, the Department receives regular support from ConocoPhillips for field trips and the seminar speaker series.

Actions taken to date *(2000 characters or less)*

The recommendation to explore the development of an endowed professorship was made during expedited program review as UA budgets were cut. The department discussed the possibility of an endowed professorship with the dept advisory board (CAB) of major AK industry stakeholders. The CAB unanimously agreed that an endowed professorship had a low likelihood of success given the large cost associated with such a position (>$4M). In fact, there is only one endowed professorship in CAS, reflecting that success in this arena is not a realistic approach without significant support from UA. Previous departmental fundraising was typically in the $10k range, with the largest monetary donation being $200K from the minerals industry to support a faculty position in mineral resources which was to be sustained by UAA after two years, however the faculty search was cancelled. ConocoPhillips donated $150K in 2015 to build a computational lab and several millions in in-kind software were also attained. A successful CPASE grant helped fund a Geophysics position that was ultimately filled for several years. Also,

the Department and UA Advancement worked to raise funds for an endowed professorship in 2016 which was spearheaded by ConocoPhillips. However, once the funds were pledged they were allocated elsewhere by UAA. After the Department lost the Director Position that was strategically created from 2016-2020 by UAA there were no resources available to continue fundraising. Finally, the interruption of the COVID19 pandemic made department fundraising, especially from the oil/gas industry, particularly challenging as the price of oil dropped to negative levels and there were numerous layoffs/staff-changes in upper management in numerous Anchorage companies. A donation on the order of millions of dollars would require a targeted effort by UAA.

Evidence of success to date *(2000 characters or less)*

The Department of Geological Sciences has made numerous attempts at generating funding for faculty positions. However, these efforts have not been successful in the long-term due to UA budget cuts, staff changes and shortages, pandemic-related difficulties with networking and other fundraising efforts, and the realities of reduced oil-industry support and the failure of UAA to provide the promised support for the mineral resources position. Finally, Geoscience faculty efforts were more urgently redirected to outreach, enrollment, and the pivot to alternate teaching modalities of courses due to pandemic-related challenges. The Department of Geological Sciences is a strategic department for the State of Alaska as a resource state, but the faculty will need additional support from UA to secure sustained industry support for an endowed professorship.

Recommendation 2: Explore ways to close the fiscal gap and rely less on state appropriations through CAS's budget.

How do you know the recommendation has been successfully achieved? *(2000 characters or less)*

This recommendation was explored through discussion and implementation of multiple initiatives that will reduce the instructional costs of the Department and provide greater subsidization of faculty salaries using external grant and contract funds. As such, the recommendation was successfully achieved (see "Evidence of success to date" section below). Nonetheless, like all programs at UAA, the MSAGS program has experienced challenges related to reduced enrollments during the pandemic that have led to a decrease in the Productivity and Efficiency metrics of the Department (i.e., SCH/FTEF and FTES/FTEF). The Department will continue its efforts to attract new students to the program, including into the non-thesis option of the MSAGS program. The Department developed new recruitment materials to showcase the faculty and their research programs, and which were utilized at a graduate school recruitment event at a national science conference in October 2022. Increasing enrollments in the program will be important to help close the fiscal gap and these efforts will continue.

Actions taken to date *(2000 characters or less)*

Overhead-generating research funding has continued to be a priority in the Department since the recommendation was made, and this should increase as early career faculty establish their funded research programs. The Department currently has $6.2 million in active grants and contracts which will collectively generate $2.4 million in indirect cost recovery to UAA over the

lifetime of the grants. Faculty use some research funding to purchase workload effort that would otherwise be devoted to lower-enrollment courses that would likely not pay for themselves. The department is now offering lower-enrollment courses less frequently, devoting faculty to higher-enrollment or required courses, and faculty are more often using workload buyouts and writing new workload buyouts into their grant proposals. A significant proportion of faculty research grants are used to pay for Graduate Research Assistantships (GRAs). Over the 6 full years of existence of the MSAGS program, at least 14 distinct graduate students have been either fully or partially supported on GRAs funded by grants, providing tuition revenue to the College as well as indirect cost recovery generated by graduate student stipends and other graduate student related expenses such as travel to conduct research and present research at conferences. The Department continues to offer stacked classes in order to leverage the instructional workload time of faculty to support both the undergraduate and graduate programs. We note that the instructional cost of stacked courses is equally distributed between the undergraduate and graduate sections in IR data even though undergraduate enrollments typically greatly exceed graduate enrollments, leading to a skewed perception of the cost efficiency of the graduate program instruction.

