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PROGRAM/DEGREE REQUIREMENT CHANGE (MAJOR/MINOR)

SUBMITTED BY:
Department: Geology and Geophysics
Prepared by: Sarah Fowell
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College/School: Natural Science and Mathematics
Phone: 907-474-7810
Faculty Contact: Sarah Fowell

See http://www.uaf.edu/ufg/faculty/cd for a complete description of the rules governing curriculum & course changes.

PROGRAM IDENTIFICATION:

DEGREE PROGRAM: Geoscience
Degree Level: (i.e., Certificate, A.A., A.A.S., B.A., B.S., M.A., M.S., Ph.D.) B.S.

A. CHANGE IN DEGREE REQUIREMENTS: (Brief statement of program/degree changes and objectives)

We have recently become aware of an unintended requirement that resulted from revision of our BS program to include four concentrations. Because the concentrations have different requirements for courses offered by other departments, some of these got rolled into the “major requirements”. As a result, students must earn a C or better in these courses. This was not our intention. The requirements for the concentrations are reorganized below in order to:

1. correct and clarify minimum grade requirements
2. make it clear that O and W courses may be taken in any department, as both students and staff were confused by the current wording
3. correct some mistakes that appeared in the catalog (the paleontology concentration does not require Geos 304, and the lettering left out “b” for this concentration)
4. clarify which physics sequence students will have the prerequisites for by deleting alternatives

B. CURRENT REQUIREMENTS AS IT APPEARS IN THE CATALOG:

Geoscience
College of Natural Science and Mathematics
Department of Geology and Geophysics
907-474-7565
www.uaf.edu/geology/
B.S. Degrees; Minor
Downloadable PDF

Minimum Requirements for Degree: 120 credits

Graduates in geoscience have broad backgrounds in the earth sciences and firm foundations in mathematics, physics and chemistry. Four options are available to allow students to pursue their own emphasis: geology, paleontology, geospatial science and geophysics. The options allow students to focus earlier in their studies but are flexible enough to allow students to pursue their own interests in the junior and senior years. All of the options are designed to prepare students for industry jobs in oil, mining and environmental consulting; jobs with agencies such as U.S. Geological Survey, NASA, Alaska Division of Geological and Geophysical Surveys; or graduate studies.

The geology option offers students a sound background in a spectrum geological disciplines with an emphasis on current field mapping techniques essential to exploration and research. The paleontology option is designed to provide students with the skills necessary to locate, excavate, interpret and curate specimens for museums, agencies or universities. The geospatial sciences option focuses on the principles, techniques and applications of remote sensing, GIS and GPS to prepare students for careers that require geospatial data analysis and visualization. The geophysics option challenges students to use physics in understanding geoscience concepts,
emphasizing applications in seismology, volcanology and glaciology in the context of the Alaskan landscape. This option is designed to prepare students for graduate work in geophysics and environmental engineering fields or other disciplines that use geophysical tools such as ground penetrating radar or exploration seismology.
Major -- B.S. Degree

1. Complete the general university requirements. (As part of the core curriculum requirements, complete MATH F200X, and CHEM F105X.)

2. Complete the following:* 
   GEOS F101X--The Dynamic Earth--4 credits 
   GEOS F112X--The History of Earth and Life--4 credits 
   GEOS F309--Plate Tectonics--3 credits

3. Complete one of the following options:*
   Option I -- Geology
   a. Complete the following:* 
      Chem 106X—General Chemistry II—4 credits 
      GEOS F213--Mineralogy--4 credits 
      GEOS F214--Petrology and Petrography--4 credits 
      GEOS F225--Field and Computer Methods in Geology--2 credits 
      GEOS F304--Geomorphology--3 credits 
      GEOS F314--Structural Geology--4 credits 
      GEOS F315W--Paleobiology and Paleontology--4 credits 
      GEOS F322--Stratigraphy and Sedimentation--4 credits 
      GEOS F351W--Field Geology**--8 credits 
      PHYS F103X and PHYS F104X--College Physics (8) 
      or PHYS F211 and PHYS F212--General Physics (8)--8 credits 
      STAT F200X--Elementary Probability and Statistics (3) 
      or STAT F300X--Statistics (3)--3 credits
   b. Complete 12 additional credits of upper-division GEOS courses or other upper-division courses approved by the undergraduate advisor, to include one O (oral intensive) course.*

