SUBMITTED BY:

Department: Geosciences
Prepared by: Paul McCarthy
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College/School: CNSM
Phone: 474-6894
Faculty Contact: Paul McCarthy

See http://www.uaf.edu/uaforg/faculty-senate/curriculum/course-degree-procedures- for a complete description of the rules governing curriculum & course changes.

PROGRAM IDENTIFICATION:

<table>
<thead>
<tr>
<th>DEGREE PROGRAM</th>
<th>Geoscience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree Level: (i.e., Certificate, A.A., A.A.S., B.A., B.S., M.A., M.S., Ph.D.)</td>
<td>M.S., Ph.D.</td>
</tr>
</tbody>
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A. CHANGE IN DEGREE REQUIREMENTS: (Brief statement of program/degree changes and objectives)

These changes are being made in response to the merger of the former departments of Geology and Geophysics, and Geography. The new department became the Dept. of Geosciences. Geography faculty within the department currently have several graduate students. Previously, geography faculty admitted students into the Interdisciplinary degree program. However, given the close relationship between some aspects of geology and physical geography, the faculty determined that it was preferred to modify the graduate program in Geology by changing its name to Geoscience and maintaining concentrations in Geology and Geography at the MS and PhD levels.

B. CURRENT REQUIREMENTS AS IT APPEARS IN THE CATALOG:

GEOLGY
College of Natural Science and Mathematics
Department of Geology and Geophysics
907-474-7565
www.uaf.edu/geology/

MS, PhD Degrees
Minimum Requirements for Degrees: MS: 30 credits; PhD: 18 thesis credits

Graduates in geology have broad backgrounds in the earth sciences and firm foundations in mathematics, physics and chemistry. There are many concentrations available in the geological sciences, and the suggested curricula are intended to be flexible enough to allow students to pursue their own emphasis. The MS program is tailored to the special research and study interest of the student.

There are about 40 professional geoscientists in residence on campus and graduate students normally participate in the ongoing research of these professionals. Teaching and research assistantships are available to graduate students in many of these areas.

MS Degree
Concentrations: Economic Geology, General Geology, Petroleum Geology, Quaternary
1. Complete the following admission requirements:
   1. Submit GRE scores.
   2. Complete a background at least to the level of a BS concentration in geology, geophysics or earth science.
2. Complete the general university requirements.
3. Complete the master's degree requirements.
   1. Complete 6-12 thesis credits.
   2. Complete any deficiencies concurrently with this degree.
4. Submit a written thesis proposal; and pass a written or oral comprehensive examination.
6. Complete one of the following concentrations:
   1. Economic Geology
      Complete GEOS F675, GEOS F618 or equivalent; GEOS F418 or equivalent; 9 credits in applied geoscience; and at least one course in mineral economics or engineering management, as approved by the graduate advisory committee.
   2. General Geology
      Complete 12 credits at the F600 level as approved by the graduate advisory committee.
   3. Petroleum Geology
      Complete 12 credits of course work at the F600 level from courses in the following disciplines: structural geology, stratigraphy, sedimentology, geophysics and/or petroleum engineering, as approved by the graduate advisory committee.
   4. Quaternary Geology
      Complete 9 credits in Quaternary geology and at least one course in another area of Quaternary studies, as approved by the graduate advisory committee.
   5. Remote Sensing
      Complete GEOS F654 or GEOS F657 and 10 credits in remote sensing-related courses, as approved by the graduate advisory committee.
   6. Volcanology
      Complete 12 credits at the F600 level in volcanology-related courses, as approved by the graduate advisory committee.
   - Minimum credits required--30 credits

PhD Degree

1. Complete the following admission requirement:
   1. Submit GRE scores.
2. Complete the general university requirements.
3. Complete the course work requirements for the appropriate MS concentration.
4. Complete the PhD degree requirements.
5. As part of the PhD degree requirements, complete the following:
   1. Complete and pass a written and oral comprehensive examination.
   2. Complete and submit a written thesis proposal for approval.
   3. Complete a research program as arranged with the graduate advisory committee.
6. Minimum credits required—18 credits

Note: In addition to courses listed under the geology and geophysics program, students should check the course listings under the College of Engineering and Mines and the marine science program.

Note: In addition to the facilities available directly through the instructional program, UAF has active research laboratories in the fields of seismology, volcanology, paleomagnetism, isotope geochronology, glaciology and ice physics in the Geophysical Institute (see Geophysical Institute under Research). These laboratories can frequently provide topics for MS and PhD theses. Other laboratories are also available in other divisions on campus, as listed under Research Institutes and Centers, page 16.