Evidence of success to date *(2000 characters or less)*

Evidence of our success is provided by the implementation of numerous initiatives: 1) faculty increasing external grant funding that is partially used to subsidize a portion of their annual salary and which pays for graduate student tuition for GRAs, 80% of which is returned to the College as revenue/fees; 2) increasing the enrollment cap on certain courses; 3) reducing the overall number of course sections offered by the department to minimize under-enrolled courses; 4) continued usage of stacked courses to double-dip on faculty instructional time in support of the undergraduate and graduate programs; 5) changes to the frequency of select course offerings from once per year to twice every three years; 6) involuntary reduction in faculty numbers through the non-renewal of a geophysics position in the Department; 7) indirect cost recovery associated with overhead-generating research; and 8) adopting strategies that increase enrollment through outreach, such as to local high schools and the ANSEP Acceleration Academy summer programs.

2. **Demonstrate the centrality of the program to the mission, needs, and purposes of the university and the college/community campus. Include how the program is integrating (or planning to integrate) intentionally designed opportunities for students to develop the four core competencies (Effective Communication; Creative and Critical Thinking; Intercultural Fluency; and Personal, Professional, & Community Responsibility). *(2500 characters or less)***

Geological Sciences (GS) have been an integral part of the CAS and UAA community for 20+ years. In the last five years we have begun offering a MS degree in Applied Geological Sciences to complement and expand on the BS degree offerings and to help support successful research programs. At the core of MSAGS is a mission to train students in the most significant areas of GS to the State of AK including Energy, Minerals, and Environment. Effective communication, creative and critical thinking, intercultural fluency, and personal, professional & community responsibility are woven throughout our course curriculum and other high impact activities available through research. Examples include a specific and required course in Professional Practices which focuses

on: 1) science communication, oral and written, 2) interacting with the professional community, and 3) preparation for careers beyond the degree. Creative and critical thinking focused assignments and experiences are required in all of the graduate level courses and can range from original research project design and implementation to field-based problem solving. Effective communication is demonstrated by the presentation of scientific abstracts and peer-reviewed papers by graduate students, presentation of research results at national conferences and a required presentation at the Graduate Student Showcase event, part of the departmental seminar series each semester. Some of the graduate students have published in high impact journals such as Geology, Geophysical Research Letters and Geochemistry, Geology, Geophysics (G3). Intercultural fluency comes through opportunities to conduct research in collaboration with local scientists in remote regions of AK as well as internationally. Additionally, some courses include exposure to resource-based projects that inherently include Environment, Social, and Government (ESG) topics. Personal, professional, and community responsibility are also at the core of the MSAGS program because we inherently are focused on resources (oil/gas and minerals) and the environment, including water resource and availability issues. It is a major goal of the program to instill resource literacy and a sense of responsible resource development and know how to help our students.

3. Demonstrate program quality and improvement through assessment and other indicators.

a. Program Student Learning Outcomes Assessment and Improvement Process and Actions

i. MS Applied Geological Sciences

- *1) Use rigorous methods of scientific analysis; 2) Demonstrate mastery of graduate-level geological sciences theory; 3) Conduct advanced geological sciences research and/or demonstrate skill application; 4) Apply the scientific method to graduate-level problems in one or more focus areas of geological sciences; 5) Work effectively within the professional framework of geological sciences careers or be prepared for Ph.D. research programs.*

Describe your key findings for these outcomes. (3000 characters or less)

These outcomes were assessed through Direct Course Level Assessment (in GEOL A689 Geology Graduate Professional Practices, GEOL A641 Paleoclimatology, GEOL A661 Advanced Geochemistry), exit surveys, theses or projects, and thesis defenses or comprehensive examinations.

These assessments resulted in the following outcomes:

1) Use rigorous methods of scientific analysis. Met faculty expectations;

2) Demonstrate mastery of graduate-level geological sciences theory. Exceeded faculty expectations;

3) Conduct advanced geological sciences research and/or demonstrate technical skill application. Exceeded faculty expectations;

4) Apply the scientific method to graduate-level problems in one or more focus areas of geological sciences. Met faculty expectations;

5) Work effectively within the professional framework of geological sciences careers or be prepared for Ph.D. research programs. Met faculty expectations.