Option II -- Paleontology
   a. Complete the following:* 
      Chem 106X—General Chemistry II—4 credits 
      GEOS F213--Mineralogy--4 credits 
      GEOS F214--Petrology and Petrography--4 credits 
      GEOS F225--Field and Computer Methods in Geology--2 credits 
      GEOS F304--Geomorphology--3 credits 
      GEOS F314--Structural Geology--4 credits 
      GEOS F322--Stratigraphy and Sedimentation--4 credits 
      GEOS F351W--Field Geology**--8 credits 
      GEOS F430--Statistics and Data Analysis in Geology--3 credits 
      PHYS F103X--College Physics (4) 
      or PHYS F211--General Physics (4)--4 credits 
      STAT F200X--Elementary Probability and Statistics (3) 
      or STAT F300X--Statistics (3)--3 credits
   c. Complete the following:* 
      GEOS F315W--Paleobiology and Paleontology--4 credits 
      GEOS F317O--Paleontological Research and Laboratory Methods--2 credits
   d. Complete at least two of the following electives:* 
      GEOS F453--Palynology and Paleopalynology--4 credits 
      GEOG F485--Mass Extinctions, Neocatastrophism and the History of Life--3 credits 
      GEOS F486--Vertebrate Paleontology--3 credits 
      GEOS F488--Undergraduate Research--2 credits
   e. Complete the requirements for a minor in biological sciences--20 credits

Option III -- Geospatial Sciences
   a. Complete the following:* 
      Chem 106X—General Chemistry II—4 credits
GEOS F213--Mineralogy--4 credits
GEOS F214--Petrology and Petrography--4 credits
GEOS F304--Geomorphology--3 credits
GEOS F314--Structural Geology--4 credits
GEOS F322--Stratigraphy and Sedimentation--4 credits
GEOS F351W--Field Geology**--8 credits
PHYS F103X and PHYS F104X--College Physics (8)
  or PHYS F211 and PHYS F212--General Physics (8)--8 credits
STAT F200X--Elementary Probability and Statistics (3)
  or STAT F300X--Statistics--3 credits

b. Complete the following:
   GEOS/GEOG F222--Fundamentals of Geospatial Sciences--3 credits
   GEOS F225--Field and Computer Methods in Geology--3 credits
   GEOS F430--Statistics and Data Analysis in Geology--3 credits

c. Complete at least two of the following remote sensing electives:
   GEOS F408--Photogeology--2 credits
   GEOS F422--Geoscience Applications of Remote Sensing--3 credits
   GEOS F488--Undergraduate Research--2 credits
   NRM F641--Remote Sensing of Natural Resources--4 credits

d. Complete at least two of the following GIS electives:
   GEOG F309--Cartography and Geovisualization--4 credits
   GEOG F435--GIS Analysis--3 credits
   GEOS F458--Geoscience Applications of GPS and GIS--3 credits
   NRM F338--Introduction to GIS--3 credits

e. Complete 9 additional credits of upper-division GEOS courses or other upper-division courses approved by the undergraduate advisor, to include one O (oral intensive) and one additional W (writing intensive) course.*

Option IV--Geophysics

a. Complete the following:
   MATH F201X and MATH F202X--Calculus II and III--8 credits
   MATH F302--Differential Equations--3 credits
   MATH F314--Linear Algebra--4 credits
   PHYS F211 and PHYS F212--General Physics--8 credits
   PHYS F213X--Elementary Modern Physics--4 credits
   PHYS F220--Introduction to Computational Physics--4 credits

b. Complete the following:
   GEOS F262--Rocks and Minerals--3 credits
   GEOS F318--Solid Earth Geophysics--3 credits
   GEOS F377O--Ice in the Climate System--3 credits
   GEOS F406--Volcanology--3 credits
   GEOS F431--Foundations of Geophysics--4 credits
   GEOS F475W,O--Presentation Techniques in the Geosciences--2 credits
   GEOS F488--Undergraduate Research--2 credits

c. Complete at least three of the following science and engineering electives:
   ES F331--Mechanics of Materials--3 credits
   ES F341--Fluid Mechanics--4 credits
   GEOS F314--Structural Geology--4 credits
   GEOS F322--Stratigraphy and Sedimentation--4 credits
   GEOS F422--Geoscience Applications of Remote Sensing--3 credits
   ME F441--Heat and Mass Transfer--3 credits
   PHYS F301--Introduction to Mathematical Physics--4 credits
   PHYS F313--Thermodynamics and Statistical Physics--4 credits
   PHYS F341--Classical Physics I: Particle Mechanics--4 credits

d. Complete 3 additional credits of upper-division GEOS courses or other upper-division courses as approved by the undergraduate advisor.*

e. Complete one W (writing intensive) course approved by the undergraduate advisor*--3 credits

4. Minimum credits required--120 credits

* Students must earn a C grade (2.0) or better in each of these courses.
** GEOS F351 is offered at UAF during the summer of odd-numbered years. Students may substitute a 6-
credit field geology class at another institution. The geology and geophysics undergraduate advisor will assist students in placement in an approved field geology class.

