

GEOSCIENCE

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

B.S. Degree

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. (See page 132. As part of the core curriculum requirements, complete MATH F200X, CHEM F105X and F106X.)
2. Complete the following:
 - GEOS F101X—The Dynamic Earth 4
 - GEOS F112X—The History of Earth and Life 4
 - GEOS F309—Plate Tectonics..... 3
3. Complete one of the following options:*

Option I — Geology

- a. Complete the following:*
- | | |
|--|---|
| GEOS F213—Mineralogy..... | 4 |
| GEOS F214—Petrology and Petrography | 4 |
| GEOS F225—Field and Computer Methods in Geology | 2 |
| GEOS F304—Geomorphology..... | 3 |
| GEOS F314—Structural Geology..... | 4 |
| GEOS F315W—Paleobiology and Paleontology | 4 |
| GEOS F322—Stratigraphy and Sedimentation | 4 |
| GEOS F351W—Field Geology**..... | 8 |
| GEOS F430—Statistics and Data Analysis in Geology | 3 |
| PHYS F103X and PHYS F104X—College Physics (8)
or PHYS F211 and PHYS F212—General Physics (8)..... | 8 |
| STAT F200X—Elementary Probability and Statistics (3)
or STAT F300X—Statistics (3) | 3 |

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

Option III — Geospatial Sciences

- a. Complete the following:*
- | | |
|--|---|
| GEOS F213—Mineralogy..... | 4 |
| GEOS F214—Petrology and Petrography | 4 |
| GEOS F304—Geomorphology..... | 3 |
| GEOS F314—Structural Geology..... | 4 |
| GEOS F322—Stratigraphy and Sedimentation | 4 |
| GEOS F351W—Field Geology**..... | 8 |
| PHYS F103X and PHYS F104X—College Physics (8)
or PHYS F211 and PHYS F212—General Physics (8)..... | 8 |
| STAT F200X—Elementary Probability and Statistics (3)
or STAT F300X—Statistics..... | 3 |
- b. Complete the following:*
- | | |
|--|---|
| GEOS/GEOG F222—Fundamentals of Geospatial Sciences | 3 |
| GEOS F225—Field and Computer Methods in Geology | 3 |
| GEOS F430—Statistics and Data Analysis in Geology | 3 |
- c. Complete at least two of the following remote sensing electives:*
- | | |
|---|---|
| GEOS F408—Photogeology | 2 |
| GEOS F422—Geoscience Applications of Remote Sensing | 3 |
| GEOS F488—Undergraduate Research..... | 2 |
| NRM F641—Remote Sensing of Natural Resources..... | 4 |
- d. Complete at least two of the following GIS electives:*
- | | |
|--|---|
| GEOG F309—Cartography and Geovisualization..... | 4 |
| GEOG F435—GIS Analysis..... | 3 |
| GEOS F458—Geoscience Applications of GPS and GIS | 3 |
| NRM F338—Introduction to GIS | 3 |
- 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
 - MATH F302—Differential Equations 3
 - MATH F314—Linear Algebra 4
 - PHYS F211 and PHYS F212—General Physics 8
 - PHYS F213X—Elementary Modern Physics 4
 - PHYS F220—Introduction to Computational Physics 4
 - b. Complete the following:^{*}
 - GEOS F262—Rocks and Minerals 3
 - GEOS F318—Solid Earth Geophysics 3
 - GEOS F377O—Ice in the Climate System 3
 - GEOS F406—Volcanology 3
 - GEOS F431—Foundations of Geophysics 4
 - GEOS F475W,O—Presentation Techniques in the Geosciences 2
 - GEOS F488—Undergraduate Research 2
 - c. Complete at least three of the following science and engineering electives:^{*}
 - ES F331—Mechanics of Materials 3
 - ES F341—Fluid Mechanics 4
 - GEOS F314—Structural Geology 4
 - GEOS F322—Stratigraphy and Sedimentation 4
 - GEOS F422—Geoscience Applications of Remote Sensing 3
 - ME F441—Heat and Mass Transfer 3
 - PHYS F301—Introduction to Mathematical Physics 4
 - PHYS F313—Thermodynamics and Statistical Physics 4
 - PHYS F341—Classical Physics I: Particle Mechanics 4
 - d. Complete one W (writing intensive) course approved by the undergraduate advisor* 3
4. Minimum credits required 120