Describe actions taken to improve student learning for these outcomes. (3000 characters or less)

While navigating the pivot to online delivery modes during the pandemic, the faculty haven't made any explicit recommendations for changes to the core structure of the MSAGS program. Last year, some grad students wanted more stand-alone grad courses. The faculty understand the issue, but creating more stand-alone grad courses is not possible now given the need of all faculty to contribute to both the undergraduate and graduate curriculum and current faculty shortages in our department (e.g., geophysics). We had four new grad students start in Fall 2021. However, due to the variable funding resources from faculty research projects and limited GTA positions, there might not be new MS students every year. Our MS program is represented at various national conferences (e.g., Geological Society of America) and we have successfully recruited MS students from across the country, many with competing offers. We also continue to work with our Community Advisory Board and Alaskan geoscience stakeholders to keep providing internship opportunities for grad students (e.g., USGS), which helps student success.

Describe evidence that these actions are working. (3000 characters or less)

N/A: We have not made any changes as no clear concerns about the delivery or effectiveness of the program were raised by previous assessments.

b. Demonstrate program quality and improvement through other means, for example, maintaining specialized accreditation, using guidance from advisory boards/councils, responding to community partners and local needs, maintaining currency of the curriculum, implementing innovative program design, intentionally integrating high-impact teaching and learning practices into the program, and meeting indications of quality in distance education, such as the C-RAC Standards. *(3000 characters or less)*

We integrate guidance from our Community Advisory Board. We also have regular interactions with employers and important members of the Alaska geoscience community (e.g., United States Geological Survey, Alaska Division of Geological & Geophysical Surveys) that help the quality of the program. We are also investigating the prospect of implementing an accelerated master's program to expand our recruitment stream from Geological Sciences undergraduate students interested in graduate work in Alaska.

4. Demonstrate student success and the closing of equity gaps.

a. Analyze and respond to the disaggregated data in the data sheet for your program. Provide clarifications or explanations for any positive or negative trends indicated by the data, and discuss what you are doing to close any equity gaps. The Student Success program review

metrics are Junior Graduation Rate, Associate Graduation Rate, Semesters to Degree – Graduate Programs, and Course Pass Rates by Course Level. ***(3000 characters or less)***

While only a limited dataset is currently available for the MSAGS, for example there are only three years of data for semesters to degree completion, the program has shown success in reducing the overall time to completion. Importantly, in 2022 time-to-degree was 6 semesters or less for all reported groups. Efforts to reduce this time further and promote equity include removing leveling course requirements for newly admitted students and revising the graduate level curriculum to include courses covering a broader range of topics that our students are already taking. While there is significant variability in the semesters-to-degree metric for our female students relative to our male students there does not yet appear to be any statistically significant equity gap between these groups.

Graduate level course pass rates remain extremely high in the MSAGS program, despite some setbacks related to the transition to and from remote-only instruction during portions of 2020 and 2021. The Department is addressing low course pass rates among specific groups of students by creating specific degree progress plans for these students and removing unnecessary leveling course requirements for students with otherwise good academic standing.

Another important step taken by the department in the past two years to address issues of equity gaps in graduate education is the removal of the GRE requirements for applicants to the MSAGS program. This decision was motivated by a study by the largest geoscience professional society in the world, the American Geophysical Union (AGI, 2022).

The article makes the case for dropping the GRE requirement for admissions into geoscience graduate programs, citing a host of evidence that there is zero correlation between GRE scores and graduate school success (as well as other career metrics). Rather, the GRE requirement inordinately negatively impacts minorities and women compared to white males, as well as causing lower overall pools of applicants. Programs that remove the GRE requirement have demonstrated significantly larger applicant pools as a result (e.g., Boise State). Given the increased scrutiny for graduate programs to become more fiscally efficient, this decision is prudent, although the hoped-for uptick in applicants did not materialize during the pandemic years.

b. Provide evidence of the overall success of students in the program. For example, you might talk about the percent of students in post-graduation employment in the field or a related field, the percent of students who go on to graduate school or other post-graduation training, and/or the percent of students who pass licensure examinations. You might also give examples of students who have been selected for major scholarships or other competitive opportunities. [Please do not use personally identifiable information.] ***(3000 characters or less)***