**Minor**

**Geology**
1. Complete the following:
   - GEOS F101X--The Dynamic Earth--4 credits
   - GEOS F112X--The History of Earth and Life--4 credits
2. Complete 12 additional credits of GEOS courses as approved by the undergraduate geoscience advisor.--12 credits
3. Minimum credits required--20 credits

**Paleontology**
1. Complete the following:
   - GEOS F101X--The Dynamic Earth--4 credits
   - GEOS F112X--The History of Earth and Life--4 credits
2. Complete three of the following:
   - GEOS F315W--Paleobiology and Paleontology--4 credits
   - GEOS F317O--Paleontological Research and Laboratory Methods--2 credits
   - GEOS F322--Stratigraphy and Sedimentation--4 credits
   - GEOS F453--Palynology and Paleopalynology--4 credits
   - GEOS F485--Mass Extinctions, Neocatastrophism and the History of Life--3 credits
   - GEOS F486--Vertebrate Paleontology--3 credits
3. Minimum credits required--16 - 20 credits

**Geospatial Sciences**
1. Complete the following:
   - GEOS F101X--The Dynamic Earth--4 credits
   - GEOS F112X--The History of Earth and Life--4 credits
   - GEOS/GEOG F222--Fundamentals of Geospatial Sciences--3 credits
   - GEOS F225--Field and Computer Methods in Geology--2 credits
   - GEOS F422--Geoscience Applications of Remote Sensing--3 credits
   - GEOS F458--Geoscience Applications of GPS and GIS--3 credits
2. Minimum credits required--19 credits

**Geophysics**
1. Complete the following:
   - GEOS F101X--The Dynamic Earth--4 credits
   - GEOS F112X--The History of Earth and Life--4 credits
   - GEOS F377O--Ice in the Climate System--3 credits
   - GEOS F406--Volcanology--3 credits
   - GEOS F318--Solid Earth Geophysics--3 credits
   - GEOS F431--Foundations of Geophysics--4 credits
2. Minimum credits required--21 credits

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**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)

**Geoscience**

College of Natural Science and Mathematics
Department of Geology and Geophysics
907-474-7565
www.uaf.edu/geology/
B.S. Degrees; Minor
Downloadable PDF
Minimum Requirements for Degree: 120 credits

Graduates in geoscience have broad backgrounds in the earth sciences and firm foundations in mathematics, physics and chemistry. Four options are available to allow students to pursue their own emphasis: geology, paleontology, geospatial science and geophysics. The options allow students to focus earlier in their studies but are flexible enough to allow students to pursue their own interests in the junior and senior years. All of the options are designed to prepare students for industry jobs in oil, mining and environmental consulting; jobs with agencies such as U.S. Geological Survey, NASA, Alaska Division of Geological and Geophysical Surveys; or graduate studies.

The geology option offers students a sound background in a spectrum geological disciplines with an emphasis on current field mapping techniques essential to exploration and research. The paleontology option is designed to provide students with the skills necessary to locate, excavate, interpret and curate specimens for museums, agencies or universities. The geospatial sciences option focuses on the principles, techniques and applications of remote sensing, GIS and GPS to prepare students for careers that require geospatial data analysis and visualization. The geophysics option challenges students to use physics in understanding geoscience concepts, emphasizing applications in seismology, volcanology and glaciology in the context of the Alaskan landscape. This option is designed to prepare students for graduate work in geophysics and environmental engineering fields or other disciplines that use geophysical tools such as ground penetrating radar or exploration seismology.

Major -- B.S. Degree

1. Complete the general university requirements. (As part of the core curriculum requirements, complete MATH F200X and CHEM F105X.)

2. Complete the following:
   - GEOS F101X -- The Dynamic Earth -- 4 credits
   - GEOS F112X -- The History of Earth and Life -- 4 credits
   - GEOS F309 -- Plate Tectonics -- 3 credits