C. PROPOSED REQUIREMENTS AS IT WILL APPEAR IN THE CATALOG WITH THESE CHANGES:
(Underline new wording strike-through-old-wording and use complete catalog format )

<table>
<thead>
<tr>
<th>Geology/Geoscience</th>
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<tbody>
<tr>
<td>College of Natural Science and Mathematics</td>
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<tr>
<td>Department of Geology and Geophysics Geosciences</td>
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<tr>
<td>907-474-7565</td>
</tr>
<tr>
<td><a href="http://www.uaf.edu/geology/">www.uaf.edu/geology/</a></td>
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</table>

**MS, PhD Degrees**

Minimum Requirements for Degrees: MS: 30 credits; PhD: 18 thesis credits

Graduates in geology Geoscience have broad backgrounds in the earth Earth sciences or Geography, and firm foundations in mathematics, physics and chemistry. There are many eConcentrations are available in the both geological sciences and geography, , and requirements are flexible to allow students to customize the curriculum, and the suggested curricula are intended to be flexible enough to allow students to pursue their own emphasis. The MS program is tailored to the special research and study interest of the student.

There are about 40 professional geoscientists in residence on campus and graduate students normally participate in the ongoing research of these professionals. Teaching and research assistantships are available to graduate students in many of these areas.

**Concentration: Geology**

**MS Degree**

Concentrations: Economic Geology, General Geology, Petroleum Geology, Quaternary Geology, Remote Sensing and Volcanology

Graduates in geology have broad backgrounds in Earth Science and firm foundations in mathematics, physics and chemistry. Flexible curriculum requirements allow students to pursue their own emphasis within a wide variety of course options. The M.S. program is tailored to the special research and study interests of the student.

1. Complete the following admission requirements:
   a. Submit GRE scores.
b. Complete a background at least to the level of a BS concentration in geology, geophysics or earth science.

2. Complete the general university requirements (page 200).
3. Complete the master's degree requirements (page 204).
   a. Complete 6-12 thesis credits.
   b. Complete any deficiencies concurrently with this degree.
4. Complete 12 credits at the F600-level as approved by the graduate advisory committee.
5. Submit a written thesis proposal; and pass a written or oral comprehensive examination.
7. Minimum credits required — 30 credits
8. Complete one of the following concentrations:
   a. Economic Geology
      Complete GEOS F675, GEOS F618 or equivalent; GEOS F418 or equivalent; 9 credits in applied geoscience; and at least one course in mineral economies or engineering management, as approved by the graduate advisory committee.
   b. General Geology
      Complete 12 credits at the F600 level as approved by the graduate advisory committee.
   c. Petroleum Geology
      Complete 12 credits of course work at the F600 level from courses in the following disciplines: structural geology, stratigraphy, sedimentology, geophysics and/or petroleum engineering, as approved by the graduate advisory committee.
   d. Quaternary Geology
      Complete 9 credits in Quaternary geology and at least one course in another area of Quaternary studies, as approved by the graduate advisory committee.
   e. Remote Sensing
      Complete GEOS F654 or GEOS F657 and 10 credits in remote sensing-related courses, as approved by the graduate advisory committee.
   f. Volcanology
      Complete 12 credits at the F600 level in volcanology-related courses, as approved by the graduate advisory committee.

Minimum credits required—30 credits

PhD Degree

1. Complete the following admission requirement:
   a. Submit GRE scores.
2. Complete the general university requirements (page 200).
3. Complete the course work requirements for the MS concentration in Geology.
4. Complete the PhD degree requirements (page 205).
5. As part of the PhD degree requirements, complete the following:
   1. Complete and pass a written and oral comprehensive examination.
   2. Complete and submit a written thesis proposal for approval.
   3. Complete a research program as arranged with the graduate advisory committee.
6. Minimum credits required—18 credits
Note: In addition to courses listed under the geology and geophysics program, students should check the course listings under the College of Engineering and Mines and the marine science program.

Note: In addition to the facilities available directly through the instructional program, UAF has active research laboratories in the fields of seismology, volcanology, paleomagnetism, isotope geochronology, glaciology and ice physics in the Geophysical Institute (see Geophysical Institute under Research). These laboratories can frequently provide topics for MS and PhD theses. Other laboratories are also available in other divisions on campus, as listed under Research Institutes and Centers.

Concentration: Geography

M.S. Degree

Geography takes a synthesizing and inherently interdisciplinary approach to develop an integrated understanding of climate change, resource development, energy use and conservation, geopolitics, sustainable development, assessment of natural and human-caused environmental hazards, land-use change, regional conflicts, and economic and political developments all over the world. Geography also provides the framework for the integration of existing and emerging technologies such as GIS, remote sensing and geo-visualization into a broad range of academic and professional fields. Graduates in geography have broad backgrounds in the geographic and earth sciences and firm foundations in human or physical geography, geospatial sciences, and/or geology. There are many avenues of research that can be pursued through a graduate degree in geography. This graduate program is tailored to the special research and study interest of the student and their advisor.

