



Academic Affairs
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Date: April 18, 2017
To: Statewide Academic Council
From: Samuel Gingerich, Provost and Executive Vice Chancellor for Academic Affairs
Through: Thomas Case, Chancellor *T Case*
Subject: Proposed MS Applied Geological Sciences

In response to state needs and industry demand, the College of Arts and Sciences is proposing a Geological Sciences Master of Applied Science (MSAGS) program. This proposal is strongly supported by the Geological Sciences Community Advisory Board, which includes geoscience professionals from the petroleum industry, environmental consulting, minerals industry, Alaska Native Corporations and multiple state and federal agencies. The many accompanying letters from industry leaders and professionals demonstrate the high level of support for this proposal. Generous ongoing financial contributions to the Geological Sciences department, as well as the 100% job and graduate school placement rate of the BS program, both outlined in the prospectus, further confirm the strong reputation the faculty and students of the program enjoy.

A Master's degree is generally considered the terminal degree for working professionals in geoscience fields, and there are over 100 companies operating out of Anchorage and throughout Alaska who hire employees with graduate level degrees in the field.

The program proposal has been approved by the faculty, dean, and appropriate UAA curriculum committees and the Faculty Senate. The MS degree is distinct from and complementary to the program offered at the University of Alaska Fairbanks, and the two faculties have been working together to find opportunities for instructional synergy and collaboration.

Attachments: BOR Program Action Request Form, Program Prospectus, Letters of Support



Board of Regents Program Action Request
University of Alaska
 Proposal to Add, Change, or Discontinue a Program of Study

1a. UA University UAA	1b. School or College CAS	1c. Department or Program Geological Sciences
2. Complete Program Title Master of Science in Applied Geological Sciences		
3. Type of Program		
<input type="checkbox"/> Undergraduate Certificate <input type="checkbox"/> Associate <input type="checkbox"/> Baccalaureate <input type="checkbox"/> Post-Baccalaureate Certificate <input checked="" type="checkbox"/> Master's <input type="checkbox"/> Graduate Certificate <input type="checkbox"/> Doctorate		
4. Type of Action		5. Implementation date (semester, year)
<input checked="" type="checkbox"/> Add <input type="checkbox"/> Change <input type="checkbox"/> Discontinue		<input checked="" type="checkbox"/> Fall <input type="checkbox"/> Spring <input type="checkbox"/> Summer Year 2017
6. Projected Revenue and Expenditure Summary (not required if the requested action is discontinuation). Provide information for the 5 th year after program change approval if a baccalaureate or doctoral degree program; for the 3 rd year after program approval if a master's or associate degree program; or for the 2 nd year after program approval if a graduate or undergraduate certificate. If information is provided for another year, specify (1st) and explain in the program summary attached. Note that revenues and expenditures are not always entirely new; some may be current (see 7d.)		
Projected Annual Revenues In FY 21		Projected Annual Expenditures In FY 21
Unrestricted		Salaries & benefits (faculty and staff) \$111,000
General Fund	\$0	Other (commodities, services, etc.) \$0
Student Tuition & Fees	\$120,000	TOTAL EXPENDITURES \$111,000
Indirect Cost Recovery	\$0	One-time Expenditures to Initiate Program (if >\$250,000)
TVEP or Other (specify):	\$0	(These are costs in addition to the annual costs, above.)
Restricted		Year 1 \$0
Federal Receipts	\$0	Year 2 \$0
TVEP or Other (specify):	\$0	Year 3 \$0
TOTAL REVENUES	\$120,000	Year 4 \$0
Page # of attached summary where the budget is discussed, including initial phase-in:		
7. Budget Status. Items a., b., and c. indicate the source(s) of the general fund revenue specified in item 6. If any grants or contracts will supply revenue needed by the program indicate amount anticipated and expiration date, if applicable.		
Revenue source	Continuing	One-time
a. In current legislative budget request	\$0	\$0
b. Additional appropriation required	\$0	\$0
c. Funded through new internal UA university redistribution	\$0	\$0
d. Funds already committed to the program by the UA university ¹	\$0	\$0
e. Funded all or in part by external funds, expiration date	\$0	\$0
f. Other funding source (specify type):	\$0	\$0
8. Facilities. New or substantially (>\$25,000 cost) renovated facilities will be required. <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, discuss the extent, probable cost, and anticipated funding source(s), in addition to those listed in sections 6 and 7 above.		
9. Projected Enrollments (headcount of majors). If this is a program discontinuation request, project the teach-out enrollments.		
Year 1: 8	Year 2: 10	Year 3: 12
Year 4: 15		
Page number of attached summary where demand for this program is discussed:		

¹Sometimes the courses required by a new degree or certificate program are already being taught by a UA university, e.g., as a minor requirement. Similarly, other program needs like equipment may already be owned. 100% of the value is indicated even though the course or other resource may be shared.

10. Number² of new TA or faculty hires anticipated (or number of positions eliminated if a program discontinuation):

Graduate TA	0
Adjunct	0
Term	0
Tenure track	0

11. Number² of TAs or faculty to be reassigned:

Graduate TA	0
Adjunct	0
Term	0
Tenure track	.6 FTE

Former assignment of any reassigned faculty: 0
For more information see page _____ of the attached summary.

12. Other programs affected by the proposed action, including those at other campuses (please list):

Program Affected	Anticipated Effect
UAF Geosciences	Positive effect through e-learning/video courses offered to grad students across MAUs and mutual co-operation and collaboration between the two departments

Page number of attached summary where effects on other programs are discussed: 14

13. Specialized accreditation or other external program certification needed or anticipated. List all that apply or 'none': None

14. Aligns with University or campus mission, goals, core themes, and objectives (list): The formation of the MSAGS directly supports the University of Alaska's Mission, Strategic Plan, and Shaping Alaska's Future through student-centered higher education, research and innovation, and partnerships with communities and industries. The attached prospectus provides details about how the program aligns with the 5 Academic Master Plan goals.

Page in attached summary where alignment is discussed: 3

15. Aligns with Shaping Alaska's Future themes:

The formation of the MSAGS directly supports the University of Alaska's Mission, Strategic Plan, and Shaping Alaska's Future through student-centered higher education, research and innovation, and partnerships with communities and industries. The attached prospectus provides details about how the program aligns with the Shaping Alaska's Future themes.

Page in attached summary where alignment is discussed: 4

16. State needs met by this program (list): Alaska benefits from having a local resource of highly qualified geoscientists. The proposed MSAGS program has a strong level of support, described and quantified in detail in the prospectus, among the geology Community Advisory Board, current BS GEOL students, BS GEOL alumni, local employers, and faculty and administrators throughout the UAA and UAF campuses.

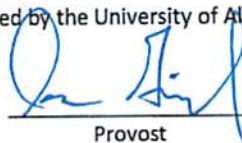
Page in the attached summary where the state needs to be met are discussed: 5

17. Program is initially planned to be: (check all that apply)

- Available to students attending classes at UAA campus(es).
- Available to students via e-Learning
- Partially available to students via e-Learning

Page # in attached summary where e-Learning is discussed: 16

Submitted by the University of Alaska Anchorage


Provost

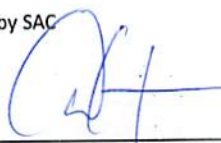
4/19/2017
Date

Thomas R. Carr | 21 Apr 2017
Chancellor Date

Consensus support of SAC

Not supported by SAC

Recommend approval by VPAAR


Date

5/5/17

<input type="checkbox"/> Recommend disapproval by VPAAR	UA Vice President for Academic Affairs & Research	Date
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²Net FTE (full-time equivalents). For example, if a faculty member will be reassigned from another program, but his/her original program will hire a replacement, there is one net new faculty member. Use fractions if appropriate. Graduate TAs are normally 0.5 FTE. The numbers should be consistent with the revenue/expenditure information provided.

Attachments: Summary of Degree or Certificate Program Proposal

Other (optional)

Revised: 02/28/2017

Master of Science in Applied Geological Sciences Prospectus

Program Overview

Current Program

The Department of Geological Sciences has offered the BS in Geological Sciences for 11 years and boasts a 100% job and or graduate school placement of its graduates. There are 122 currently enrolled (AY15-16 and 16-17) BSGS majors in the program and an average of 15 students graduate each year.

The Department currently has thirteen 600-level courses (mostly stacked with 400 level courses) and two Research/Thesis course sections to facilitate meeting graduate level instructional and research requirements. Additional 600-level courses are either planned or are currently in the curriculum approval process. Enrollment in these 600-level courses currently comprises graduate students in the UAA MS Interdisciplinary Studies program, UAA COE, UAF, APU, employees of local companies (e.g., oil and gas industry), and former graduates of the UAA BSGS program. Since Fall 2015, there have been a total of 48 independent enrollments in various sections of 600-level courses, amounting to over 120 course credits (many at the out-of-state tuition rate – currently \$979/cr), and demonstrating significant interest and demand for the MSAGS at UAA.

Proposed MSAGS Program

The MSAGS program is intended for students seeking graduate level training to advance their understanding of geological sciences and position them with a wider range of job opportunities in Alaska, especially in typically high-paying geoscience positions. By providing MSAGS graduates, the proposed program will meet critical state needs in the field of geosciences, one of the fundamental keystones of the economy of the state of Alaska. The MSAGS program will adopt standard entrance requirements in graduate level education at institutes of higher learning to ensure that students are well-prepared for their graduate studies. Once enrolled in the program, students will focus on a field of study that closely aligns with the research expertise of the current Department faculty, with particular application to one of three applied tracks in geological sciences relevant to Alaskan state needs: 1) petroleum systems, 2) hydrology and environment, and 3) minerals and resources. There will be two options for MSAGS students: 1) MS with thesis, and 2) Professional Masters with no thesis – the latter will accommodate working professionals attempting to obtain graduate level credentials that will facilitate career advancement. A broad program of coursework coupled with applied research and interaction with local industry will prepare students to succeed in their chosen industry as well as providing state industries with the professional graduates they need.

Critical Achievements and Partnerships

- 1) The Geological Sciences Community Advisory Board, which was formed seven years ago, has a strong commitment to supporting both the BSGS and MSAGS programs at UAA. The membership of this board includes geoscience professionals from the petroleum industry, environmental consulting, minerals and industry, Alaska Native Corporations, and multiple state and federal agencies including the USGS and BLM. All of the members hold at least a BS in geology and most have an MS or PhD degree in geology. Two of the members are graduates of the UAA geology program, one of whom is currently enrolled in the MS Interdisciplinary Studies program with a geological sciences emphasis.
- 2) The Department of Geological Sciences established the Excellence in Geology Fund seven years ago. This fund has received over \$100K in support of student and faculty research, primarily from industry, but also from private individuals including alumni. Additionally, multiple industries have supported student site visits to mines and exploration sites (remote Red Dog mine and the Pebble exploration site) at no financial cost to UAA or the students.
- 3) Local oil and gas companies based in the Anchorage region have demonstrated a remarkable commitment to the UAA geosciences program and have voiced a strong need for the MSAGS program. In particular, ConocoPhillips Alaska regularly invests in the growth of departmental infrastructure and resources. In the past two years alone, ConocoPhillips Alaska has provided \$150K to develop a computer laboratory to support UAA geology instruction, a further \$100K to facilitate technical support of this facility and to aid in new faculty infrastructural support, and \$40K to develop a Student Field Experiences Fund in order for the department to significantly subsidize student expenses in critical field-based instruction associated with their undergraduate or graduate courses.
- 4) Fund-raising activities of the Department, UAA Advancement, and the Community Advisory Board resulted in \$200K to support a term position in the area of minerals and mining. This seed funding culminated in UAA support for a tenure-track position which is now filled.
- 5) In-kind donations of \$33.8 million from several petroleum software vendors (IHS, Schlumberger and ALT) have recently been made to the Department to support the development of the petroleum/stratigraphy MSAGS track, and contribute to existing undergraduate research and teaching.

Mission and Strategic Alignment

The formation of the MSAGS directly supports the University of Alaska's Mission, Strategic Plan, and Shaping Alaska's Future through student-centered higher education, research and innovation, and partnerships with communities and industries.