Since its inception in 2017, the Applied Geological Sciences MS program has graduated 12 students. Of these graduates, more than 83% are employed in a field allied with the geological sciences. This cohort includes students from both the thesis and non-thesis degree tracks. Our MSAGS graduates have gone on to fill critical positions in Alaska relating to private mineral

resource development, oil and gas exploration, and resource management for native corporations. Some have also become critical contributors or employees at State and Federal agencies such as the Bureau of Land Management, the Alaska Department of Natural Resources, and the Bureau of Ocean Energy Management. Moreover, at least 5 of our continuing MSAGS students are currently employed full time in geoscience jobs in Alaska while they work towards completion of their degrees, strongly reflecting the high demand for our graduates. Our MSAGS graduates have also been successful in transitioning to academic career paths and Ph.D. programs both in (UAF) and outside of Alaska. These students have been highly successful at R1 institutions such as Johns Hopkins University and Cornell University, and some are active affiliates of major group science efforts such as NASA's Europa Clipper mission to Jupiter's moon Europa.

5. Demonstrate demand for the program.

a. Analyze and respond to the data in the data sheet for your program. Provide clarifications or explanations for any positive or negative trends indicated by the data, and discuss what you are doing to improve. The Demand program review metrics are Ratio of Out-of-Discipline Credit Hours to Total Credit Hours, Number of Program Graduates Who Continue Education, Number of Program Graduates Who Return to UAA to Pursue an Additional Program, and Gap between Job Openings and Degree Completions. (Note: Gap between Job Openings and Degree Completions not required for AY23 Program Reviews.) ***(3000 characters or less)***

Although a limited dataset is currently available for the MSAGS, only ratio of out-of-discipline credit hours to total credit hours data for example, there is a trend of minimal to no students outside the discipline taking graduate level courses in GS. For a MS program this is probably to be expected given that the intent of a MS degree program is to specialize in a discipline. However, there are likely opportunities here to recruit students from other disciplines such as Chemistry and Biology and Civil Engineering to our graduate level courses. Although the "number of program graduates who continue education" and the "number of program graduates who return to UAA to pursue an additional program" have no data collected by UAA, there has been at least one student who received an MSAGS at UAA who is now enrolled in a Ph.D. program outside of UAA. It would be rare for MSAGS graduate to return to UAA to pursue an additional degree program as that would likely be a Ph.D. which is currently unavailable at UAA.

6. Demonstrate program productivity and efficiency.

Analyze and respond to the data in the data sheet for your program. Provide clarifications or explanations for any positive or negative trends indicated by the data, and discuss what you are doing to improve. The Productivity and Efficiency program review metrics are Five Year Degree and/or Certificate Awards Trend, Student Credit Hours per Full-Time Equivalent Faculty, and Full-Time Equivalent Student per Full-Time Equivalent Faculty. (3000 characters or less)

In the five years of MSAGS program delivery the SCH/FTEF had remained relatively consistent with a noticeable increase of 62% from 2018 to 2019 and a smaller decrease of 33% from 2021 to 2022. It is possible that the increase from 2018 to 2019 may have continued/stabilized, however, due to the global COVID19 pandemic a decreasing trend is not unexpected. Similarly the FTES/SCH was on the

rise from 2018 to 2019 with a decrease into 2020 partly due to graduating 6 MSAGS students, then it stabilized to 3 graduates per year in the COVID19 and post-COVID19 pandemic years.

Optional: Discuss the extent to which, if any, extramural funding supports students, equipment, and faculty in the program. ***(2500 characters or less)***

The Department has significant external funding to support faculty research programs, MSAGS students as well as access to high-end research facilities such as the ASET and SIL analytical labs and the ConocoPhillips computational facility. We expect this trend to increase as we have several early career faculty who are expected to develop their research programs to include sources of external funding and strong established research from some of the senior faculty that brings millions of dollars in funding. Our faculty go the extra mile to ensure that students have access to funding to support their research in Alaska, the lower 48 and internationally. These activities add additional costs that can be on the level of 10s of thousands of dollars. The Department also receives philanthropic contributions to support field trips, field work, and speaker series. Since the start of the program in AY18-19, extramural funding has provided either full or partial GRA support for at least 15 MSAGS students. Fortunately, the Department has had access to two Graduate Teaching Assistantships (GTAs) for MS students per year and that has helped support particularly early career faculty research programs as well as contributing to the instructional mission of the department as GTAs serve as instructors of record for introductory lab courses.