3. Complete one of the following options: asterix deleted
   Option I -- Geology
      a. Complete the following: asterix deleted
         - Chem 106X -- General Chemistry II -- 4 credits
         - PHYS F103X and PHYS F104X -- College Physics (8) -- 8 credits
      b. Complete the following major requirements: asterix deleted
         - GEOS F213 -- Mineralogy -- 4 credits
         - GEOS F214 -- Petrology and Petrography -- 4 credits
         - GEOS F225 -- Field and Computer Methods in Geology -- 2 credits
         - GEOS F304 -- Geomorphology -- 3 credits
         - GEOS F314 -- Structural Geology -- 4 credits
         - GEOS F315W -- Paleobiology and Paleontology -- 4 credits
         - GEOS F322 -- Stratigraphy and Sedimentation -- 4 credits
         - GEOS F351W -- Field Geology** -- 8 credits
         - GEOS F430 -- Statistics and Data Analysis in Geology -- 3 credits
         - PHYS F103X and PHYS F104X -- College Physics (8)
         - or PHYS F211 and PHYS F212 -- General Physics (8) -- 8 credits
         - STAT F200X -- Elementary Probability and Statistics (3)
         - or STAT F300X -- Statistics (3) -- 3 credits
      c. Complete 12 additional credits of upper-division GEOS courses or other upper-division courses approved by the undergraduate advisor*, to include one O (oral-intensive) course.*, including one O (oral intensive) course from any department.

   Option II -- Paleontology
      a. Complete the following: asterix deleted
         - Chem 106X -- General Chemistry II -- 4 credits
         - PHYS F103X and PHYS F104X -- College Physics (8) -- 8 credits
      b. Complete the following major requirements: asterix deleted
         - GEOS F213 -- Mineralogy -- 4 credits
         - GEOS F214 -- Petrology and Petrography -- 4 credits
         - GEOS F225 -- Field and Computer Methods in Geology -- 2 credits
         - GEOS F304 -- Geomorphology -- 3 credits
         - GEOS F314 -- Structural Geology -- 4 credits
GEOS F322--Stratigraphy and Sedimentation--4 credits
GEOS F351W--Field Geology**--8 credits
GEOS F430--Statistics and Data Analysis in Geology--3 credits
PHYS F103X--College Physics (4)
—or PHYS F211--General Physics (4) 4 credits
STAT F200X--Elementary Probability and Statistics (3)
or STAT F300X--Statistics--3 credits
b. Complete the following:*
   GEOS F315W--Paleobiology and Paleontology--4 credits
   GEOS F317O--Paleontological Research and Laboratory Methods--2 credits
c. Complete at least two of the following electives:*
   GEOS F453--Palynology and Palaeopalynology--4 credits
   GEOG F485--Mass Extinctions, Neocatastrophism and the History of Life--3 credits
   GEOS F486--Vertebrate Paleontology--3 credits
   GEOS F488--Undergraduate Research--2 credits
d. Complete the requirements for a minor in biological sciences--20 credits

Option III -- Geospatial Sciences
   a. Complete the following:* asterix deleted
      Chem 106X--General Chemistry II--4 credits
      PHYS F103X and PHYS F104X--College Physics (8) --8 credits
   b. Complete the following major requirements:*
      GEOS F213--Mineralogy--4 credits
      GEOS F214--Petrology and Petrography--4 credits
      GEOS F304--Geomorphology--3 credits
      GEOS F314--Structural Geology--4 credits
      GEOS F322--Stratigraphy and Sedimentation--4 credits
      GEOS F351W--Field Geology**--8 credits
      PHYS F103X and PHYS F104X--College Physics (8)
—or PHYS F211 and PHYS F212--General Physics (8) --8 credits
      STAT F200X--Elementary Probability and Statistics (3)
or STAT F300X--Statistics--3 credits
   b. Complete the following:* asterix deleted
      GEOS/GEOG F222--Fundamentals of Geospatial Sciences--3 credits
      GEOS F225--Field and Computer Methods in Geology--3 credits
      GEOS F430--Statistics and Data Analysis in Geology--3 credits
c. Complete at least two of the following remote sensing electives:*
   GEOS F408--Photogeology--2 credits
   GEOS F422--Geoscience Applications of Remote Sensing--3 credits
   GEOS F488--Undergraduate Research--2 credits
   NRM F641--Remote Sensing of Natural Resources--4 credits
d. Complete at least two of the following GIS electives:*
   GEOG F309--Cartography and Geovisualization--4 credits
   GEOG F435--GIS Analysis--3 credits
   GEOS F458--Geoscience Applications of GPS and GIS--3 credits
   NRM F338--Introduction to GIS--3 credits
e. Complete 9 additional credits of upper-division GEOS courses or other upper-division courses approved by the undergraduate advisor*, to include including one O (oral intensive) and one additional W (writing intensive) course asterix deleted from any department.