The proposed MSAGS program aligns with the 5 goals of the UA Academic Master Plan by:

- Preparing Alaskans for the state's future by providing skilled graduates for high-impact jobs in the critical field of geological sciences, which forms one of the pillars of the state's economy through its natural economic resources.
- Promoting graduate level teaching and research on the UAA campus, which will enhance the professional development and scholarship of the geological sciences faculty.
- Dissemination of new knowledge that has direct application to the management and utilization of Alaska's resources and thus is responsive to state needs.
- Increasing collaboration and synergy across the UA system through cooperation and integration of instructional opportunities between departments at UAA and UAF.

The proposed MSAGS program aligns with the UAA 2017 Strategic Plan priorities in *Instruction, Research, Educational Opportunity and Student Success, Community, and Public Square* by:

- Enhancing the University of Alaska education system by expanding graduate learning and research opportunities.
- Providing necessary technical training for professional-level job attainment in the high-impact job field of Geological Sciences where a Master of Science or Professional Masters is critical.
- Promoting teaching and research on the UAA campus, which will enhance the professional development and scholarship of the geological sciences faculty.
- Creating a research-driven graduate program of distinction with internationally-recognized research-active faculty.
- Responding to a currently underserved need for graduate-level geology education in the Anchorage area and the state of Alaska.
- Offering one of the academic programs expressly supported by UAA.
- Providing collaboration between graduate programs at UAA and between MAUs through instructional synergies with UAF.
- Developing educational partnerships with local industries through engagement of current employees with the Professional Masters program.

The proposed MSAGS program aligns with Shaping Alaska's Future themes as follows:

Student Achievement and Attainment:

- Inspiring learning and professional development in Anchorage and its surrounding area through the pursuit of an advanced geology degree.

Productive Partnerships with Public Entities and Private Industries:

- Facilitating productive partnerships with public entities through public outreach and dissemination of research findings, and through internships and graduate hiring with private industry and local and state government.

Research & Development (R&D) and Scholarship to Enhance Alaska's Communities and Economic Growth:

- Enhancing research and development to enrich Alaska's communities and economic growth by offering graduate emphases that are directly applicable to the Environmental, Petroleum, and Mining industries.

Accountability to the People of Alaska:

- Serving Alaska and its diverse peoples by bringing the opportunity to pursue graduate-level study in applied geological sciences to a new region of Alaska.

Alaska benefits from having a local resource of highly qualified geoscientists:

- Training in-state Geoscientists to represent the People of Alaska on natural resources issues.
- Hires from within Alaska have a higher retention rate and direct cost savings over hires recruited from outside Alaska.
- Master's level geoscientists offer greater levels of technical skill and specialization than those at the Bachelor's level.

Additionally, Anchorage employers benefit from a rigorous local MS program focused on applied geological sciences:

- Numerous government, oil and gas, environmental, geotechnical, and mineral resource employers operate in the Anchorage area.
- Employers need more highly qualified geoscientists and technically skilled managers who would be produced through graduate education.
- Anchorage employs the largest number of Alaska's geoscientists.
- Replacement of skilled geoscientists lost by retirement or attrition can be facilitated by graduate education through the MSAGS program.
- Coursework outside of the Anchorage area is not an option for most local geoscientists. Employed geoscientists have job and family commitments that limit their ability to travel for extended periods of time.
- Working professionals need flexibility in local course offering options (e.g., evenings, weekends, e-Learning, modular courses) within the Anchorage area that can be achieved within the MSAGS program.
- A Master's degree is generally considered the terminal degree for working professionals in geoscience fields.

The proposed MSAGS Program has a strong level of support, described and quantified in detail in the full Prospectus, among the geology Community Advisory Board, current BS GEOL students, BS GEOL alumni, local employers, and faculty and administrators throughout the UAA and UAF campuses.

Student Demand and State Needs

There are over 100 companies operating out of Anchorage and throughout Alaska who hire employees with graduate level degrees in the geosciences. Currently, UAA does not contribute to those workforce needs and the only other graduate degree granting program in the Alaska does not produce sufficient MS graduates to meet the burgeoning needs of the petroleum, minerals and mining, or the environmental consulting industries. These are niches we will fill with the UAA MSAGS. Additionally, place-bound students who want to further their education to the MS level in geological sciences will be able to do so in Anchorage, similar to place-bound BSGS students who have resulted in UAA having the largest undergraduate geological sciences cohort in the state of Alaska.

The US Bureau of Labor Statistics predicts a 21% increase in job-growth in the geosciences in Alaska, compared to a national average of 13%. Anchorage, ranked the #3 location in the country for geoscience jobs, is thus well-positioned to see geoscience job-growth in the 20% range. Salary ranges for geoscientists with a BS are \$30,000-\$60,000. By contrast, salaries for MS graduates were bimodal depending on the industry that hired them. MS graduates in environmental services and federal government earned an annual salary from \$40,000-\$70,000, but MS graduates that found jobs in the oil and gas industry ranged from \$80,000-\$120,000. (AGI, 2016; Figure 1). Only 35% of geoscientists with BS degrees took jobs in the highest-paying industry (oil and gas) compared to 74% with an MS degree, largely because the MS is considered to be the entry-level degree for petroleum jobs (AGI, 2013; Figure 2a). The core industries that hire geoscience graduates are oil/gas, environmental sciences, federal government, mining, and 4-year universities (Figure 2b). However, the entry-level degree for oil/gas, federal jobs, and 4-year universities is not currently offered in Anchorage. Without a UAA MSAGS program that specifically targets the needs of these core industries, there is less opportunity for the people of Alaska to compete for these jobs. The past experience of the department suggests that Anchorage-based students have little to no interest in attending UAF for a graduate level degree in geosciences for a variety of reasons, including being place-bound in Anchorage, needing to balance education and work, or because the UAF program does not offer the full breadth of areas of emphasis required for specific geoscience jobs in Alaska. Only one graduate of the UAA BSGS program (in 10 years) has attended UAF for a graduate degree (MS Chemistry). Offering the MSAGS program at UAA will better serve the Anchorage community by providing the skills and degree needed to obtain the highest-paying jobs in geosciences, as well as to broaden their employment opportunities.

Starting salaries for graduates who accepted a job in the geosciences

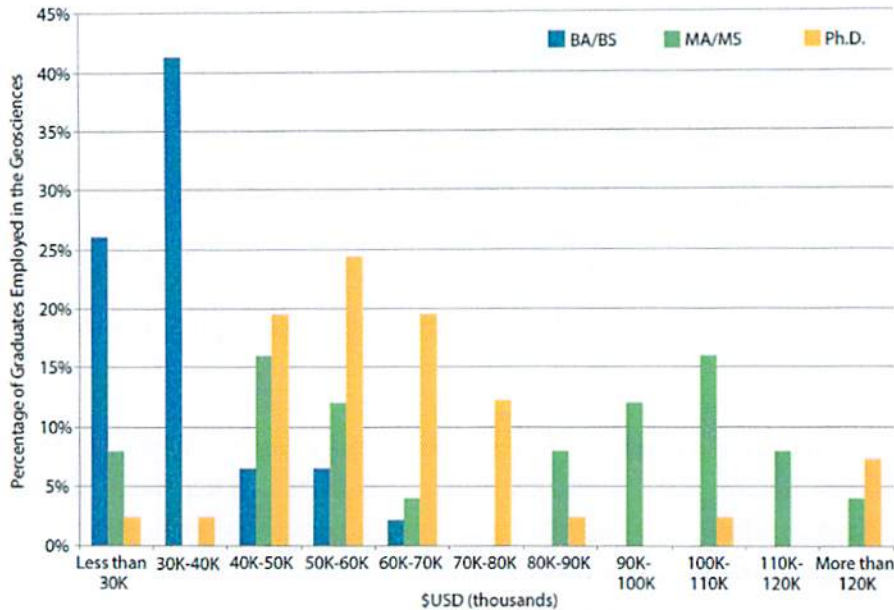


Figure 1. More than twice as many geoscience graduates take high-paying industry jobs with an MS than with a BS (American Geological Institute, 2016).

The development of the MSAGS graduate degree at UAA will also attract prospective graduate students from out-of-state, increasing the diversity of UAA’s student body and providing a larger population of MS graduate to support the job market needs of the state. For example, an informational and student recruitment effort for UAA geosciences at the annual meeting of the Geological Society of America, held in Denver in September 2016, resulted in indications of interest in MSAGS studies at UAA from 107 current undergraduate students in geological sciences from 28 states and 2 foreign countries. Contact information was collected from all 107 students in the event that the MSAGS program becomes available.

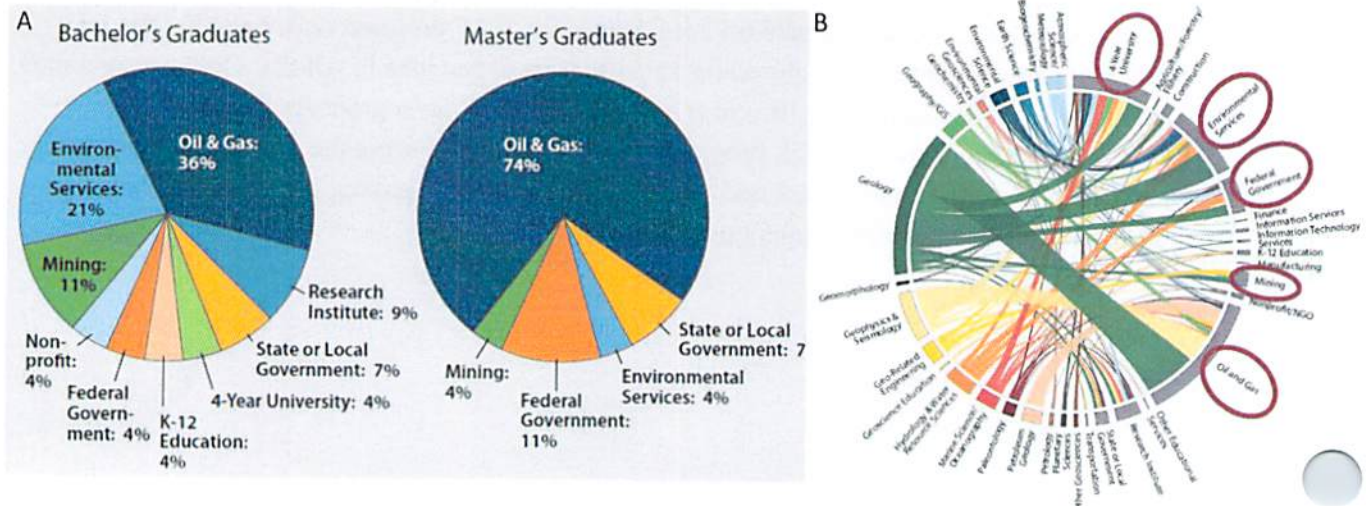


Figure 2a. Nationally 2/3 of MS geoscience graduates are working in the oil and gas industry whereas only 1/3 in the industry have only a BS degree. Anchorage is the business center for oil and gas industries in Alaska (American Geological Institute, 2013).

Figure 2b. Job trajectories for all geoscience graduates by subdiscipline highlighting the top 5 industries that hire recent geoscience graduates (American Geological Institute, 2016). The top employers are Oil and Gas, Environmental Sciences, 4-year Universities, and Mining. The MSAGS specifically targets these industries to maximize opportunities for Anchorage-based students in Alaskan geoscience jobs.

Enrollment Projections

	Year 1	Year 2	Year 3	Year 4	Year 5
Enrollment Headcount	8	10	12	15	18
Graduates	0-2	2-4	4-6	4-8	4-8

Student Opportunities and Student Success

Three groups of students are interested in a UAA MSAGS:

- a. *UAA Geological Science graduates* who would like to continue their education in Anchorage in order to compete in the higher paying professional job market. These students are place-bound and have made requests for the opportunity for an MSAGS program at UAA.
- b. *Anchorage professionals* who are currently employed in Anchorage and would like to take continuing education and graduate level courses, many times in conjunction with current jobs (and the possibility to use current research as graduate projects).
- c. *Students from outside Alaska* who are familiar with the outstanding job opportunities in the natural resource and environmental industries in Anchorage, and the unique research opportunities provided by our faculty (cf. 107 indications of interest from 28 states).