7. **Assess program distinctiveness, as well as any duplication resulting from the existence of a similar program or programs elsewhere in the University of Alaska System. Is duplication justified, and, if so, why? How are you coordinating with UAA's community campuses and the other universities in the system?** ***(2000 characters or less)***

   The UAA MSAGS program is unique among the UA system. It is the only applied geological sciences MS program in existence. Our graduates are sought after for employment both in and out of Alaska particularly in the oil/gas and mining sectors. Our MGSG program is complementary to the Geological Sciences and Geophysics graduate degree programs at UAF, some of our students taking courses there and some of the UAF students taking courses at UAA. Among the three areas of emphasis that students can specialize in particularly in the non-thesis option of the MSAGS, the environmental option is the only one of its kind in the UA system. Finding ways to support and grow this particular emphasis and marketing it to the large community of environmental consulting companies in the state could lead to a robust enrollment in those particular courses.

8. **Assess the strengths of your program and propose one or two action steps to address areas that need improvement.** ***(3500 characters or less)***

   As mentioned above a particular unique strength of the UAA MSAGS program is the option to focus in environmental geosciences, whereas UAF is now hiring a mineral resource faculty position and is already known for oil and gas related research. Environmental geosciences is particularly suited to collaborative efforts between other UAA science programs like Chemistry and Biology and some Engineering programs. One suggestion would be to pursue the formation of an integrated MS option that fully capitalizes on the environmental related curricula and research offered by multiple programs. In a time of scarce resources for hiring new faculty it could be a way to use the resources we have in CAS more efficiently and effectively to provide attractive opportunities for the Alaska

community and beyond to pursue graduate education. This area of research is also currently well funded in Geological Sciences, Chemistry and Biology with central research facilities (ASET and SIL) that are currently underutilized by students, so perhaps a look at how to build on strengths across these programs and how to make strategic interdisciplinary hires could be a new and effective path forward. This could even start at the undergraduate level and build towards a 5th year MS style option. At least 50% of the current GS faculty teach courses in environmental geoscience as well as conduct research in this area, it is a clear marked strength for the program. Chemistry and Biology also have a large emphasis in environmental based education and research. One step we are taking is to cross list the three GEOL geochemistry courses with the Chemistry Dept to help increase enrollments and make the courses more accessible to the Chemistry students. Advertisement to help market such a program is something not tested before and could be done in Alaska and outside of Alaska to capitalize on our unique offerings and environmental setting. Because environmental sciences are valued by multiple industries in Alaska this could also be an area to consider for an endowed professorship. Education in resource development beyond the basic sciences is critical to the future of resource development in Alaska.

After completing the Program Section above, the program review committee chair should enter their name, date, and email this form to the dean, copying the committee members. If the program is fully delivered on a community campus, copy the appropriate community campus director(s).

Committee chair first name last name: Lee Ann Munk **Date:** 2/27/2023

END OF PROGRAM SECTION

DEAN SECTION (Due on April 1)

If the program is fully delivered on one or more community campus, the dean should consult with the director(s) of the campus. After completing the Dean Section below and entering their name, the dean should email this form to the committee, and to uaa.oaa@alaska.edu. If the program is delivered on a community campus, copy the appropriate community campus director(s). The program has one week to provide an optional response to the Dean Section using the Program Optional Response Section of this form.

1. **Evaluation of Progress on Previous Recommendations**

   For each recommendation from the last program review, indicate if the recommendation has been met or has not been met and provide commendations and guidance as appropriate. *(2000 characters or less for each recommendation)*

   Recommendation 1: Explore with industry opportunities for an endowed professorship and sustainable financial support for the long term. Recommendation has been met.

   As the Department rightly points out, an endowed professorship is a large investment, on the order of several million dollars, for an organization to make. Achieving a goal such as this will require a organized and collaborative effort between the Department and the UAA leadership. The

Department receives regular funding from ConocoPhillips to augment classroom instruction with field trips and a speaker series. These funds provide valuable opportunities for students that they would not otherwise have. The Department, like others in CAS, has cut costs through a variety of mechanisms from course rotations to the use of stacked courses. Also, the Department has been successful in funding graduate students to work on research projects through external grant funding. This augments the CAS funded graduate teaching assistantships and helps boost the number of students in the program. However, there is still a need for more funding for UAA graduate students to make this a successful and viable program. While Geological Sciences seems like the ideal department for an endowed professorship, it is perhaps a more realistic goal to explore sustained financial support for graduate students.

