

GEOSCIENCE

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

BS 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 concentrations are available to allow students to pursue their own emphasis: geology, paleontology, geospatial science and geophysics. The concentrations 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 concentrations 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 concentration 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 concentration is designed to provide students with the skills necessary to locate, excavate, interpret and curate specimens for museums, agencies or universities. The geospatial sciences concentration 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 concentration challenges students to use physics in understanding geoscience concepts, emphasizing applications in seismology, volcanology and glaciology in the context of the Alaskan landscape. This concentration 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 — BS Degree

1. Complete the general university requirements. (See page 131. As part of the core curriculum requirements, complete MATH F200X and CHEM F105X.)
2. Complete the following:*
3. Complete one of the following concentrations:*

Geology

- a. Complete the following:
CHEM F106X—General Chemistry II4
PHYS F103X—College Physics I4
PHYS F104X—College Physics II4
 - b. Complete the following (major) requirements:*
- | | |
|---|---|
| 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 |
| STAT F200X—Elementary Probability and Statistics (3)
or STAT F300—Statistics (3) | 3 |
- c. Complete 12 additional credits of upper-division GEOS courses or other upper-division courses approved by the undergraduate advisor* including one O (oral intensive) course from any department.

Paleontology

- a. Complete the following:
CHEM F106X—General Chemistry II4
PHYS F103X—College Physics I4
 - b. Complete the following (major) requirements:*
- | | |
|---|---|
| GEOS F213—Mineralogy | 4 |
| GEOS F214—Petrology and Petrography | 4 |
| GEOS F225—Field and Computer Methods in Geology | 2 |
| 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 |
| STAT F200X—Elementary Probability and Statistics (3)
or STAT F300—Statistics (3) | 3 |
| GEOS F315W—Paleobiology and Paleontology | 4 |
| GEOS F317O—Paleontological Research and Laboratory
Methods | 2 |
- c. 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 |
- d. Complete the requirements for a minor in biological sciences.....20

Geospatial Sciences

- a. Complete the following:
CHEM F106X—General Chemistry II4
PHYS F103X—College Physics I4
PHYS F104X—College Physics II4
 - b. Complete the following (major) requirements:*
- | | |
|---|---|
| GEOS F213—Mineralogy | 4 |
| GEOS F214—Petrology and Petrography | 4 |
| GEOS/GEOG F222—Fundamentals of Geospatial Sciences | 3 |
| GEOS F225—Field and Computer Methods in Geology | 3 |
| 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 |
| STAT F200X—Elementary Probability and Statistics (3)
or STAT F300—Statistics | 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* including one O (oral intensive) course and one additional W (writing intensive) course from any department.

Geophysics

- a. Complete the following:*

GEOS F262—Rocks and Minerals	3
GEOS F318—Solid Earth Geophysics.....	3
GEOS F406—Vulcanology	3
GEOS F431—Foundations of Geophysics.....	4
GEOS F475W,O—Presentation Techniques in the Geosciences.....	2
GEOS F477O—Ice in the Climate System	3
GEOS F488—Undergraduate Research.....	2
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 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
 - c. Complete 3 additional 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.*
 4. Minimum credits required120
- * Students must earn a C- grade 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 required20

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/GEOS 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 F318—Solid Earth Geophysics.....	3
GEOS F406—Volcanology	3
GEOS F431—Foundations of Geophysics.....	4
GEOS F477O—Ice in the Climate System	3
2. Minimum credits required:21

Baccalaureate Core Requirements

Communication 9 Credits

- ENGL F111X—Introduction to Academic Writing.....(3)
ENGL F190H may be substituted.