Geology is designated as a “high demand” job area (HDJA) in a state with significant quantities of undeveloped natural resources and high employment opportunities. Anchorage is named 3rd out of “The Top Twenty Best Cities for Geoscientists” (see below, taken directly from <http://www.valuepenguin.com/2013/07/best-cities-geoscientists>), ranking only behind the two top “oil towns” Houston and Midland, Texas, which have a much larger combined population.

Top Twenty Best Cities for Geoscientists

Rank	City	Median Salary	Jobs	Location Quotient	Cost of Living	Score
1	Houston-Sugar Land-Baytown, TX	\$143,710	7,720	10.8	89	92
2	Midland, TX	\$103,380	730	35.4	94	73
3	Anchorage, AK	\$112,470	410	8.8	135	70
4	Dallas-Plano-Irving, TX	\$114,830	710	1.3	88	67
5	Tulsa, OK	\$126,000	190	1.7	88	65

Rank	City	Median Salary	Jobs	Location Quotient	Cost of Living	Score
6	Gulfport-Biloxi, MS	\$92,730	280	10.2	91	65
7	Denver-Aurora-Broomfield, CO	\$102,450	1,620	4.9	110	64
8	Lafayette, LA	\$106,150	140	3.5	94	63
9	Tyler, TX	\$164,800	50	2	90	62
10	New Orleans-Metairie-Kenner, LA	\$100,350	400	2.9	93	58
11	Corpus Christi, TX	\$104,210	80	1.7	86	58
12	Abilene, TX	\$88,880	60	3.7	85	57
13	Bakersfield-Delano, CA	\$120,560	130	1.7	97	56
14	Reno-Sparks, NV	\$80,460	240	4.8	94	53
15	Fort-Worth-Arlington, TX	\$103,490	300	1.3	90	52
16	Sacramento-Arden-Arcade-Roseville, CA	\$97,310	640	2.9	117	50
17	Casper, WY	\$75,760	90	8.2	98	46
18	Oakland-Fremont-Hayward, CA	\$104,970	360	1.4	144	42
19	Santa Barbara-Santa Maria-Goleta, CA	\$109,070	90	2.06	167	41
20	Boulder, CO	\$88,360	170	4.0	145	40

Sources

1. Median Salary: cities with the highest median annual salary for healthcare social workers, as reported by the Bureau of Labor Statistics. Data as of May 2012
2. Cost of Living: cities with the lowest cost of living, with data sourced from Sperling's Best Places COL Calculator. Data as of July 2013
3. Employment: cities with the highest location quotient metrics, as reported by the Bureau of Labor Statistics. Data as of May 2012

Four of the top 5 employers of geoscientists: oil/gas, environmental sciences/consulting, federal government, and mining industries flourish in Anchorage, Alaska (Fig. 2b). We anticipate that the outstanding reputation of the UAA BSGS program with a recent history of 100% job placement will translate to the MSAGS program. Sponsorship, in particular from the petroleum industry (e.g., a history of contributions from ConocoPhillips Alaska), for graduate student support will be key in helping to provide projects of interest to the students, UAA, and industry. These same types of opportunities exist in the minerals/mining and environmental industries. Additionally, opportunities for internships and research projects with state and federal agencies are also available.

Current Capacity and Quality

The Department of Geological Sciences currently consists of 5 tenured/tenure-track faculty members with 2 additional tenure-track faculty slated to begin in the Fall 2017 semester. Additionally, the department has 2 term instructors who contribute to the lower-division undergraduate curriculum instruction. The department currently offers 13 stacked upper division/graduate level courses that have predominantly supported an existing graduate program hosted by the graduate school (MS Interdisciplinary Studies), with enrolled students consisting of current undergraduate Seniors in the department (many of whom are preparing to pursue a graduate degree program), existing UAA graduate students, and local industry professionals seeking graduate education opportunities to provide leverage for career advancement in Alaska. These classes are currently offered as part of existing workload agreements; all tenured/tenure-track faculty members are already required to offer at least one of these courses per year. Therefore, the creation of the MSAGS program will not result in significant changes to existing workloads. Moreover, the enrollment capacity of these courses (i.e., classroom/facility capacity as well as instructional quality capacity) exceeds the recent enrollment history in these courses. In fact, enrollments in these courses can easily be as much as doubled without exceeding classroom capacity or impacting on the quality of instruction. Therefore, the MSAGS program will have the desired benefit of increasing graduate tuition revenue (e.g., currently \$979/cr for out-of-state students and \$466/cr for Alaska residents) without the need for additional instructional costs.

The classroom resources currently utilized by the department has a capacity that will easily meet the needs of the proposed MSAGS program, given projected enrollments (see section 4). The department has sole access to 1 dual-use teaching classroom/laboratory with a capacity of 24 in the ConocoPhillips Integrated Science Building (CPISB 215) as well as 3 dual-use teaching classrooms/laboratories in the Natural Science Building (NSB 102, 105, and 204), two of which have a capacity of 32 and one of which has a capacity of 24 (the ConocoPhillips Computational Laboratory). Given that the department currently typically offers 2-4 graduate-level courses per semester, the enrollment capacity of these classrooms will comfortably support the projected enrollments of the proposed MSAGS program, as well as having room for growth.

Current faculty in the department are actively engaged in research and typically engage both graduate and undergraduate students in research activities. Research is an integral component of the tri-partite workload agreement; therefore, providing an infrastructure in which faculty can excel in this arena while simultaneously providing transformative research experiences for both graduate and undergraduate students is a desired outcome. For example, it is common for undergraduate students to be paired with graduate students (e.g., providing field assistance during field-based research) on research projects, providing the undergraduate student body with unique opportunities and experiences that can shape their educational path as they consider the benefits of continuing into graduate education programs and ultimately join the State of Alaska workforce in high-impact jobs. Faculty are nonetheless limited in the number of thesis-based research projects they are able to manage at one time in order to preserve the quality of the research mentoring experience and research product outcomes. For this reason, the non-thesis Professional Masters option in the proposed MSAGS program will provide the benefit of circumventing the thesis-based degree enrollment capacity of the existing faculty by permitting

enrolled MSAGS students to pursue an instruction-based professional graduate degree.

Resource Implications

The resources required to initially develop a successful MSAGS program are already available for instruction and research mentoring. The MSAGS program will have the option of a research-based thesis and, therefore, beyond coursework, the program will require resources to support MSAGS student stipends (i.e., graduate research assistantships) and research projects. This can be partially accomplished through external and internal grant support (see below). Overhead producing, external research grant support typically includes funding for graduate student tuition, fees, stipends, and health insurance. The pursuit of such funding is considered an expectation of all tri-partite faculty with significant research components in their workload agreements, as described in the official, ratified Tenure and Promotion Guidelines document for the Department of Geological Sciences. Five of the existing 7 tenure-track positions include at least 40% research time in the workload.

Institutional support of graduate programs typically also includes teaching assistantships to support graduate students. The College of Arts and Sciences (CAS) has already committed one full-time teaching assistantship to support MSAGS, which is sufficient for initiation of the program. However, if the program experiences significant growth, further additions of teaching assistantships may be needed. Tuition revenue (e.g., currently \$979/cr for out-of-state graduate students and \$466/cr for in-state graduate students) may partially subsidize the cost of these resources, concomitant with the enrollment success of the program; however, additional resources may need to be committed by CAS as the program grows in the future. Similarly, instructional and research support for program initiation is sufficient with the current faculty numbers; however, future program growth, combined with ongoing success of the undergraduate program, may require the consideration of the addition of new faculty to sustain growth.

The internal research infrastructure support includes allocated research space, and the ASET (Applied Science, Engineering, and Technology) Laboratory and SIL (Stable Isotope Laboratory) facilities that currently operate on the UAA campus. In addition, there will be synergistic opportunities for collaboration and interaction with UAF faculty and resources as these departments work together to maximize the respective instructional and analytical capacity strengths of each respective department. External resources include grant support, other types of industry related support, and UA Foundation and scholarship funds. Intramural research support is also frequently obtained by department faculty and which provide funding for graduate students and research projects (e.g., the ConocoPhillips Arctic Science and Engineering Endowment Awards).

All instructional infrastructure is already in place that would be required to support the MSAGS curriculum (see section 6). In addition, the department is developing a state-of-the-art computational facility using a \$150K donation from ConocoPhillips Alaska. This facility will be operational by the summer of 2016 and will include 20 workstations with wide monitors and a central server. The department has obtained multi-million-dollar educational licensing for a number of specialty software packages, as are used in geoscience industries across Alaska and worldwide. Licenses will be managed from the departmental server and will provide both

graduate and undergraduate students to unparalleled access to software tools that will benefit both instructional and research efforts. The department also has an on-site rock-crushing facility for sample preparation and a wide selection of field and safety equipment for faculty and students to utilize during field-based learning and research projects.

Library resources at UAA are sufficient to support the needs of the MSAGS program. The UA Consortium library provides several online database search functions (e.g., access to GeoRef, GeoScienceWorld, and Web of Science) as well as access to a wide selection of journals with online digital access that promotes success in research efforts by both faculty and student researchers.

Grant Support:

Summary of recent or pending research funding support in the form of research grants and funded projects for current research-active faculty:

PI: Dr. Jennifer Aschoff (Associate Professor)

- 1) Co-PI: Reinvigorating Arctic Oil/Gas Exploration with New Shelf-edge Exploration Concepts, ConocoPhillips Arctic Science and Engineering Endowment Award, 2016, \$100,000. Co-PI Simon Kattenhorn, UAA.
- 2) Co-PI: Petroleum Geology at UAA: Geophysics Faculty and ConocoPhillips Subsurface Laboratory Support, ConocoPhillips Arctic Science and Engineering Endowment Award, 2015, \$100,000. Co-PIs: L. Munk, E. Shea, M. Reeves, UAA.
- 3) PI: Megaregional Correlation and Sequence Architecture of the Fox Hills Sandstone: Implications for Conventional and Unconventional Petroleum Resources, American Chemical Society, 2015, \$70,000.
- 4) In-kind donation: Schlumberger Software Donation-UAA, 2015, \$33M equivalent.
- 5) In-kind donation: IHS Software Donation-UAA, 2014, \$144,450 equivalent.
- 6) In-kind donation: Advanced Logic Technology Software Donation-UAA, 2014, \$90,000 equivalent.
- 7) PI: NSF Collaborative Research: Understanding Cordilleran Arc magmatism, tectonics and effects on associated Lower Triassic sedimentary basin development, in review 2017, \$225,010.
- 8) PI: NSF Collaborative Research: Linking sediment dispersal, stratal architecture, and tectonic subsidence mechanisms in the Late Cretaceous Cordilleran Foreland Basin, in review 2017, \$229,918.
- 9) PI: Industry Project: Exploration to appraisal scale evaluation of shelf-edge delta oil/gas plays North Slope, AK, in review 2017, \$596,694 .

PI: Dr. Simon Kattenhorn (Professor and Director) – new hire (includes recent awards at previous institution)

- 1) Co-PI: Reinvigorating Arctic Oil/Gas Exploration with New Shelf-edge Exploration Concepts, ConocoPhillips Arctic Science and Engineering Endowment Award, 2016, \$100,000. Co-PI Jennifer Aschoff.

- 2) PI: An integrated study of the evolution of Cerberus Fossae, Mars: Fracture mechanics, volcanology, and megafloods. NASA, 2012-2016, \$324,197.
- 3) PI: Surface features and tectonic histories on Enceladus and Dione: A comparative analysis. NASA, 2012-2015, \$161,034.
- 4) PI: Collaborative Research: Testing the role of magma and related fluids in early-stage rifting, East Africa. NSF, 2011-2015, \$269,591. Co-PIs C. Ebinger, Univ. of Rochester and T. Fischer, Univ. of New Mexico.

