

GEOPHYSICS

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

M.S., Ph.D. Degrees

Minimum Requirements for Degrees: M.S.: 30 credits;
Ph.D.: 18 thesis credits

The geophysics program at UAF specializes in several broad areas of research and is closely connected with the Geophysical Institute. Although much of the research conducted by geophysics faculty takes advantage of the geographic location of the university, the faculty have research projects on all continents. Students have the option to obtain a general geophysics degree or to choose one of three concentrations to focus their studies.

Graduate Program — M.S. Degree

Concentrations: Solid-Earth Geophysics; Snow, Ice and Permafrost Geophysics; Remote Sensing Geophysics

1. Complete the following admission requirements:
 - a. Submit GRE scores.
 - b. Complete a background at least to the level of a B.S. concentration in geology, geophysics or an appropriate physical science or engineering.
 - c. Complete MATH F302, MATH F314, MATH F421 and PHYS F220 or equivalent.
2. Complete the general university requirements (page 202).
3. Complete the master's degree requirements (page 206).
 - a. Complete 6 – 12 thesis credits.
 - b. Complete any deficiencies concurrently with this degree.
4. Submit a written thesis proposal and pass an oral comprehensive examination centered on this proposal.
5. Complete and submit a written thesis and pass an oral defense of thesis.
6. Complete the following geophysics core requirements:

GEOS F631—Foundations of Geophysics	4
GEOS F482—Geological Sciences Seminar	1
7. Complete 6 credits from relevant graduate-level courses agreed by the advisory committee, or chose one of the following concentrations:

Solid-Earth Geophysics

- a. Complete 6 credits from the following:

GEOS F604—Seismology	3
GEOS F605—Geochronology	3
GEOS F607—Applied Seismology	3
GEOS F613—Global Tectonics	3
GEOS F655—Tectonic Geodesy	3
GEOS F671—Volcano Seismology	3
- b. Minimum credits required, including thesis/research credits ... 30

Snow, Ice and Permafrost Geophysics

- a. Complete 6 credits from the following:

GEOS F614—Ice Physics	3
GEOS F615—Sea Ice	3
GEOS F616—Permafrost	3
GEOS F617—Glaciers	3
- b. Minimum credits required, including thesis/research credits ... 30

Remote Sensing

- a. Complete 6 credits from the following:

GEOS F654—Visible and Infrared Remote Sensing	3
GEOS F657—Microwave Remote Sensing	3
GEOS F622—Digital Image Processing in the Geosciences	3
GEOS F434/F634—Remote Sensing of the Cryosphere	4
GEOS F484/F684—Remote Sensing Bi-Weekly Seminar	1
GEOS F676—Remote Sensing of Volcanic Eruptions	3
GEOS F639—InSAR and its Applications	3
ATM F413/F613—Atmospheric Radiation	3
- b. Minimum credits required, including thesis/research credits 30

Graduate Program — Ph.D. Degree

1. Complete the following admission requirement:
 - a. Submit GRE scores.
2. Complete a master's degree in geology, geophysics or an appropriate field of physical science or engineering.
3. Complete the general university requirements (page 202).
4. Complete the course work requirements for the appropriate M.S. concentration.
5. Complete the geophysics core requirements:

GEOS F482—Geological Sciences Seminar	1
GEOS F631—Foundations of Geophysics	4
6. Complete 3 credits each in two of the following advanced skills categories (total 6 credits):
 - a. Digital signal analysis and remote sensing

GEOS F654—Visible and Infrared Remote Sensing	3
GEOS F657—Microwave Remote Sensing	3
GEOS F622—Digital Image Processing in the Geosciences	3
PHYS F628—Digital Time Series Analysis	3
 - b. Statistics and parameter estimation

ATM F693—Analysis Methods in Meteorology and Climate	3
GEOS F609—Inverse Problems and Parameter Estimation	3
STAT F401—Regression and Analysis of Variance	3
STAT F461—Applied Multivariate Statistics	3
 - c. Numerical methods

MATH F615—Applied Numerical Analysis	3
MATH F661—Optimization	3
MATH F694—Numerical Linear Algebra	3
ME F601—Finite Element Analysis in Engineering	3
7. One graduate-level advanced skills course approved by the student's advisory committee
8. Complete the Ph.D. degree requirements (page 207).
9. As part of the Ph.D. degree requirements, complete the following:
 - a. Complete and pass a written and oral comprehensive examination.
 - b. Complete and submit a written thesis proposal for approval.
 - c. Complete a research program as arranged with the graduate advisory committee.
 - d. Complete 18 credits of thesis, write a thesis and pass an oral defense of thesis.
10. Minimum credits required 18

Admission to Ph.D. geophysics program directly from a bachelor's program:

Entering graduate students whose highest earned degree is the baccalaureate are normally admitted as master of science candidates. However, exceptionally able and accomplished students in this category are eligible for direct admission to the Ph.D. program. For direct admission from the baccalaureate to the Ph.D. program, a student must receive approval from the graduate admission committee and also meet one of three criteria:

- a. At least one first-authored manuscript published, accepted, or submitted for publication in a peer-reviewed scientific journal

- b. Receipt of an NSF, NIH or similar prestigious pre-doctoral fellowship.
- c. Demonstrated research proficiency AND either (1) attained a GPA of at least 3.5 in mathematics and science courses at the undergraduate level, or (2) scored at or above the 80th percentile in two of three categories in the GRE. The requirement of demonstrated research proficiency can be waived for exceptionally promising students. In this case the student is required to complete a research or review paper focusing on a thesis-related topic approved by the graduate advising committee. The paper should be roughly 4,000 – 5,000 words and must be submitted and approved by the advising committee within the first three semesters to maintain Ph.D. status. Failure will result in changing the student's status to M.S. candidate.

After admission, M.S. candidates may, in exceptional cases, petition for conversion to the Ph.D. program if they satisfy one of the above criteria. Such petitions must be approved both by the student's current (M.S.) and proposed (Ph.D.) advisory committee and the department director or designee.