1. Complete the following admission requirements:
   a. Submit GRE scores.
   b. Complete a background at least to the level of a BA concentration in geography, geology, environmental science or Earth science.
2. Complete the general university requirements (page 200).
3. Complete the master's degree requirements (page 204).
   a. Complete 6-12 thesis credits.
   b. Complete any deficiencies concurrently with this degree.
4. Complete 12 credits at the F600-level in geography-related courses as approved by the graduate advisory committee.
5. Submit a written thesis proposal; and pass a written or oral comprehensive examination.
7. Minimum credits required – 30 credits

PhD Degree

1. Complete the following admission requirement:
   a. Submit GRE scores.
2. Complete the general university requirements (page 200).
3. Complete the course work requirements for the MS concentration in Geography.
4. Complete the PhD degree requirements (page 205).
5. As part of the PhD degree requirements, complete the following:
   1. Complete and pass a written and oral comprehensive examination.
2. Complete and submit a written thesis proposal for approval.
3. Complete a research program as arranged with the graduate advisory committee.
6. Minimum credits required--18 credits

Note: In addition to the facilities available directly through the instructional program, UAF has active research laboratories in the fields of coastal geoscience, volcanology, GIS, and remote sensing in the Geophysical Institute (see Geophysical Institute under Research). These laboratories can frequently provide topics for MS and PhD theses. Other laboratories are also available in other divisions on campus.

D. ESTIMATED IMPACT

WHAT IMPACT, IF ANY, WILL THIS HAVE ON BUDGET, FACILITIES/SPACE, FACULTY, ETC.

This action is being taken in response to a merger between the departments of Geology and Geophysics, and Geography. We have already made accommodations to facilities/space to incorporate Geography faculty into the Reichardt Building. No new faculty are required for this program change as existing faculty will continue to teach existing courses. The main impact is that Geography graduate students will now be able to complete MS and PhD degrees in Geoscience with a concentration in Geography. Previously, they had no option but to complete Interdisciplinary MS and PhD degrees.

E. IMPACTS ON PROGRAMS/DEPTS:

What programs/departments will be affected by this proposed action? Include information on the Programs/Departments contacted (e.g., email, memo)

The Dept. of Geosciences is the only department affected by this action. Graduate programs in Geology and Geography will be affected by the change with both disciplines becoming concentrations under the Geoscience MS and PhD degrees.

F. IF MAJOR CHANGE - ASSESSMENT OF THE PROGRAM:

Description of the student learning outcomes assessment process.

The outcomes assessment plans for the MS and PhD programs in Geology will continue to be used for the MS and PhD programs in Geoscience. The Geology and Geography concentrations will be assessed using the same data and metrics. The SLOA plans are listed below.

UNIVERSITY OF ALASKA FAIRBANKS
Student Learning Outcomes Assessment Plan
Geoscience Graduate M.S. Program
College of Natural Science and Mathematics

MISSION STATEMENT: The Department of Geosciences educates all levels of students in geological, geophysical and geographical principles through research, classroom and field-based instruction. The scholarly and research activities of the department enhance its educational programs to stimulate inquiry and develop learning skills for the next generation of geoscientists.

GOALS: To prepare graduates for careers in the geosciences by developing the technical expertise and critical thinking skills necessary to define, solve, and communicate scientific
<table>
<thead>
<tr>
<th>Intended Objectives/Outcomes</th>
<th>Assessment Criteria and Procedures</th>
<th>Implementation (what, when, who)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduates attain a level of technical ability and knowledge to function as professionals in their discipline.</td>
<td>Students will demonstrate their abilities and progress through presentations, manuscripts, and annual committee meetings.</td>
<td>A. Annual progress reports will be reviewed by faculty to assure program goals are being met.</td>
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<td></td>
<td></td>
<td>B. List of peer reviewed publications and conference presentations will be compiled and reviewed annually.</td>
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<td>Masters graduates have performed research using technical and problem solving skills to contribute to their field.</td>
<td>Graduates will contribute to the peer-reviewed literature and present work at conferences.</td>
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<tr>
<td></td>
<td></td>
<td>A. Written comprehensive exam results and written thesis proposal will be reviewed by faculty (Capstone Project or Thesis Rubric).</td>
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<td></td>
<td>B. Oral comprehensive examinations’ quality will be assessed by audience (if public talk) and faculty committee. (Capstone Project or Thesis Rubric).</td>
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<tr>
<td></td>
<td></td>
<td>C. Thesis defense quality will be assessed by audience and faculty committee (Capstone Project or Thesis Rubric)</td>
</tr>
<tr>
<td>Communication/ presentation skills are consistent with professional standards.</td>
<td>Graduate students will have experience in giving oral presentations at conferences. They will gain experience preparing peer-reviewed manuscripts and development of research proposals.</td>
<td>A. Survey of graduate students and student committees (including oral defenses and exams) will include questions to assess their progress towards the stated objective (Capstone Project or Thesis Rubric).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B. List of peer reviewed publications and conference presentations will be compiled and reviewed annually.</td>
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<tr>
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<td></td>
<td>C. We will assess the presentation/writing skills improvement for students who take the optional GEOS 675.</td>
</tr>
<tr>
<td>Graduates obtain employment or continue education in the field following graduation.</td>
<td>Students will be employed or continue education in a related field within one year</td>
<td>A. Graduates will be surveyed (Graduate Student Exit Survey and Feedback Seminar)</td>
</tr>
</tbody>
</table>