Recommendation 2: Explore ways to close the fiscal gap and rely less on state appropriations through CAS's budget. Recommendation has been met.

The Department, like others in CAS, has cut costs through a variety of mechanisms from course rotations to the use of stacked courses. Additionally, faculty have been involved in numerous outreach activities to market their programs and recruit students. Faculty have been successful in obtaining external funding for their research, with grants also including support for graduate students, approximately 1-3 per year. The Department has explored many ways to close the fiscal gap, but due to the decline in enrollments in both the undergraduate and graduate programs, the gap remains.

Provide your analysis of #2-8 below, based on the data provided and the program's responses above.

2. Centrality of the Program. ***(1750 characters or less)***

The Department of Geological Sciences plays a central role in supporting a multitude of Alaska industries. The faculty have a range of expertise from critical minerals to volcanology to hydrogeology and conduct research important to the state of Alaska. Faculty are also engaged teachers and provide opportunities for students to develop in the four core competencies. The Department offers a BS and MS degree.

3. Program Quality and Improvement ***(1750 characters or less)***

The Department assessed five student learning outcomes using a variety of artifacts and found students met or exceeded expectations. The Department is very engaged with their Community Advisory Board as well as with industry partners. While the quality of the program is high, enrollment is not. In four of the last five years enrollment in the MS program has been lower than what is necessary to sustain a vibrant program and to meet the minimum enrollment threshold for stand-alone graduate courses.

4. Student Success and the Closing of Equity Gaps ***(1750 characters or less)***

As the program is fairly new, there is limited data available from which to make conclusions about student success, however the metric of passing rate in courses has been consistently high. The Department has removed the GRE requirement for application into the program, something shown to be an increased barrier for applications from women and under-represented minorities. The

Department has also documented the success of their graduates - in geological sciences jobs in Alaska and top graduate programs in the UA.

5. **Demand *(1750 characters or less)***

I agree with the Department that these metrics are not the right ones to judge demand for a specialized graduate degree.

6. Productivity and Efficiency *(1750 characters or less)*

The data provided is for the past last five years, which goes back to the start of the program. While the number of student credit hours (SCH) in the program greatly increased from year 1 and year 2, the number of SCH in year 5 is only half of the maximum in year 2. With limited data, it is difficult to predict the SCH for the future. Is this decline an anomaly, due to the pandemic, or an indication of demand? As mentioned in the Department report and earlier in this report, the faculty in this program do an excellent job of securing external funding to support their research projects and UAA students.

7. Duplication and Distinctiveness *(1750 characters or less)*

The UAA MS degree in Applied Geological Sciences is unique in the UA system, complementing the Geological Sciences and Geophysics graduate programs at UAF. The UAA non-thesis MS option is particularly distinctive. Additionally, the environmental option is the only one of its kind in Alaska.

8. Strengths and Ideas for Moving Forward *(1750 characters or less)*

One of the main strengths of the program is the excellence of the faculty. All tenured and tenure-track faculty in the Department have funded research programs, which speaks to the quality of the work that they do. The faculty are also engaged teachers and creative thinkers. The ideas presented here by the Department are interesting and should be explored further: focus on environmental geological sciences, create interdisciplinary MS programs, explore the opportunities for a five-year MS degree.

Dean's Final Evaluation

I commend the program for: *(number and list the specific commendations in the narrative box, 1500 character limit)*

1. the development of a strong externally-funded research program,

2. outreach to industry, community and educational partners, including the Community Advisory Board,

3. engaged teaching, with opportunities for field-based experiences, and

4. producing successful graduates.

I recommend that the program: ***(number and list the specific recommendations in the narrative box, 1500 character limit)***

As the Department notes "increasing enrollments in the program will be important to help close the fiscal gap." Increasing enrollments will also help create a more vibrant program. My recommendations are in the area of student recruitment and support.

1. Grow the MS program. Recruit a large enough cohort each year to maintain the program's integrity, while keeping the average time to degree 2-3 years.