PI: Dr. Lee Ann Munk (Professor)

- 1) Co-PI (leadership team): RII Track-1: Fire and Ice: Navigating Climate-Driven Landscape Shifts in Boreal Forest and Subarctic Coastal Ecosystems, NSF EPSCoR phase 5, submitted August 2016, \$20M.
- 2) PI - SusChEM - Collaborative Research: Hydrogeochemical Processes of Lithium Release, Transport, and Accumulation in Arid to Hyper-Arid Basins, NSF EAR, submitted March 2017 (\$130,000)
- 3) PI- Hydrostratigraphy of Lithium Brines in Clayton Valley, Nevada, Albemarle Corp. \$23,981, 2016-2017.
- 4) Co-PI- MRI-Acquisition of a shared multi-collector inductively coupled mass spectrometer (MC-ICP-MS) to benefit teaching, federal, state and national research needs in the Arctic., proposal #1625573, \$591,702.
- 5) A Plio-Pleistocene record of environment and climate from the Salar de Atacama basin based on recently recovered sediment cores, NSF RAPID Award #1443226, \$75,000, 2014-2015. Co-PI S. Hynek, PSU.
- 6) A Database for the Distribution of Potentially Toxic Elements in the Aleutian Volcanic Arc Terrestrial Ecosystem, USF&W, ABSILCC, \$102,000, 2014-2016. Co-PI K. Mock, UAA, supports existing graduate student for 2 years.
- 7) Sources of Calcium and Lithium to Salar de Atacama, Chile, Rockwood Lithium, \$625,000, in collaboration with D. Boutt, University of Massachusetts Amherst, and S. Hynek, The Pennsylvania State University, 2012-2016, \$625,000.
- 8) Hydrogeology and Geochemistry of Groundwater in the Sand Lake Area, Anchorage, Alaska, State of Alaska, in collaboration with JA Munter Consulting, 2013-2016, \$200,000.

PI: Dr. Shuvajit Bhattacharya (Assistant Professor – new hire in Fall 2017; recent awards at previous institution))

- 1) PI: Current grants from the U.S. Department of Energy (DOE) and World Bank.
- 2) Previous grant and/or travel funding received as a PhD graduate student from DOE, Hess Corporation, American Association of Petroleum Geologists, Society of Petrophysicists & Well Log Analysts, Society of Exploration Geophysicists, and the Geological Society of America.
- 3) Co-PI for acquisition of research data and software from Newfield Exploration, PDC Energy, CGG, Paradigm, and Schlumberger.

Other External Resources

The Department has many strong ties with the resource related industries in Alaska. These relationships have culminated in many positive outcomes for the Department and UAA. For example, the mining industry donated \$200,000 to support a term faculty position in mineral resources which led to a tenure-track position that was recently filled, with the faculty member starting in the Fall 2015 semester. Industry sponsored research is identified above in the research grant support section and has exceeded \$1M in recent years, primarily originating from the minerals and mining industry. We anticipate that since we have now added faculty expertise related to the petroleum industry (e.g., Dr Jennifer Aschoff and Dr Simon Kattenhorn) that we should be able to attract even more resources to support research and the MSAGS program.

Affected Programs

MSAGS students will be permitted to take up to 6 credits of elective 400- or 600-level coursework in supporting disciplines that contribute to the MSAGS learning outcomes. In particular, several 400- and 600-level courses in English, Business, Project Management, and Geomatics are excellent options depending on the specific focus of the graduate thesis.

The Department of Geological Sciences at UAA has also been coordinating with the geosciences department at UAF to seek opportunities for instructional synergy and collaboration at the graduate level. We anticipate offering courses at each institution that will (1) attempt to avoid duplication of similar course offerings, where feasible; and (2) provide opportunities for graduate students at each MAU to enroll in courses at the other campus through the development of video-linked courses or graduate e-Learning. This arrangement will provide tangible benefits to each department by increasing the educational breadth of course offerings for all geology graduate students in the UA system as well as providing mutually beneficial enrollment opportunities for each department.

Program Accreditation and Special Certifications

No special certifications or accreditations are required for a graduate program in geological sciences.

Program Student Learning Outcomes and Plan for Assessment

The proposed MSAGS program will function within the following identified Student Learning Outcomes, as listed in the catalog description for the program:

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 technical 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.

The instructional and programmatic objectives of the MSAGS program will be periodically and regularly assessed in accordance with a rigorous Academic Assessment Plan that will include Direct Course Level Assessment (fundamentally linked to the stated Program Student Learning Outcomes), assessment of research products (e.g., research thesis or professional project), and utilization of the results of an Exit Survey for each graduate.

Schedule for Implementation of the Program

Critical Milestone	Date
Applications for MSAGS Program Open	Fall 2017
Graduate Courses Offered	Ongoing in Fall 2017
First MSAGS Students Formally Admitted into Program (<i>includes enrolled students transferring from MS INDS to MSAGS program</i>)	Spring 2018
First Direct Course Level Assessment Completed	Spring 2018
First Exit Survey Completion	Spring 2019
First graduates from MSAGS program	Spring/Summer 2019

E-learning Options

Geological Sciences faculty will develop several online courses that will be aimed at fostering collaboration between UAA and UAF. Online courses would be available to UAA and UAF graduate students, allowing us to share expertise and connect students between the two campuses. Initial graduate level e-Learning will commence in the Fall 2017 semester.

Faculty and Staff

The MSAGS program will be supported by 5 current tenured/tenure track faculty and 2 new tenure track faculty starting in the Fall 2017 semester. Instructional support of the MSAGS program will be accomplished as part of existing workload agreements in that graduate level instruction is already included as an expectation in departmental workload agreements. Several new graduate level courses have been proposed to support the program and will be offered in an alternating schedule with existing courses to maximize per-semester enrollments in each course (i.e., most graduate-level courses will be offered on an alternate-year basis).

Individual faculty members are listed below, showing their respective fields of expertise that will support research elements of the MSAGS program, as well as the graduate level courses that they are qualified to teach.

- 1) Dr Jennifer Aschoff (Associate Professor of Geological Sciences): Stratigraphy, Sedimentology, and Petroleum Geology

Courses:

GEOL A636 Advanced Petroleum Geology

GEOL A637 Advanced Depositional Systems and Dynamic Stratigraphy
GEOL A638 Applied Sedimentary Petrology and Diagenesis
GEOL A688 Professional Project
GEOL A689 Geology Graduate Professional Practices
GEOL A690 Graduate Topics in Geology
GEOL A698 Directed Research
GEOL A699 Graduate Thesis

- 2) Dr Shuvajit Bhattacharya (Assistant Professor of Geological Sciences): Petroleum Geology and Geophysics, Petrophysics, and Subsurface Interpretation

Courses:

GEOL A676 Applied Geophysics
GEOL A678 Petroleum Geophysics and Petrophysics
GEOL A688 Professional Project
GEOL A689 Geology Graduate Professional Practices
GEOL A690 Graduate Topics in Geology
GEOL A698 Directed Research
GEOL A699 Graduate Thesis

- 3) Dr Kristine Crossen (Professor of Geological Sciences): Quaternary Geology and Glacial Geology

Courses:

GEOL A654 Glacial and Quaternary Geology
GEOL A655 Permafrost
GEOL A656 Geoarchaeology
GEOL A658 Advanced Geology of Alaska
GEOL A689 Geology Graduate Professional Practices
GEOL A690 Graduate Topics in Geology
GEOL A698 Directed Research
GEOL A699 Graduate Thesis

- 4) Dr Simon Kattenhorn (Professor of Geological Sciences): Structural Geology, Geomechanics, Petroleum Geology, and Planetary Geology

Courses:

GEOL A648 Advanced Structural Geology and Geomechanics
GEOL A688 Professional Project
GEOL A689 Geology Graduate Professional Practices
GEOL A690 Graduate Topics in Geology
GEOL A698 Directed Research
GEOL A699 Graduate Thesis

- 5) Dr LeeAnn Munk (Professor of Geological Sciences): Geochemistry and Environmental Geology

Courses:

GEOL A660 Environmental Geochemistry
GEOL A665 Isotope Geochemistry
GEOL A688 Professional Project
GEOL A689 Geology Graduate Professional Practices
GEOL A690 Graduate Topics in Geology
GEOL A698 Directed Research
GEOL A699 Graduate Thesis

- 6) Dr Erin Shea (Assistant Professor of Geological Sciences): Igneous and Metamorphic Petrology, Geochronology, and Economic Geology

Courses:

GEOL A623 Advanced Igneous and Metamorphic Petrology
GEOL A626 Advanced Mineral Resources
GEOL A665 Isotope Geochemistry
GEOL A688 Professional Project
GEOL A689 Geology Graduate Professional Practices
GEOL A690 Graduate Topics in Geology
GEOL A698 Directed Research
GEOL A699 Graduate Thesis

- 7) New Hire, Fall 2017 (Assistant Professor of Geological Sciences): Hydrogeology

Courses:

GEOL A640 Advanced Hydrogeology
GEOL A645 Advanced Geothermal Energy
GEOL A688 Professional Project
GEOL A689 Geology Graduate Professional Practices
GEOL A690 Graduate Topics in Geology
GEOL A698 Directed Research

MS, Applied Geological Sciences Catalog Copy

Graduate study in applied geological sciences prepares students for work in the multitude of careers including environmental geology/sciences, oil and gas industry, minerals and mining, and state and federal agencies that require a deep and broad foundation in the geological sciences. A Master of Science degree in Applied Geological Sciences (MSAGS) implies not only an enhanced level of understanding of the fundamentals of geological sciences, but also an applied skill set that allows students to apply advanced concepts of geological sciences to problem solving.

The Master of Science in Applied Geological Sciences has both a thesis and a non-thesis option. The thesis option includes a focus on skills related to the acquisition of new knowledge and is designed for students who wish to pursue higher entry level positions into jobs or to eventually pursue a Ph.D. degree. The non-thesis option is designed for students who wish to further emphasize applied geological sciences and prefer to substitute additional classroom education and a comprehensive written exam or a professional project and comprehensive oral exam for graduate research experience.

Program Objectives

The UAA applied geological sciences graduate program objectives are to provide graduates with:

1. Graduate-level technical knowledge within geological sciences.
2. An ability to conceive and conduct graduate-level geological sciences research and problem solving.
3. An ability to effectively communicate graduate-level geological sciences concepts and applications to a broad audience.

Student Learning Outcomes

In keeping with the above objectives, the expected student learning outcomes of the UAA MSAGS program include an ability to:

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.

Admission Requirements

Satisfy the Admission Requirements for Graduate Degrees and deadlines. Instructions are available on the [Geological Sciences Department website](#). All students must hold a baccalaureate degree in geological sciences or closely related discipline and submit to the UAA Office of Admissions:

1. A completed UAA graduate application.
2. Official transcripts of all college-level work.
3. Graduate Record Examination (GRE) results, taken within two years prior to the application date.
4. Three letters of recommendation from professors or other professionals particularly qualified to attest to the applicant's qualifications for graduate-level research and study.
5. A resume or curriculum vitae.
6. A one-page personal statement discussing the applicant's credentials and readiness for graduate studies. This is an opportunity for the applicant to share relevant information, qualifications, and experience that would not be included with the UAA graduate application form or reflected on official transcripts. It is

also the applicant's opportunity to describe his or her desire and commitment to pursue graduate study in geological sciences.

The application deadline for consideration of teaching assistantship funding in the Fall semester is March 1.

Advising

All graduate students enrolled in the MSAGS program must have an academic advisor identified prior to acceptance in the program. The academic advisor will assist the student through all aspects of the degree process, including:

1. Mentoring the student throughout the graduate degree duration.
2. Approving a graduate studies plan.
3. Overseeing the academic progress of the student.
4. Guiding the student through the development and completion of the graduate thesis project or professional project, where applicable.
5. Working with the graduate committee to evaluate the final thesis or professional project, or to develop and implement a comprehensive written exam, where applicable.

Academic Requirements

Graduation Requirements

- Satisfy the General University Requirements for Graduate Degrees.
- Complete the Program Requirements below.