UNIVERSITY OF ALASKA FAIRBANKS  
Student Learning Outcomes Assessment Plan  
Geoscience Graduate Ph.D. Program  
College of Natural Science and Mathematics

MISSION STATEMENT: The Department of Geosciences educates all levels of students in geological, geophysical and geographical principles through research, classroom and field-based instruction. The scholarly and research activities of the department enhance its educational programs to stimulate inquiry and develop learning skills for the next generation of geoscientists.

GOALS: To prepare graduates for careers in the geosciences by developing the technical expertise and critical thinking skills necessary to define, solve, and communicate scientific problems.

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<tr>
<td>Graduates attain a level of technical ability and knowledge to function as professionals in their discipline.</td>
<td>Students will demonstrate their abilities and progress through presentations, manuscripts, and annual committee meetings.</td>
<td>C. Annual progress reports will be reviewed by faculty to assure program goals are being met.</td>
</tr>
<tr>
<td>Doctoral graduates demonstrate that they can independently identify a problem and devise appropriate methods for its solutions.</td>
<td>Graduates should demonstrate ability to develop new research ideas.</td>
<td>G. Written comprehensive exam results and written thesis proposal will be reviewed by faculty (same faculty as before).</td>
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<td></td>
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<td>D. Written comprehensive exam results and written thesis proposal will be reviewed by faculty (Capstone Project or Thesis Rubric).</td>
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<td>E. Oral comprehensive examinations’ quality will be assessed by audience (if public talk) and faculty committee (Capstone Project or Thesis Rubric).</td>
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<td>F. List of peer reviewed publications and conference presentations will be compiled and reviewed annually.</td>
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<td>Graduates will make significant contributions to the peer-reviewed literature.</td>
<td>form as above) H. Oral comprehensive examinations’ quality will be assessed by audience (if public talk) and faculty committee (Capstone Project or Thesis Rubric). I. Thesis defense quality will be assessed by audience and faculty committee (Capstone Project or Thesis Rubric).</td>
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| Communication/presentation skills are consistent with professional standards. | Graduate students will have experience in giving oral presentations at conferences. Preparation of peer-reviewed manuscripts and development of research proposals. | D. Survey of graduate students and student committees (including oral defenses and exams) will include questions to assess their progress towards the stated objective (Capstone Project or Thesis Rubric). E. List of peer reviewed publications and conference presentations will be compiled and reviewed annually. F. We will assess the presentation/writing skills improvement for students who take the optional GEOS 675 |

| Graduates obtain employment. | Students will be employed, continue education in a related field or receive requested mentoring towards employment or continued education. | C. Graduates will be surveyed when they graduate (Graduate Student Exit Survey and Feedback Seminar). D. Faculty will be surveyed annually regarding recent graduates. |
JUSTIFICATION FOR ACTION REQUESTED

The purpose of the department and campus-wide curriculum committees is to scrutinize program/degree change applications to make sure that the quality of UAF education is not lowered as a result of the proposed change. Please address this in your response. This section needs to be self-explanatory. If you drop a course, is it because the material is covered elsewhere? Use as much space as needed to fully justify the proposed change and explain what has been done to ensure that the quality of the program is not compromised as a result.

This program change is requested as part of the merger of the former departments of Geology and Geophysics, and Geography. In an effort to better integrate the department, we have decided to modify the Geology MS and PhD program and change its' name to Geoscience, with concentrations in Geology and Geography. This allows Geography graduate students to be admitted into the Geoscience disciplinary degree program rather than having the Interdisciplinary degree program as their only option.

APPROVALS: SIGNATURES MUST BE OBTAINED PRIOR TO SUBMISSION TO THE GOVERNANCE OFFICE

Signature, Chair, Program/Department of: GEOSCIENCES Date 9/18/15

Signature, Chair, College/School Curriculum Council for: CNSM Date 10-2-15

Signature, Dean, College/School of: CNSM Date 10/2/15

CHAIR SIGNATURE OBTAINED FOLLOWING APPROVAL BY FACULTY SENATE COMMITTEE

Signature, Chair, UAF Faculty Senate Curriculum Review Committee Graduate Academic and Advisory Committee