Complete one of the following:

- ENGL F211X—Academic Writing about Literature.....(3)
- ENGL F213X—Academic Writing about the Social and Natural Sciences.....(3)

Complete one of the following:

- COMM F131X—Fundamentals of Oral Communication: Group Context.....(3)
- COMM F141X—Fundamentals of Oral Communication: Public Context.....(3)

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Perspectives on the Human Condition 18 Credits

Complete all of the following four courses:

- ANTH F100X/SOC F100X—Individual, Society and Culture.....(3)
- ECON F100X or PS F100X—Political Economy.....(3)
- HIST F100X—Modern World History.....(3)
- ENGL/FL F200X—World Literature.....(3)

12

Complete one of the following three courses:

- ART/MUS/THR F200X—Aesthetic Appreciation: Interrelationship of Art, Drama and Music.....(3)
- HUM F201X—Unity in the Arts.....(3)
- ANS F202X—Aesthetic Appreciation of Alaskan Native Performance.....(3)

3

Complete one of the following six courses:

- BA F323X—Business Ethics.....(3)
- COMM F300X—Communicating Ethics.....(3)
- JUST F300X—Ethics and Justice.....(3)
- NRM F303X—Environmental Ethics and Actions.....(3)
- PS F300X—Ethics and Society.....(3)
- PHIL F322X—Ethics.....(3)

3

Or complete 12 credits from the above courses plus one of the following:

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

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Mathematics 3 Credits

Complete one of the following:

- MATH F103X—Concepts and Contemporary Applications of Mathematics.....(3)
 - MATH F107X—Functions for Calculus*.....(4)
 - MATH F161X—Algebra for Business and Economics**.....(3)
 - STAT F200X—Elementary Probability and Statistics.....(3)
- * No credit may be earned for more than one of MATH F107X or F161X.

Or complete one of the following:*

- MATH F200X—Calculus I**.....(4)
- MATH F201X—Calculus II.....(4)
- MATH F202X—Calculus III.....(4)
- MATH F262X—Calculus for Business and Economics.....(4)
- MATH F272X—Calculus for Life Sciences.....(4)

* Or any math course having one of these as a prerequisite

** No credit may be earned for more than one of Math F200X, F262X or F272.

3 – 4

Natural Sciences 8 Credits

Complete any two (4-credit) courses.

- ATM F101X—Weather and Climate of Alaska.....(4)
- BIOL F100X—Human Biology.....(4)
- BIOL F101X—Biology of Sex.....(4)
- BIOL F103X—Biology and Society.....(4)
- BIOL F104X—Natural History.....(4)
- BIOL F115X—Fundamentals of Biology I.....(4)
- BIOL F116X—Fundamentals of Biology II.....(4)
- BIOL F120X—Introduction to Human Nutrition.....(4)
- BIOL F213X—Human Anatomy and Physiology I.....(4)
- BIOL F214X—Human Anatomy and Physiology II.....(4)
- CHEM F100X—Chemistry in Complex Systems.....(4)
- CHEM F103X—Basic General Chemistry.....(4)
- CHEM F104X—Beginnings in Biochemistry.....(4)
- CHEM F105X—General Chemistry.....(4)
- CHEM F106X—General Chemistry.....(4)
- GEOG F111X—Earth and Environment: Elements of Physical Geography.....(4)
- GEOS F100X—Introduction to Earth Science.....(4)
- GEOS F101X—The Dynamic Earth.....(4)
- GEOS F106X—Life and the Age of Dinosaurs.....(4)
- GEOS F112X—History of Earth and Life.....(4)
- GEOS F120X—Glaciers, Earthquakes and Volcanoes.....(4)
- GEOS F125X—Humans, Earth and Environment.....(4)
- MSL F111X—The Oceans.....(4)
- PHYS F102X—Energy and Society.....(4)
- PHYS F103X—College Physics.....(4)
- PHYS F104X—College Physics.....(4)
- PHYS F115X—Physical Science I.....(4)
- PHYS F175X—Astronomy.....(4)
- PHYS F211X—General Physics.....(4)
- PHYS F212X—General Physics.....(4)
- PHYS F213X—Elementary Modern Physics.....(4)

8

Library and Information Research 0 – 1 Credit

- Successful completion of library skills competency test or LS F100X or LS F101X prior to junior standing

0 – 1

Upper-Division Writing and Oral Communication

Complete the following at the upper-division level:

- Two writing intensive courses designated (W) and one oral communication intensive course designated (O), or two oral communication intensive courses designated (O/2) (see degree and/or major requirements)

Total credits required 38 – 39

All degrees (e.g. B.A., B.S., etc.) require additional courses.

Refer to specific degree and program requirements.

Students must earn a C- grade or better in each course used toward the baccalaureate core.