Program Requirements, Thesis Option

Students must satisfy all University Requirements for Graduate Degrees and complete coursework and thesis work approved in advance by the student's academic advisor and graduate committee.

Students must complete a total of 30 credits of coursework, of which at least 24 credits must be at the 600 level. Up to 6 credits of 400 or 600 level coursework in related disciplines may count toward the degree if not used to fulfill any requirements of a baccalaureate degree. Coursework selected by the student must be approved by the student's graduate committee and must appear on the student's Graduate Studies Plan.

1. Complete 15 credits of Geological Sciences courses from the following: 15

Code	Title	Credits
GEOL A623	Advanced Igneous and Metamorphic Petrology	3
GEOL A626	Advanced Mineral Resources	3
GEOL A636	Advanced Petroleum Geology	3
GEOL A637	Advanced Depositional Systems and Dynamic Stratigraphy	3
GEOL A638	Applied Sedimentary Petrology and Diagenesis	3

Code	Title	Credits
GEOL A640	Advanced Hydrogeology	4
GEOL A648	Advanced Structural Geology and Geomechanics	3
GEOL A654	Glacial and Quaternary Geology	3
GEOL A655	Permafrost	3
GEOL A656	Geoarchaeology	3
GEOL A658	Advanced Geology of Alaska	3
GEOL A660	Environmental Geochemistry	3
GEOL A665	Isotope Geochemistry	3
GEOL A676	Applied Geophysics	3
GEOL A678	Petroleum Geophysics and Petrophysics	3
GEOL A690	Graduate Topics in Geology	1-4

2. Complete GEOL A689 3

Code	Title	Credits
GEOL A689	Geology Graduate Professional Practices	3

3. Complete a minimum of 6 credits of elective courses 6

At least 6 credits of 600 level courses within the Department, which may include:

Code	Title	Credits
GEOL A698	Directed Research	1-6

or 400 or 600 level courses outside of the Department that are relevant to the degree and which have been approved on the Graduate Studies Plan.

4. Complete 3 credits of geological sciences graduate thesis and at least 3 credits of graduate directed research: 6

Code	Title	Credits
GEOL A698	Directed Research	3-6
GEOL A699	Graduate Thesis	3

5. A written thesis proposal, submitted to the student's graduate committee by the beginning of the third semester, presenting evidence that the thesis requirements will be satisfied. The proposal will consist

of an explicit problem statement, a literature review, and one or more sections describing the research and analytical methods that will be applied. The proposal is subject to approval by the student's graduate committee following an oral thesis proposal presentation scheduled no sooner than two weeks after submission of the written proposal.

6. Thesis document and oral thesis defense.

Thesis Requirements

The completed thesis must:

1. Describe how the work is associated with the current state of the science in the candidate's graduate field of study.
2. Contribute to the body of knowledge in the candidate's field of graduate study.
3. Be eligible to be published in either peer-reviewed technical conference proceedings or a peer-reviewed journal as judged by the candidate's graduate committee.
4. Demonstrate command of knowledge and skills associated with the candidate's program of graduate study and as stated in the Student Learning Outcomes.
5. Be defended by the student in an oral presentation to the candidate's graduate committee.

Program Requirements, Non-Thesis Option

Students must satisfy all University Requirements for Graduate Degrees, complete coursework selected from one of three focus areas approved in advance by the student's graduate advisor, and complete either a professional project or additional coursework. Completion of a professional project requires the student to have a graduate committee.

Students must complete a total of 30 credits of coursework, of which 24 credits must be at the 600 level. Up to 6 credits of 400 or 600 level coursework in related disciplines may count toward the degree if not used to fulfill any requirements of a baccalaureate degree. Coursework selected by the student must be approved by the student's graduate advisor and must appear on the student's Graduate Studies Plan.

1. Complete at least 15 credits from one of the geological sciences focus areas below: 15

I. Applied Environmental Geology

Code	Title	Credits
GEOL A637	Advanced Depositional Systems and Dynamic Stratigraphy	3
GEOL A640	Advanced Hydrogeology	4
GEOL A648	Advanced Structural Geology and Geomechanics	3
GEOL A654	Glacial and Quaternary Geology	3
GEOL A660	Environmental Geochemistry	3
GEOL A665	Isotope Geochemistry	3
GEOL A676	Applied Geophysics	3

II. Applied Petroleum Geoscience

Code	Title	Credits
GEOL A636	Advanced Petroleum Geology	3
GEOL A637	Advanced Depositional Systems and Dynamic Stratigraphy	3
GEOL A638	Applied Sedimentary Petrology and Diagenesis	3
GEOL A640	Advanced Hydrogeology	4
GEOL A648	Advanced Structural Geology and Geomechanics	3
GEOL A658	Advanced Geology of Alaska	3
GEOL A678	Petroleum Geophysics and Petrophysics	3

III. Applied Mineral Resources

Code	Title	Credits
GEOL A623	Advanced Igneous and Metamorphic Petrology	3
GEOL A626	Advanced Mineral Resources	3
GEOL A648	Advanced Structural Geology and Geomechanics	3
GEOL A658	Advanced Geology of Alaska	3
GEOL A660	Environmental Geochemistry	3
GEOL A665	Isotope Geochemistry	3
GEOL A676	Applied Geophysics	3

2. Complete GEOL A689: 3

Code	Title	Credits
GEOL A689	Geology Graduate Professional Practices	3

3. Complete 12 credits of elective coursework in the Department, which may include 600 level courses in the Department, up to 3 credits of: 3

Code	Title	Credits
GEOL A688	Professional Project	3

and up to 6 credits (400 or 600 level) in a related supporting discipline as approved by the student's graduate advisor.

4. Successfully complete a comprehensive written exam or a professional project report and comprehensive oral exam.

Professional Project Requirements, if applicable

The project must solve an applied or practical problem in the geological sciences to the extent that original developments by the student are evident in the project report.

1. The project problem and solution must be explained in the context of the current state of the science by means of a thorough review of pertinent literature.
2. The project must include advanced technical components directly involving modern practice and applications of geological sciences.
3. The project must have sufficient scope to clearly demonstrate the student's advanced technical expertise in geological sciences.
4. The project report must demonstrate command of knowledge and skills directly associated with the student's graduate program of study and chosen focus area (I, II, or III above).
5. The project proposal, submitted prior to enrolling in GEOL A688, must present evidence that the above requirements will be satisfied and will generally consist of an explicit problem statement, a literature review, and methodology.
6. The final project will be in the form of a written report and oral presentation to the student's graduate committee.

MS, Applied Geological Sciences New Course Descriptions

GEOL A623: Advanced Igneous and Metamorphic Petrology

3 credits

Igneous and metamorphic processes and the evolution of the lithosphere. Application of field, petrographic, and chemical data to models of petrogenesis and metamorphism.

GEOL A626: Advanced Mineral Resources

3 credits

Mineral resource genesis, classification, exploration, development, and associated environmental factors with a focus on metallic and non-metallic minerals. Specific analysis of mineral resource availability, exploration techniques, viability of extraction and processing, and assessment of environmental implications of extraction. Includes one or more case studies of existing exploration and/or mining sites.

GEOL A648: Advanced Structural Geology and Geomechanics

3 credits

Classification, origin and evolution of all types of rock fractures with application to structural analysis, oil and gas reservoirs, resource recovery, engineering geology, hydrogeology and hazards analysis. Application of continuum and rock mechanics principles to brittle deformation, including rock strength and failure criteria, stress states in the lithosphere, stress tensors and linear elastic fracture mechanics theory.

GEOL A676: Applied Geophysics

3 credits

Overview of geophysical techniques used for subsurface visualization, mapping and interpretation, with applications to natural resource exploration, geotechnical investigations and environmental studies. Techniques include gravity, magnetic, electric, seismic and well logging. Applications of mathematics and physics-based principles to image shallow and deep subsurface at local and regional scales.

GEOL A678: Petroleum Geophysics and Petrophysics

3 credits

Principles and methods in seismic and petrophysics, with emphasis on hydrocarbon exploration from conventional and unconventional reservoirs, and CO₂ storage. Extensive practical training on 2D/ 3D seismic data analysis, and integration with petrophysical logs to interpret structural and stratigraphic features, analyze subsurface lithology, pore fluid, and map reservoir geobodies.

GEOL A688: Professional Project

3 credits

Individualized professional project in an area of geological sciences as related to the profession. Project topic must be approved by the graduate committee.

GEOL A689: Geology Graduate Professional Practices

3 credits

Professional development of graduate students in preparation for careers in the geosciences.

Letters of Support

Support letters from the Anchorage Community

Letters of support from local industries, geoscience professionals, government organizations, Alaska Native Corporations, and present or former geology students of UAA.





Christophe Mornet
Onshore Exploration Manager

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700 G Street, 99501
Anchorage, Alaska 99510-0360
Phone (907) 265-4340
Christophe.j.mornet@conocophillips.com

February 3, 2017

University of Alaska, Anchorage
Attn: Provost Gingerich
290 Spirit Drive
Anchorage, AK 99508

Dear Provost Gingerich:

I am writing on behalf of ConocoPhillips Alaska, Inc. in support of the Masters of Science degree in Applied Geological Sciences (MSAGS) program at the University of Alaska Anchorage (UAA).

Geological sciences are an essential requirement of the workforce within the State of Alaska and it is critical for the oil and gas industry to have a well-educated and trained staff. The MSAGS program will be an opportunity for people in Alaska to receive the education and necessary training in key areas of applied petroleum geoscience and mineral resource evaluation.

The thesis option in the MSAGS program will provide opportunities for those seeking experience in research, whereas the non-thesis option will offer academic training beyond the Bachelor of Science level. In addition, it can provide geoscientists with higher-level professional career opportunities in the field of geological sciences within the State of Alaska.

Sincerely,

A handwritten signature in black ink, appearing to read 'C. Mornet', is written over a horizontal line.

Christophe Mornet

cc: S. Jepsen



Oil and Gas

February 2, 2017

Dear Provost Gingerich:

I am writing on behalf of Glacier Oil and Gas to support the MS Applied Geological Sciences program at UAA. The Geological Sciences are a fundamental part of resource-based jobs in the State of Alaska and it is critical that we have a well-trained workforce to support these jobs. Alaska is very rich in Natural Resources and is a Geologist's classroom. As a lifelong Alaskan, former UAA geology student and Senior Geologist I had to leave Alaska to get my Master's degree in Petroleum Geology at a University that would prepare me for working in the oil and gas industry and that had recruitment to get a job upon graduation. I was very fortunate to be recruited in Baton Rouge, Louisiana at this University for my first job after my MS degree at ConocoPhillips in Anchorage, AK. The MSAGS program at UAA will provide the training necessary for people in Alaska to receive the background and training in three key areas of applied geological sciences: 1) environmental geoscience, 2) petroleum geoscience, and 3) mineral resource geoscience. Having this program available locally would deter students like myself from leaving the state to pursue their education elsewhere and would also attract geoscience students from around the globe to enroll at UAA.

I have worked in Alaska for 10 years a geoscientist in the Oil and Gas Industry for a major and now a small independent company. I have met very few Alaskans with my education level working in my professional career. When I am introduced colleagues are surprised I am actually from Anchorage. Most of my colleagues are from Texas, Colorado, Oklahoma, and other lower 48 states. I am proud to have been able to pursue the education I needed and to be able to return to work in this field in my home state and even luckier my home town. Although, most UAA students like myself that pursue higher education outside of the state do not return for their career. They are recruited by companies in the state in which they went to school and work and relocate their families there. If UAA can provide a MS program for Geologist's in Alaska's biggest city, those graduates are more likely to stay and work in the state and be recruited locally. Most geoscience jobs in the Oil and Gas Industry require a M.S. Degree. At the local geoscience career fair companies such as Exxon, ConocoPhillips and Chevron have had information booths for UAA geology students encouraging them to pursue higher education so they are capable of being recruited in years to come. I hope to see in the future the UAA Geology MS students eligible for these companies' internships and to be recruited at the local job fair for careers upon graduation in Alaska.