2. Expand support for UAA graduate students from grants, industry and community partners.

3. Investigate partnerships with UAF. Currently, several UAF students are supported by faculty in the Department, often at the expense of UAA students. The Department should continue to investigate a collaborative agreement with UAF, which benefits the program under review here. For example, UAF PhD students could be required to complete the UAA non-thesis MS degree via UAA coursework.

4. Continue to attract and support part-time students. The Department is encouraged to investigate ways to better meet these students' needs. For example, a well-defined and up-to-date course plan for part-time students could be beneficial to decrease their time to degree as well as to recruit other students who see a part-time program as attractive.

5. Investigate the option of a fast-track Master's program.

6. Explore the option of a focus of the program, such as in environmental geological sciences. This may entail a redesign of the curriculum at the graduate and undergraduate level.

Dean's overall recommendation to the provost: Continued Review -- Program is required to address specific issues and to undergo another review within the next two academic years.

If an Interim Progress Report is proposed, recommended year: N/A

If a Follow-up Program Review is proposed, recommended year: N/A

Proposed next regular Program Review: AY2025

After completing the Dean Section above, the dean should enter their name, date, and email this form to the committee, and to uaa.oaa@alaska.edu. If the program is fully delivered on a community campus, copy the appropriate community campus director(s). The program has one week to provide an optional response to the Dean Section using the Program Optional Response Section below.

Dean first name last name: Jenny McNulty **Date:** 4/1/2023

END OF DEAN SECTION

PROGRAM OPTIONAL RESPONSE SECTION (Due within one week of receiving dean's review)

Programs have the option to submit to the provost a response to the dean's evaluation within one week of receiving the dean's review, using the narrative box below. Please indicate whether or not you will submit an optional response below.

Are you submitting an optional response? If yes, add your response below, enter your name and date, and follow the guidance below for submission. If no, enter your name and date, and follow the guidance below for submission. Yes

Optional Response: (10,000 characters or less)

A combined response of Department faculty and the Community Advisory Board to the Department resulted in these highlighted points. All appreciate the comments from the Dean of CAS, but the CAB requests an audience with the Provost and Dean to discuss further the needs to support this graduate program.

1) It is not realistic to have a threshold for the number of graduate students entering each year that defines success or vibrancy; the number of new grad students will be uneven as available funding for them is not the same across all years. UAA provides very limited support for graduate students. Our current TA funding is for just 1 AY, and this is about 1/2 the norm and 1/3 what is actually needed for a traditional MS student. Without at least two 2-yr TA funding available the department is forced to rely on research funding that fluctuates based on many factors.

2) Keeping the time to degree completion at 2-3 years could discriminate against students who are purposely working full time and cannot be dedicated to a full-time graduate program, in fact one of the Dean's recommendations is to "attract part-time students", who by definition will not finish in a 2-3 yr timeframe. Especially at UAA, not all students are traditional.

3) There are many external factors that cause our funding cycles, graduation cycles and enrollment cycles to fluctuate. Our funding cycle on average takes about a year. We submit grants and find out in 6-8 months whether those were successful, if they are not then it is another round, in some cases it can take three submissions before an NSF grant is funded. For example, NSF has a 5-15% funding rate. We would typically submit a grant in fall for funding that would start in the next AY. Funding comes and goes, some years are successful, and others are not. A single NSF proposal takes months to write, and even the very best proposals have a 85-95% rejection rate. Furthermore, some years faculty may need to teach more or do more service, and this would reduce the amount of time they can devote to graduate students, research, and funding opportunities. This takes its toll particularly in understaffed departments like ours, we are currently down two full time TT faculty positions so there are fewer faculty to support graduate students.

4) Some faculty have had great success with industry funding sources and are capitalizing on special programs from NSF and DOE for the types of science being funded, like climate change, green energy, and energy transition focused research. We should consider more support for faculty to pivot and/or make strategic hires in these areas to capitalize on the funding opportunities that do exist.

5) Research-active faculty must use workload credits (buying out teaching) to conduct the required activities supported by external grants, which includes supervising graduate students. To make progress

on sponsored projects faculty buy themselves out of teaching. This is counterproductive to building a vibrant graduate program because it consumes large amounts of the personnel grant funds that could be used to support graduate students. The more successful faculty are in obtaining external grants the more they are punished for this success on their workloads. Rather than being recognized and allotted proper workload credit. In many cases those course buyout funds are not even used to hire instructors to teach courses. Faculty and Chairs are not informed of how teaching buyout funds are reallocated.