^{*} 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
 - GEOS F112X—The History of Earth and Life 4
2. Complete 12 additional credits of GEOS courses as approved by the undergraduate geoscience advisor: 12
3. Minimum credits required 20

Paleontology

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

Geospatial Sciences

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

Geophysics

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

All degrees (e.g. B.A., B.S., etc.) require additional courses. Refer to specific degree and program requirements.

Baccalaureate Core Requirements

(Note: all courses for Core must be at C- or higher.)

COMMUNICATION (9)

Complete the following:

ENGL F111X(3) _____
ENGL F190H may be substituted.

Complete one of the following:

ENGL F211X OR ENGL F213X(3) _____

Complete one of the following:

COMM F131X OR COMM F141X(3) _____

PERSPECTIVES ON THE HUMAN CONDITION (18)

Complete all of the following four courses:

ANTH F100X/SOC F100X(3) _____
ECON F100X OR PS F100X(3) _____
HIST F100X(3) _____
ENGL/FL F200X(3) _____

Complete one of the following three courses:

ART/MUS/THR F200X, HUM F201X OR ANS F202X (3) _____

Complete one of the following six courses:

BA F323X, COMM F300X, JUST F300X, NRM F303X,
PS F300X OR PHIL F322X(3) _____

OR complete 12 credits from the above courses PLUS

- two semester-length courses in a single Alaska Native language or other non-English language **OR**
- three semester-length courses (9 credits) in American Sign Language taken at the university level.

MATHEMATICS (3)

Complete one of the following:

MATH F103X, MATH F107X, MATH F161X OR
STAT F200X(3 – 4) _____
* No credit may be earned for more than one of MATH F107X or F161X.

OR complete one of the following:*

MATH F200X, MATH F201X, MATH F202X,
MATH F262X OR MATH F272X(4) _____
*Or any math course having one of these as a prerequisite.

NATURAL SCIENCES (8)

Complete any two (4-credit) courses:

ATM F101X(4) _____
BIOL F100X(4) _____
BIOL F103X(4) _____
BIOL F104X(4) _____
BIOL F111X(4) _____
BIOL F112X(4) _____
BIOL F115X(4) _____
BIOL F116X(4) _____
CHEM F100X(4) _____
CHEM F103X(4) _____
CHEM F104X(4) _____
CHEM F105X(4) _____
CHEM F106X(4) _____
GEOG F111X(4) _____
GEOS F100X(4) _____
GEOS F101X(4) _____
GEOS F112X(4) _____
GEOS F120X(4) _____
GEOS F125X(4) _____
MSL F111X(4) _____
PHYS F102X(4) _____
PHYS F103X(4) _____
PHYS F104X(4) _____
PHYS F115X(4) _____
PHYS F116X(4) _____
PHYS F175X(4) _____
PHYS F211X(4) _____
PHYS F212X(4) _____
PHYS F213X(4) _____

LIBRARY AND INFORMATION RESEARCH (0 – 1)

Successful completion of library skills competency test **OR**
LS F100X or F101X prior to junior standing(0 – 1) _____

UPPER-DIVISION WRITING AND ORAL COMMUNICATION (0)

Complete the following:

Two writing intensive courses designated (W)(0) _____
and one oral communication intensive course
designated (O)(0) _____

OR two oral communication intensive courses designated
(O/2), at the upper-division level (see degree and/or major
requirements)(0) _____

CORE CREDITS REQUIRED 38 – 39

Minimum credits required for degree 120



UNIVERSITY OF ALASKA FAIRBANKS

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