Best Regards,

Anna M. Belanger
Senior Geologist
Anchorage, AK 99501
E-mail: abelanger@glacieroil.com



Paug-Vik Contractors LLC
6250 Tuttle Place, Ste.5
Anchorage, Alaska 99507-2094
Phone: 907-258-1345
FAX 907-222-1188

January 23, 2017

Dr. Sam Gingerich, Provost
University of Alaska Anchorage
3211 Providence Drive
Anchorage, AK 99508

Dear Provost Gingerich:

We would like to support the proposed MS program in Applied Geological Sciences at UAA.

We provide environmental consulting services in Alaska, and hire and engage with geoscientists. Like most everyone in our industry in Alaska, our main offices are in Anchorage. We would benefit from having closer access to students working at the master's level in Anchorage. Additionally, a master's program in Anchorage would provide our people with more continuing education opportunities.

I know this is a time of shrinking budgets for UA and for the state of Alaska. But the geosciences form the basis for some of the largest and most productive industries in Alaska. Locating a MS program near where the work is actually being done, in Anchorage, can only help foster better relations between industry and the UA system.

Thanks for taking the time to read this letter.

Sincerely

Matt Zukowski
Operations Manager

Feb 16, 2017

Dear Provost Gingerich:

I am writing on behalf of Schlumberger to support the MS Applied Geological Sciences program at UAA. The Geological Sciences are a fundamental part of resource-based jobs in the State of Alaska and it is critical that we have a well-trained workforce to support these jobs. For example, in within Schlumberger we employ 20 geoscientists each year and 100% are hired from outside the state. The MSAGS program at UAA will provide the training necessary for people in Alaska to receive the background and training in three key areas of applied geological sciences: 1) environmental geoscience, 2) petroleum geoscience, and 3) mineral resource geoscience.

The thesis option in the MS program in Applied Geological Sciences will provide opportunities for those seeking experience in research, whereas the non-thesis option will offer academic training beyond the Bachelor of Science level in order to provide geoscientists with higher-level professional career opportunities in the geosciences in Alaska.

I believe that local knowledge is an invaluable resource in today's geology and petroleum industry. I have worked in Alaska for the past nine years after receiving my bachelors, masters, and Ph.D. from universities around the country. Through my studies I have gained a theoretical knowledge of geological processes, without any regard for the local geology in which I have been working. Anchorage is the hub of the oil and gas industry here in Alaska and I believe a master's program would provide a unique opportunity for collaboration between industry and academia. Schlumberger has donated millions of dollars in software to UAA for geological studies and reservoir engineering and a master's program would only increase our ability to collaborate.

As one of the main economic resources for Alaska, oil and gas will need an influx of people in the upcoming years. The downturn in the industry and the increasing age of many of the geologists and petroleum engineers will cause a shortage of highly trained scientists, especially scientist who are familiar with the local environment and geology. A master's program would not only allow petroleum companies to hire locally, but would cut years off their training. A highly desirable incentive for companies when hiring new employees.

I hope you consider employing a master's degree program at the UAA.

Best Regards,

Jason Burt Ph.D.
Senior Petrophysicist and Well Placement Engineer
Schlumberger Oil Field Services
jburt2@slb.com

YUKUSKOKON PROFESSIONAL SERVICES, LLC.



P.O. Box 870507, Wasilla, AK 99687 U.S.A

PH: 907-373-4000, Fax: 907-373-4010

January 27, 2017

Dr. Sam Gingerich, Provost
University of Alaska Anchorage
3211 Providence Drive
Anchorage, AK 99508

Dear Provost Gingerich:

I am writing on behalf of Yukuskokon Professional Services, LLC to support the proposed MS Applied Geological Sciences program at UAA. The Geological Sciences are a fundamental part of resource-based jobs in the State of Alaska and it is critical that we have a well-trained workforce to support these jobs. For example, in our company Yukuskokon Professional we employ 2-6 mineral resource geologists each year and 50-75% are hired from outside the state. The MSAGS program at UAA will provide Alaskans the training necessary for successful careers in three key areas of applied geological sciences: 1) environmental geoscience, 2) petroleum geoscience, and 3) mineral resource geoscience.

The thesis option in the MS program in Applied Geological Sciences will provide opportunities for those seeking experience in research, whereas the non-thesis option will offer academic training beyond the Bachelor of Science level in order to provide geoscientists with higher-level professional career opportunities in the geosciences in Alaska.

As you know the future of Alaska is dependent upon the natural resource sector, specifically mineral exploration and development, especially with the oil industry weakening. Our clients have numerous project and mineral deposit-specific research opportunities and summer jobs that could support MS students studying Economic Geology for their Masters degree. And for those students and others who complete masters degrees there will be ample opportunities for continuing their career in this field.

Please consider the importance of this program, not only as a benefit to UAA, but also a benefit to the mineral sector and ultimately to the State of Alaska.

Thank you,
William Burnett

Provost Sam Gingerich
Office of Academic Affairs
University of Alaska Anchorage
3211 Providence Drive, ADM 214
Anchorage, AK 99508

Dear Provost Gingerich:

November 17, 2016

I am writing as a member of the UAA Geology Department Community Advisory Board in support of the MS Applied Geological Sciences program at UAA. The Geological Sciences are a fundamental part of resource-based jobs in the State of Alaska and it is critical that we have a well-trained workforce to support these jobs.

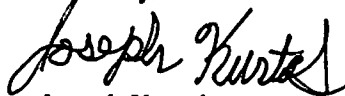
I am retired from Federal Service after working 35 years as a geologist for the Bureau of Mines and the Bureau of Land Management (BLM). Over the years we have hired several student interns from the UAA Geology Department and found them to be self-motivated and excellent workers. After graduating several of these students have transitioned to full-time employment with BLM. Some would like to further their education and career opportunities by getting a MS degree. However for some, family and other commitments make it difficult to pick up and move to another university to reach this goal.

The MS would provide the educational environment necessary for these students to obtain advanced degrees while still residing in Anchorage. In addition the MS degree program would allow them to receive the background and training in three key areas of applied geological sciences: 1) environmental geoscience, 2) petroleum geoscience, and 3) mineral resource geoscience.

The thesis option in the MS program in Applied Geological Sciences will provide opportunities for those seeking experience in research, whereas the non-thesis option will offer academic training beyond the Bachelor of Science level in order to provide geoscientists with higher-level professional career opportunities in the geosciences in Alaska.

With Anchorage being the largest city in Alaska and a base for many resource development companies, including mining and oil and gas, it only makes sense for UAA to have a graduate program based here. Please take these comments into consideration when considering approval of an MS program for geology at UAA.

Sincerely,



Joseph Kurtak
5621 Whispering Spruce Dr.
Anchorage, AK 99516

ph. 907-345-5512
email: minensky@gic.net

February 6, 2017

Dear Provost Gingerich:

I am writing to express my support of the MS Applied Geological Sciences program at UAA. The Geological Sciences are a fundamental part of resource-based jobs in the State of Alaska and it is critical that we have a well-trained workforce to support these jobs. The MSAGS program at UAA will provide the curriculum necessary for people in Alaska to receive the background and training in three key areas of applied geological sciences: 1) environmental geoscience, 2) petroleum geoscience, and 3) mineral resource geoscience.

The thesis option in the MS program in Applied Geological Sciences will provide opportunities for those seeking experience in research, whereas the non-thesis option will offer academic training beyond the Bachelor of Science level in order to provide geoscientists with higher-level professional career opportunities in the geosciences in Alaska.

In my organization (USGS) we rarely hire geologists in the professional series that do not have at least a masters degree. It has been my experience that students who complete a masters degree have most of the skills and training necessary to be professionally competent researchers and productive scientists. Whereas most students with a bachelors degree only typically struggle with the demands of professional work within USGS. Having the option to pursue a masters degree at UAA is an excellent way to ensure that graduates in Geology are even more employable and more likely to be successful in their chosen profession.

The proposed MS program in Applied Geological Sciences seems like a logical and necessary next step in the evolution of the Geological Sciences program at UAA. I think this program will make a significant difference in the educational opportunities available to students in Alaska and the Pacific Northwest and will increase the stature of the Department and the University. As a member of the local scientific community, I see a lot of very exciting things happening at UAA and see a growing university with tremendous potential. The geology faculty are all first rate and highly successful in their respective disciplines. I expect much continued success from this group, and see the MS program as an important and reasonable component of a growing and evolving Department.

Sincerely,

Christopher F. Waythomas, Ph.D.
U.S. Geological Survey, Alaska Volcano Observatory



CALISTA CORPORATION
www.calistacorp.com

January 18, 2017

Dr. Sam Gingerich, Provost
University of Alaska Anchorage
3211 Providence Drive
Anchorage, AK 99508

Dear Provost Gingerich:

Calista Corporation, an Alaska Native Claims Settlement Act regional corporation writes in support of the proposed MS Applied Geological Sciences program at UAA. Geological Sciences are a necessary component of ANCSA resource management for regional corporations that own and seek to develop subsurface resources on their lands. Calista sees steadily increasing numbers of rural Alaskan students leaving our villages in pursuit of higher education and many of them come to the University of Alaska Anchorage. The majority of Calista Shareholders' descendants who attend college obtain their education at Alaska universities. We fully support development of a MS Applied Geological Sciences program at UAA to expand educational opportunities within Alaska.

We like the two options proposed in the MS program. While the thesis option in the MS program in Applied Geological Sciences will provide opportunities in research, the non-thesis option will offer academic training beyond the Bachelor of Science level in order to provide geoscientists with higher-level professional career opportunities in the geosciences in Alaska.

Calista employs two geoscientists in its Land Department who manage its lands and mineral resource endowment. Both Calista geologists are Alaska Native women who obtained their degrees at universities outside Alaska. The non-thesis option could provide an opportunity for career advancement for such employees who are working full time and supporting their families.

Calista options its known mineral properties to the mining industry for exploration and development. Calista's mineral leases with our industry partners always contain provisions for Calista Shareholder and descendant hire. This strategy has led to increased employment of our Shareholders, including some who hold undergraduate degrees in geology or natural resources. A MS Applied Geological Sciences program at UAA could offer these employees further preparation and credentials to qualify for professional careers in applied geological sciences in environmental, petroleum and mineral resource fields.

Sincerely,

June McAtee

Vice President, Land & Shareholder Services

February 13, 2017

Dear Provost Gingerich,

I am a geological advisor to CASA Exploration (currently based in Houston, TX) and I emphatically support the UAA Department of Geosciences proposed MS degree program. I have worked exploration and development projects in Alaska for 20 years (ARCO/Phillips/ConocoPhillips) and had early recognized the UAA and UAF Geosciences Departments as very valuable resources to both benefit from and invest in. The UAA Department is particularly valuable to invest in due to its proximity to Anchorage-based oil, mining, and environmental companies. UAA can ably provide critical addition and breadth to the range of Geoscience MS graduate student skills and specialties (e.g., stratigraphy, hydrogeology, basin studies) emerging from the UA system.

As the lead geoscience recruiting coordinator for CoP Alaska for several years I can assure that a Master's Degree is required for geoscientist hiring consideration among the majors in the Alaska oil industry. There are unique, excellent, cost-effective modes of collaboration with UAA Geosciences in the form of internships (just a drive across town for the student), special UAA presentations from visiting government, oil, mining, and environmental company geoscience specialists (just a drive across town for the presenter). The 'Anchorage advantage' also includes proximity to the Alaska DGGs Geologic Materials Center, digital data, projects, internships, and mentoring based out of Anchorage offices). These valuable Anchorage-based data and collaboration opportunities support stronger relationships between UAA Geoscience and the oil industry and provide further justification for developing an Applied Geoscience Masters degree program at UAA. The proximity to mining and environmental companies also suggests similar advantages for UAA students in other geoscience sub-disciplines.

In full disclosure, I have been a member of the UAA Geosciences Community Advisory Board for several years and was the committee chair for 2 years. My involvement was driven by the vision of a competitive geoscience program in Anchorage, as well as enthusiasm for the potential of the UAA Geosciences Department (as articulated above and through direct observation of the excellence of the teaching staff, their leadership, and the phenomenal growth of student energy and enrollment).