Option IV--Geophysics
   a. Complete the following major requirements:*
      MATH F201X and MATH F202X--Calculus II and III--8 credits
      MATH F302--Differential Equations--3 credits
      MATH F314--Linear Algebra--4 credits
      PHYS F211 and PHYS F212--General Physics--8 credits
      PHYS F213X--Elementary Modern Physics--4 credits
      PHYS F220--Introduction to Computational Physics--4 credits
   b. Complete the following:*
GEOS F262--Rocks and Minerals--3 credits
GEOS F318--Solid Earth Geophysics--3 credits
GEOS F370--Ice in the Climate System--3 credits
GEOS F406--Volcanology--3 credits
GEOS F431--Foundations of Geophysics--4 credits
GEOS F475W,O--Presentation Technique in the Geosciences--2 credits
GEOS F488--Undergraduate Research--2 credits

e. Complete at least three of the following science and engineering electives:*  
ES F331--Mechanics of Materials--3 credits
ES F341--Fluid Mechanics--4 credits
GEOS F314--Structural Geology--4 credits
GEOS F322--Stratigraphy and Sedimentation--4 credits
GEOS F422--Geoscience Applications of Remote Sensing--3 credits
ME F441--Heat and Mass Transfer--3 credits
PHYS F301--Introduction to Mathematical Physics--4 credits
PHYS F313--Thermodynamics and Statistical Physics--4 credits
PHYS F341--Classical Physics I: Particle Mechanics--4 credits

f. Complete 3 additional credits of upper-division GEOS courses or other upper-division courses as approved by the undergraduate advisor.*

d. Complete one W (writing intensive) course approved by the undergraduate advisor.--3 credits

4. Minimum credits required--120 credits
* Students must earn a C grade (2.0) or better in each of these courses.
** GEOS F351 is offered at UAF during the summer of odd-numbered years. Students may substitute a 6-credit field geology class at another institution. The geology and geophysics undergraduate advisor will assist students in placement in an approved field geology class.

Minor
Geology
1. Complete the following:
   GEOS F101X--The Dynamic Earth--4 credits
   GEOS F102X--The History of Earth and Life--4 credits
2. Complete 12 additional credits of GEOS courses as approved by the undergraduate geoscience advisor.--12 credits
3. Minimum credits required--20 credits

Paleontology
1. Complete the following:
   GEOS F101X--The Dynamic Earth--4 credits
   GEOS F102X--The History of Earth and Life--4 credits
2. Complete three of the following:
   GEOS F315W--Paleobiology and Paleontology--4 credits
   GEOS F3170--Paleontological Research and Laboratory Methods--2 credits
   GEOS F322--Stratigraphy and sedimentation--4 credits
   GEOS F453--Paleontology and Paleopaleontology--4 credits
   GEOS F485--Mass Extinctions, Neocatastrophism and the History of Life--3 credits
   GEOS F486--Vertebrate Paleontology--3 credits
3. Minimum credits required--16 - 20 credits

Geospatial Sciences
1. Complete the following:
   GEOS F101X--The Dynamic Earth--4 credits
   GEOS F102X--The History of Earth and Life--4 credits
   GEOS/GEOG F222--Fundamentals of Geospatial Sciences--3 credits
   GEOS F225--Field and Computer Methods in Geology--2 credits
   GEOS F422--Geoscience Applications of Remote Sensing--3 credits
   GEOS F458--Geoscience Applications of GPS and GIS--3 credits
2. Minimum credits required--19 credits

Geophysics
1. Complete the following:
   GEOS F101X--The Dynamic Earth--4 credits
   GEOS F102X--The History of Earth and Life--4 credits
   GEOS F370--Ice in the Climate System--3 credits
   GEOS F406--Volcanology--3 credits
   GEOS F318--Solid Earth Geophysics--3 credits
D. ESTIMATED IMPACT

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

These changes are corrections and clarifications of our existing requirements. Therefore little impact on budget, faculty workloads, or facilities/space is expected.

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)

These changes correct unintended minimum grade requirements for Chem and Phys courses, clarify O and W expectations, and clear up minor errors in the catalog entry. This will minimize student and registrar confusion and eliminate unnecessary petitions.

F. IF MAJOR CHANGE - ASSESSMENT OF THE PROGRAM:

Description of the student learning outcomes assessment process.

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.

Changes are clarification of intended requirements and correction of several errors in the current catalog entry. The intent is to make our requirements easier for students and the registrar’s staff to navigate.

APPROVALS:

Signature, Chair, Program/Department of: Geology & Geophysics

Signature, Chair, College/School Curriculum Council for: CNSM

Signature, Dean, College/School of: CNSM

ALL SIGNATURES MUST BE OBTAINED PRIOR TO SUBMISSION TO THE GOVERNANCE OFFICE

Signature, Chair, UAF Faculty Senate Curriculum Review Committee