6) UAA also has a counterproductive approach to out of state students by requiring out of state tuition for graduate students. Again, that puts a large burden on the available grant funds where instead of being able to support two students there is only enough for one. Furthermore, there are no incentives for international students, despite the looming enrollment cliff in the US.

7) Additionally, the quantity and quality of our applicants varies widely, some years we have very few applicants that would be successful, while other years all of them look great. During and just after the pandemic all geoscience programs saw a huge drop in MS applicants. Evaluation of our grad program needs to account for a) variability in funding amount and timing, b) variability in workload needs for the department, and c) variability in grad applicant quantity and quality.

8) Grad students add to the vibrancy of the department and research, the generation of external funds in our discipline, cannot be done with undergraduates alone.

9) We have one graduate of the UAF Ph.D. Geosciences who completed all course work at UAA, and there are at least two-three more students who have applied to the UAF Ph.D. Geosciences who are completing their M.S. degrees in Applied Geological Sciences at UAA now. Some students need to complete a M.S. prior to entering Ph.D. programs others do not, this should remain flexible because we accept students with diverse backgrounds into the program. It is important to keep students first and be sure they can achieve their career goals.

10) A review cycle of two years is unrealistic from multiple standpoints. The recovery from pandemic and post-pandemic induced challenges, it is simply not enough time to recover from the pandemic, post-pandemic challenges, and departmental leadership changes due to losing the Director position.

A path forward would be to pick perhaps 3 items that we can all agree on would lend proper support to this program, allow the program to implement the change then assess in 3-4 years how the modifications were or were not successful. We can't just keep things status quo and expect to enact the changes that are being requested. We are open to work with the CAS and UAA Administration to explore ways that the university can help support the graduate students and the program to make it even more vibrant and sustainable. We all have that as our end goal so let's make it happen.

After completing this section, the form should be submitted to uaa.oaa@alaska.edu, with a copy to the dean. If the program is fully delivered on a community campus, copy the appropriate community campus director(s) as well.

Committee chair first name last name: LeeAnn Munk, Chair; Jennifer Aschoff, Co-Chair **Date:** 4/10/2023

END OF PROGRAM OPTIONAL RESPONSE SECTION

PROVOST SECTION (Due on August 1)

After completing, signing, and dating the Provost Section of this form, email the completed form to the program review committee and dean, with a copy to uaa.oaa@alaska.edu for posting. If the program is delivered on a community campus, copy the appropriate community campus director(s) as well.

Provost's commendations, additional or adjusted recommendations, if any, and other general comments *(3000 characters or less)*:

I agree with the dean's commendations and would like to recognize in particular the active research program among the faculty. I also agree with the dean's recommendations and would like to emphasize, in particular, the request for faculty to use their funding to support more of the UAA undergraduate and graduate students in the department.

In the next regular program review I would like to combine the undergraduate degree with the master's degree and review them both together. In preparation, please evaluate the undergraduate and graduate curricula for efficiency and for alignment with the department's strengths. Consider narrowing the scope of the department's offerings with those two goals in mind.

As I did last year in the Program Review process, I am asking programs to think about how they put students first. This includes continuing to monitor any courses with high DFW rates and seeking out strategies for remediation as needed. It also includes continuing to think about what it means to embrace diversity and inclusivity on the course and program level and to demonstrate this in your particular program(s). This could be through the use of proven, high-impact practices at the program level, or through proven pedagogic strategies such as designing assignments using Transparency in Learning and Teaching (TILT). It can also be through implementing OER and ZTC materials, particularly where course materials can be more reflective of diverse perspectives, or by using the same materials across all sections of a course. Finally, I am asking that every program identify at least one opportunity for students to develop each of UAA's core competency within the program's curricular and/or co-curricular offerings.

I am changing the decision to continuation and scheduling a combined review of the BS Geological Sciences and the MS Applied Geological Sciences in a single review in AY25.

Provost's decision: Continuation -- Program is successfully serving its students and meeting its mission and goals. No immediate changes necessary, other than regular, ongoing program improvements.

Interim Progress Report year: N/A

Follow-up Program Review year: N/A

Next regular Program Review: AY2025

Provost's signature: Denise K. Runge **Date:** 5/12/2023