I would be thrilled to discuss the exciting potential I see in the UAA Geosciences Department with you. Hopefully the energy (no pun intended) you may already sense coming from the Department of Geosciences will speak more eloquently than I possibly could. Please help us help aspiring geoscientists to realize more industry-competitive educational opportunities in Anchorage.

Sincerely Yours,

Robert Morse

907-342-7784 (cell)

January 31, 2017

Dr. Sam Gingerich, Provost
University of Alaska Anchorage
3211 Providence Drive
Anchorage, AK 99508

Dear Provost Gingerich:

This letter is to support UA's proposal to create a Master's program in geoscience at UAA.

I first became aware of the need for advanced environmental education at UAA in 1989 when I was asked to teach the course "Groundwater Dynamics" as an Adjunct Instructor through the Engineering Department at UAA and the classroom was packed with around 30 people. Many of these people were working professionals in need of advanced training in the field. I know of four former students who went on to have very successful careers in Anchorage and two of whom are now retired. I am sure others in the class also have had successful careers in their field.

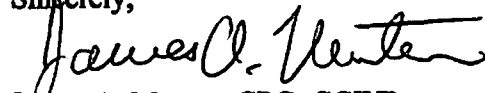
In the 1990's, I served as Managing Principal for a startup environmental consulting firm and we expanded to 34 employees in 14 months. One of our biggest challenges was hiring talented employees. There was a very limited local labor pool. One of our best hires was a recent graduate of UAA who has continued to have a very successful career in Anchorage. I would have liked to have hired many more people like her, however, they were simply not available.

Anchorage continues to have a robust environmental consulting employment market, partly because there are quite a few of us who are approaching or at retirement age and need to be replaced.

Anchorage also has many opportunities for geologists in oil and gas, minerals, geologic hazards, hydrology, agency regulation and land stewardship. Many regional Native Corporations have hired geologists to help manage their subsurface resources, including gravel deposits because Village Corporations do not own any of the subsurface estate - only the regional Corporations.

The Pebble Project spent many tens of millions of dollars in environmental studies with a high emphasis on water and "set the bar" for other large projects in terms of what level of science is expected by permitting agencies. Fulfilling these expectations is a major challenge and requires environmental program managers for resource companies to have a very high level of expertise - and that usually means at least a Master's degree. So if the State of Alaska wants resource development, a modest investment in training people who can do the required work is well worth it.

Sincerely,



James A. Munter, CPG, CGWP
Principal Hydrogeologist
Certified Ground Water Professional No. 119481
Alaska Licensed Professional Geologist No. 568

5701 PENNY CIRCLE, ANCHORAGE, AK, 99516
jamunter@arctic.net
PHONE (907) 345-0165; FAX (907) 348-8592



December 8, 2016

Provost Samuel Gingerich
University of Alaska Anchorage
3211 Providence Drive
Anchorage, AK 99508

Dear Provost Gingerich:

UMIAQ Environmental, LLC and our parent company, Ukpeaġvik Iñupiat Corporation, wish to register our support for the proposed MS Applied Geological Sciences program at UAA. As a company actively involved in resource development in the Arctic, it is important for our continued growth to have geoscience scientists with an understanding of the unique conditions in Alaska and an appreciation of native culture. We currently have three geologists in our company, all of whom are educated to Master's level and beyond from out of state.

The MSAGS program at UAA will provide the training necessary for people in Alaska to receive the background and training in three key areas of applied geological sciences: 1) environmental geoscience, 2) petroleum geoscience, and 3) mineral resource geoscience. The thesis option in the MS program in Applied Geological Sciences will provide opportunities for those seeking experience in research, whereas the non-thesis option will offer academic training beyond the Bachelor of Science level in order to provide geoscientists with higher-level professional career opportunities in the geosciences in Alaska.

As an Alaskan Native Village Corporation, Ukpeaġvik Iñupiat Corporation has a commitment to creating opportunities for our shareholders. It has been our experience that Anchorage has a more supportive environment for our young people to pursue their studies, often in conjunction with interning at one of our Anchorage-based subsidiaries. We have full-time staff who would like to enroll in a master's program if that was available at UAA.

The geosciences program at UAA has a great track record of engaging with Alaska's industry and providing graduates contribute to their growth. However, career progression is limited by the difficulty in pursuing higher degrees in Anchorage.

Sincerely,

Dr. Keith Torrance
Associate Environmental Geologist – UMIAQ Environmental, LLC



1/31/2017

Dr. Sam Gingerich, Provost

University of Alaska Anchorage
3211 Providence Drive
Anchorage, AK 99508

Dear Provost Gingerich:

I am writing on behalf of myself, my business, and myriad others unspoken in support of the proposed MS Applied Geological Sciences program at UAA. As an alumnus of the department, a UAA Alumni of Distinction, and the Chair of the Department of Geological Sciences Advisory Board (and past Chair of the College of Arts and Sciences Advisory Board) I am uniquely, deeply, and continuously connected with UAA.

The Geological Sciences are a fundamental part of resource-based jobs in the State of Alaska and it is hugely important that we have a well-trained workforce to support and encourage the local-hire of these jobs. The MSAGS program at UAA will provide Alaskans the training necessary for successful Alaskan careers in three key areas of applied geological sciences: 1) environmental geoscience, 2) petroleum geoscience, and 3) mineral resource geoscience.

The thesis option in the MS program in Applied Geological Sciences will provide research opportunities, whereas the non-thesis option will offer academic training beyond the Bachelor of Science level in order to provide geoscientists with an improved competitiveness regarding career opportunities in the geosciences within Alaska and beyond.

This program, plain and simple, would promote, increase, strengthen, and build local-Alaskan jobs and improve the recruiting competitiveness of the University and the Anchorage economy.

Sincerely,

Stephen Trimble | Founder & CEO

Arctic Solar Ventures, a Certified B-Corp

1407 W 31st Ave, Suite 301

Anchorage, AK 99503

907-268-4188

strimble@arcticsolarventures.com



United States Department of the Interior

U.S. GEOLOGICAL SURVEY
ALASKA SCIENCE CENTER
4210 University Drive
Anchorage, AK 99508

January 30, 2017

Dr. Sam Gingerich, Provost
University of Alaska Anchorage
3211 Providence Drive
Anchorage, Alaska 99508

Dear Provost Gingerich,

I am writing in regards to the proposed Master of Applied Geological Sciences program at the University of Alaska Anchorage. If approved, this proposed MS degree program would have a positive impact on the research conducted by the Geology Office of the USGS Alaska Science Center (ASC) and more broadly on the Mission of the U.S. Geological Survey.

The Geology Office of the USGS ASC conducts earth science research to inform geologic bedrock mapping, mineral resource assessment, oil and gas assessment, and earthquake and tsunami hazards assessment in Alaska. Our office consists of 20 scientists and science-support staff, three of whom came from the University of Alaska Anchorage, Department of Geological Sciences as student appointments. One of these UAA students left the state a few years back to pursue further education and returned to our employ with a Master of Science degree. Another of the UAA students very much desires to obtain a Master's degree in Geology and is currently exploring the options. Access to high quality geoscience students, such as these three, has enhanced our research capabilities and having them available locally makes them cost effective as well.

Please be advised that this letter is not a commitment of Government resources, but is written in support of the benefits to the USGS mission in Alaska and to the public in general.

Sincerely,

Marti L. Miller

Digitally signed by Marti L. Miller
DN: cn=Marti L. Miller, o=USGS, ou=Alaska
Science Center, email=mlmiller@usgs.gov, c=US
Date: 2017.01.30 11:43:29 -09'00'

Marti L. Miller
Chief, Geology Office
USGS Alaska Science Center
4210 University Drive
Anchorage, Alaska 99508



THE STATE
of **ALASKA**
GOVERNOR BILL WALKER

Department of Natural Resources

DIVISION OF MINING, LAND AND WATER

PUBLIC ACCESS ASSERTION AND DEFENSE

550 West Seventh Avenue, Suite 1000

Anchorage, AK 99501

Main: 907.269.4755

March 1, 2017

Dr. Sam Gingerich, Provost
University of Alaska Anchorage
3211 Providence Drive
Anchorage, AK 99508

Re: Proposed MS Applied Geological Sciences program at the UAA

Dear Provost Gingerich:

My name is Jim Walker. I am the manager of the Public Access Assertion and Defense Unit of the Division of Mining, Land and Water of the Alaska Department of Natural Resources. I am writing to express my support for the proposed MS Applied Geological Sciences program at UAA.

The Geological Sciences are a fundamental part of resource-based jobs in the State of Alaska, and it is critical that we have a well-trained workforce to support these jobs. Effective state government and management, moreover, requires that Alaska employ top geoscientists each year to fulfill the mission of the Department of Natural Resources to develop, conserve and maximize the use of Alaska's natural resources consistent with the public interest. The MSAGS program at UAA will provide Alaskans the training necessary for successful careers in three key areas of applied geological sciences: 1) environmental geoscience, 2) petroleum geoscience, and 3) mineral resource geoscience. I am advised that the thesis option in the MS program in Applied Geological Sciences will provide opportunities for those seeking experience in research, whereas the non-thesis option will offer academic training beyond the Bachelor of Science level in order to provide geoscientists with higher-level professional career opportunities in the geosciences in Alaska.

Having a MSAGS program at UAA will greatly benefit my organization and will likewise be of enormous value to the State of Alaska as a whole today and in the future.

If I can provide any further information, please do not hesitate to contact me.

Sincerely Yours,


James Walker

Manager, Public Access Assertion and Defense Unit

5701 Penny Circle
Anchorage AK 99516

January 31, 2017

Dr. Sam Gingerich, Provost
University of Alaska Anchorage
3211 Providence Drive
Anchorage, AK 99508

Dear Provost Gingerich:

This letter is to support UA's proposal to create a Master's program in geoscience at UAA. As a resource development state, it is important for Alaska's decision-makers to understand how Alaskans create wealth for other Alaskans. The best example, of course, is provided by geologist Tom Marshall. Mr. Marshall, as a State employee in the early 1960's, recommended that the State should select lands at Prudhoe Bay. The stunning success of Mr. Marshall's insights have led to much of the wealth Alaska enjoys today.

In 1981 I sampled sediments from a small unnamed tributary to the Goodpaster River northeast of Fairbanks. The samples proved anomalous and further exploration work eventually discovered an economic deposit of gold mineralization (called the Liese 1 and Liese 2 zones) in what is now named the Liese Creek valley. For more than 10 years now, these deposits have been mined at the Pogo Mine, safely producing 281,359 ounces of gold in 2015 (<http://dnr.alaska.gov/mlw/mining/largemine/pogo/>). The mine currently supported 317 direct jobs in 2015, and the studies, engineering, planning, and construction for the mine and ancillary facilities have probably supported thousands more jobs in the recent past.

In order to find and safely develop deposits such as Pogo, a high degree of expertise is required from discovery through environmental studies, permitting, and closure. I have no doubt that Alaska hosts additional deposits of minerals that can be developed in an environmentally acceptable manner for many years to come. The education of geologists in Anchorage to facilitate this industry would be a wise and modest use of our education assets to further the economic interests of the entire State of Alaska.

Thank you for considering these matters.

Sincerely,



Liese Munter, M.S. (Geology)



ALASKA EARTH SCIENCES, Inc.

January 20, 2017

Dr. Sam Gingerich, Provost
University of Alaska Anchorage
3211 Providence Drive
Anchorage, AK 99508

Dear Provost Gingerich:

As president of Alaska Earth Sciences, Inc (AES) I am writing in support of the proposed MS Applied Geological Sciences program at UAA. The Geological Sciences are a fundamental part of resource-based jobs here in Alaska and it is critical that we have a well-trained workforce to support these jobs. Since its inception in 1985, AES has employed from 4 to as many as 30 undergraduate and graduate geologists annually. While we have always looked for graduates from our University of Alaska system, about 80% of those we have hired were educated at other universities. As I understand it, the MSAGS program at UAA will provide Alaskans the training necessary for successful careers in three key areas of applied geological sciences: 1) environmental geoscience, 2) petroleum geoscience, and 3) mineral resource geoscience. While AES has focused on mineral resource exploration, we have also worked in construction and energy so there has been some overlap in all three of these areas of expertise.

For AES, the thesis option within the MS program in Applied Geological Sciences is important because we have seen a gradual erosion of technical writing skills in the last couple of decades. Good technical writing reflects the analytical thought process necessary for good scientific research. Just as important good technical writing should convey concepts to a wide audience and make clear recommendations to our clients.

The last 3 years have been a slow and challenging time in the minerals exploration business. We are guardedly hopeful that some changes are occurring both globally and nationally that will encourage further exploration and development of resources here in Alaska. If those changes come, AES will be hiring geologists, geophysicists, mining engineers, logistics and permitting specialists. We encourage the University of Alaska and UAA to provide further graduate level degrees in the earth sciences.

Thank you for your attention.

Sincerely,


Robert M. Retherford

30 January, 2017

Dr. Sam Gingerich, Provost
University of Alaska Anchorage
3211 Providence Drive
Anchorage, AK 99508

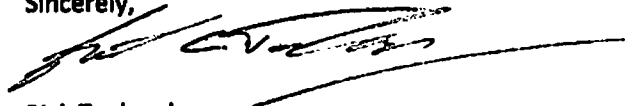
Dear Provost Gingerich:

I am writing to you as UAA alumni to support the proposed MS Applied Geological Sciences program at UAA. The Geological Sciences are a fundamental part of resource-based jobs in the State of Alaska and it is critical that we have a well-trained workforce to support these jobs. For example, my employer (Bureau of Land Management) employs 11-15 geoscientists each year. In the last 3 years, 67% new hires are from outside the state. The MSAGS program at UAA will provide Alaskans the training necessary for successful careers in three key areas of applied geological sciences: 1) environmental geoscience, 2) petroleum geoscience, and 3) mineral resource geoscience.

The thesis option in the MS program in Applied Geological Sciences will provide opportunities for those seeking experience in research, whereas the non-thesis option will offer academic training beyond the Bachelor of Science level in order to provide geoscientists with higher-level professional career opportunities in the geosciences in Alaska.

As a student at UAA, I enjoyed the opportunities that UAA offered to support non-traditional students. My daughter was able to stay in her school, my wife could continue to further her own career, and I could continue to work and support them while attending classes. Upon graduation, non-traditional students are faced with a choice. Either pack-up the family and move to Fairbanks or the lower 48, or give-up on continuing to a master's degree. Personally, I chose to keep my family in place and provide for their happiness instead of pursuing my goal of a graduate degree. The geological community in Alaska is in need of qualified geologists, and there are more opportunities available for those with graduate degrees than for entry level positions. Establishment of a graduate program is imperative for continued growth of UAA's Geological Sciences.

Sincerely,



Rick Tankersley
Geologist, Bureau of Land Management
907-854-6062

Dr. John W. Reeder
850 Beech Street, Suite 201
San Diego, California 92101
707-202-8277

5 February 2017

Academic Affairs
University of Alaska Anchorage
3211 Providence Drive
Anchorage, Alaska 99508

Dear Dr. Sam Gingerich, Provost and Executive Vice Chancellor:

Southcentral Alaska has more Earth science and Earth engineering professionals in industry and government on a per capita basis than anywhere else in the United States. Many of these individuals have a need to advance their professional credentials through academia. But, unfortunately they cannot because of the lack of academic structure at the University of Alaska Anchorage and/or at the Alaska Pacific University. If the University of Alaska Anchorage had a Master's program in applied Earth sciences, this problem would be greatly reduced!

I have personally taught at the University of Alaska Anchorage continuously from summer 1987 through 2010, having taught over 3,000 students. Many of these students were very interested in obtaining an Earth science undergraduate degree if it was offered; but, nothing was available until the very end of my efforts. But, even with a UAA undergraduate program, it has limited value if there is no corresponding supportive research and related avenues for advanced degrees. The existing Earth science faculty at UAA were and still are very dedicated and hard working. But, without the academic structure to issue advanced degrees with corresponding advanced research, their efforts are sadly limited by the system itself!

Alaska is a big place and there is a lot we do not know about its resources and environments. I have attached one of my recent Earth science papers as an example. In this 2016 paper, the plate tectonics of Alaska is completely redefined as well as the mechanics of the 27 March 1964 Alaska earthquake. How could such a "cart wheel" occur with our knowledge of Alaska in modern times? Well, doors need to be kept open for allowing "unrestricted open research" of our Earth with our University of Alaska systems!! Alaskans have the right to know the truth about our wonderful State. Please help bring about this badly needed Master's program in your University. It would only be an injustice to the people of Alaska not to allow such a growth in the applied Earth sciences at UAA. Such growth would also only be a compliment to the rest of the important Earth sciences in the University of Alaska Statewide System.

As a 4th generation Alaskan with my heart still in Alaska geology, if there is anything I can/may do to help you with this important Earth cause, please contact me!

Dr. John W. Reeder,

Dear Professor Gingerich:

I am an adjunct instructor in Geology at the UAA Chugiak-Eagle River campus. I wish to express my support for the establishment of a Master's Degree program in Geology at UAA. The need for people with advanced education in earth sciences has never been greater, considering both our state's resources and needs, and the advancements in scientific understanding of environmental issues central to the requirements facing us in the future. I have been teaching at UAA for eight years, and have seen my class enrollment grow from a dozen or so students to sixty or more every semester for the past three years. Several of my students in introductory classes have gone on to major in Geology and enter professional employment, but all would benefit by having the opportunity to pursue an advanced degree on the Anchorage campus.

We have now an extraordinary source of research materials in the new Alaska State Geologic Materials Center in Anchorage, a facility far superior to the one that had been located in Eagle River. It alone offers a vast amount of material for thesis research, and has already been of great benefit for class laboratory work in a variety of subdisciplines. Given that Anchorage is by far the largest hub of population in the state, having the availability of advanced study in Geology would attract students for whom travel to a more distant campus could be a serious burden, and having such a program at UAA would be of great benefit to the community and Alaska as a whole.

**Dr. Robert L. Ravn
Adjunct Instructor
University of Alaska Anchorage
Chugiak-Eagle River Campus**

January 22, 2017

Dr. Sam Gingerich, Provost
University of Alaska Anchorage
3211 Providence Drive
Anchorage, AK 99508

Dear Provost Gingerich:

As a senior geological sciences undergraduate, I am writing to support the proposed MS Applied Geological Sciences program at UAA. The Geological Sciences are enmeshed in the economic health of Alaska and, as the economic hub of our state, there are many job opportunities available for geoscientists in Anchorage. It is critical that we have a well-trained workforce to support these positions. Unfortunately, there are numerous jobs that graduates from the department are not able to fill because they require a Master's degree. Additionally, many UAA geology graduates who do procure jobs eventually reach a career plateau that could be overcome with further education. As of now, that further education would require moving to Fairbanks or to the lower 48. These geographical relocations are frequently proposed when we discuss the lack of geologic higher education at UAA, but this disregards the diverse demographic of student who comprise UAA – many of whom have families or are otherwise financially or geographically tied to Anchorage. Further, even if a student moved to Fairbanks as the nearest option, UAF does not offer environmental or petroleum-based Master's degrees which comprise the bulk of geoscience jobs in Anchorage. There must be another option.

In addition to the benefits that a Master's Program would provide for the workforce, there would be advances for undergraduate students and for the university system. First, Master's students typically require field assistants for their research – a role that is often filled by undergraduates. This would expose undergrads to the research process and allow them to gain tangible training in the field. Speaking from personal experience, assisting with research projects also inspires students to conduct research of their own. By introducing a Master's program, it is likely that more undergraduates would conduct research and that the experience of undergraduates would be enhanced overall. Next, the health of the university could be increased as the program is likely to attract numerous master's applicants from the lower 48. Geologically-speaking, Alaska is sexy. There is an entire untapped pool of applicants who would move here in a heartbeat. Speaking again from personal experience, it is this attractiveness which drew me to Anchorage and to UAA. I never considered going to Fairbanks because of the oppressive winter darkness, the extremity of interior Alaska temperature fluctuations, and the further isolation. I believe many students transitioning from the lower 48 would feel similarly.

Overall, instituting a Master's program for the geological sciences would benefit the Alaskan economy, the current geological sciences undergraduates, and the University of Alaska system. It would close workforce gaps, fill Alaskan jobs with homegrown applicants, encourage further research, and attract talented students (and their associated tuition) to UAA.

Sincerely,

Anna Stanczyk

January 20, 2017

Dr. Sam Gingerich, Provost
University of Alaska Anchorage
3211 Providence Drive
Anchorage, AK 99508

Dear Provost Gingerich:

I am writing to support the proposed MS Applied Geological Sciences (MSAGS) program at UAA. The Geological Sciences are a fundamental part of engineering and resource-based jobs in the State of Alaska and it is critical that we have a well-trained workforce to support these jobs. The MSAGS program at UAA will provide Alaskans the training necessary for successful careers in three key areas of applied geological sciences: 1) environmental geoscience, 2) petroleum geoscience, and 3) mineral resource geoscience.

The thesis option in the MS program in Applied Geological Sciences will provide opportunities for those seeking experience in research, whereas the non-thesis option will offer academic training beyond the Bachelor of Science level in order to provide geoscientists with higher-level professional career opportunities in the geosciences in Alaska.

I hold BS Geology from Washington State University; I am a former student of UAA and attended in 2001 before a Bachelor's in Geology program was established. In the past few years that I have been coordinating with the UAA Geological Sciences Department faculty, staff, and students, I am impressed with the level of education and experience these students are receiving. I am now live and am employed here in Anchorage as a full-time geologist for a local engineering consulting firm and have been interested in pursuing graduate studies. However, I am a wife, a mother, and a loyal employee such that a move out of Anchorage is not part of my family's plan. Having an MS program at UAA would allow local professionals like me to pursue a graduate degree without having to upset their family life.

An MS program will also encourage students to remain in Anchorage and Alaska and allow them to join our local workforce and professional community while still pursuing higher education; by having to transfer to Fairbanks (often not a desired location for many) or out of state to another program, Alaska is losing its most qualified workforce.

I sincerely appreciate your consideration, and encourage a serious evaluation to establish such a program at UAA. Thank you.

Sincerely,



Keri Nutter, CPG

January 31, 2017

Dr. Sam Gingerich, Provost
University of Alaska Anchorage
3211 Providence Drive
Anchorage, AK 99508

Dear Provost Gingerich,

As a graduate from UAA's Geological Science undergraduate program and prospective graduate student, I am writing in support of the proposed MS Applied Geological Science program at UAA. The Geological Sciences are a fundamental part of resource-based jobs in the State of Alaska and it is critical to have a well-trained workforce to support these jobs. Prospective Alaska-based graduate students such as myself will be provided with the training necessary for successful careers in three key areas of applied geological sciences: 1) environmental geoscience, 2) petroleum geoscience, and 3) mineral resource geoscience.

The thesis option in the MS program in Applied Geological Science will provide opportunities for those seeking experience in research, whereas the non-thesis option will offer academic training beyond the Bachelor of Science level in order to provide geoscientists with higher-level professional career opportunities in the geosciences in Alaska. As someone who obtained her BS in Geological Science somewhat recently (December 2015) and immediately started searching for employment, I've discovered that the Alaskan job market is challenging to navigate with an undergraduate degree. Many entry-level geoscience positions prefer applicants with MS degrees, emphasizing the need to further one's education in order to become a more competitive candidate.

I am personally interested in pursuing the thesis-based option for the MS program, with the goal of pursuing a research-oriented career with agencies such as Alaska Division of Geological and Geophysical Surveys, US Geological Survey, Geophysical Institute, or in academia. I believe that Alaska is the perfect natural geologic laboratory and that there is an incredible amount of research opportunities waiting to be pursued. With its convenient geographic location, proximity to the hub of industry, and Geology Department comprised of brilliant and engaging professors, I believe UAA is the ideal place for an MS in Applied Geological Science program.

Thank you for your consideration.

Sincerely,

Natalie Tyler