

Bachelor of Science in Geomatics

The Bachelor of Science (BS) in Geomatics prepares students for a career in surveying and mapping, Geographic Information Systems (GIS), remote sensing, and related professional fields. Geomatics integrates disciplines of land surveying and mapping, geodesy, hydrography, remote sensing, photogrammetry, LiDAR/point clouds, and GIS. The Geomatics program is the only program statewide to provide the level of education required by the State of Alaska in obtaining professional land surveyor licenses.

The Bachelor of Science in Geomatics is accredited by the Applied and Natural Sciences Accreditation Commission of ABET, <https://www.abet.org> (<https://www.abet.org>).

Licensure and/or Certification

Graduates of the BS in Geomatics gain four years of education credit toward obtaining a professional land surveyor license in Alaska.

Please go to UAA's Authorization by State (<https://www.uaa.alaska.edu/academics/office-of-academic-affairs/uaa-state-authorization/authorization.cshml/>) website for information about licensure or certification in a state other than Alaska.

Admission Requirements

- Complete the Admission Requirements for Baccalaureate Degrees (<http://catalog.uaa.alaska.edu/academicpoliciesprocesses/admissions/undergraduate/>).

Special Considerations

- Students who intend to enroll in this degree of study are strongly encouraged to complete the following courses in high school with a C or better: Mathematics - Algebra and Trigonometry (2 semesters), Natural Science such as Chemistry, Physics, Biology, or Geology (1 year), English Composition - Skill level as demonstrated by ACT, SAT, or approved placement test to qualify for enrollment in WRTG A111. Insufficient preparation may increase the number of semesters required to complete the degree.
- A student who is unable to earn a minimum grade of C in a major requirement course during their initial enrollment may attempt to earn a satisfactory grade one additional time on a space-available basis. Failure to earn a minimum grade of C on the second attempt may result in removal from the geomatics program.

Graduation Requirements

- Complete the General University Requirements for Baccalaureate Degrees (<http://catalog.uaa.alaska.edu/undergraduateprograms/baccalaureaterequirements/>).
- Complete the General Education Requirements for Baccalaureate Degrees (<http://catalog.uaa.alaska.edu/undergraduateprograms/baccalaureaterequirements/gers/>).

- The 3 credit Tier 1 Quantitative Skills GER will be met and exceeded by the following degree requirements: (MATH A151 & MATH A152) or MATH A155, MATH A251 or MATH A251F, and MATH A252 or MATH A252F.
- The 7 credit Tier 2 Natural Science GER will be met and exceeded by the 11-12 credit Natural Sciences Elective degree requirement.
- For 3 credits of Tier 2 Humanities GER, choose PHIL A305.
- Complete the following major requirements with a minimum grade of C:

| Code | Title | Credits |
|---|--|---------|
| Core Courses | | |
| BA A241 | Business Law I | 3 |
| BA A300 | Organizational Theory and Behavior | 3 |
| ESM A450 | Economic Analysis and Operations | 3 |
| GIS A101 | Introduction to Geographic Information Systems | 3 |
| GIS A201 | Intermediate Geographic Information Systems | 3 |
| GIS A351 | Remote Sensing | 3 |
| GEO A460 | Geomatics Capstone Project | 3 |
| MATH A151 & MATH A152 or MATH A155 | College Algebra for Calculus and Trigonometry Precalculus | 5-7 |
| MATH A251 or MATH A251F | Calculus I F.A.T. Calculus I | 4-6 |
| MATH A252 or MATH A252F | Calculus II F.A.T. Calculus II | 4-6 |
| MATH A314 | Linear Algebra | 3 |
| PHIL A305 | Professional Ethics | 3 |
| STAT A253 | Applied Statistics for the Sciences | 4 |
| Complete 11-12 credits from the following with at least one lab and 3 credits in PHYS | | 11-12 |
| ASTR A103 & A103L | Solar System Astronomy and Solar System Astronomy Laboratory | |
| BIOL A102 & BIOL A103 | Introductory Biology and Introductory Biology Laboratory | |
| BIOL A178 & BIOL A179 or GEOL A178 & GEOL A179 | Introduction to Oceanography and Introduction to Oceanography Laboratory Introduction to Oceanography and Introduction to Oceanography Laboratory | |
| CHEM A105 & A105L | General Chemistry I and General Chemistry I Laboratory | |

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| ENVI A211 & A211L | Environmental Science: Systems and Processes and Environmental Science: Systems and Processes Laboratory |
| GEOG A111 | Earth Systems: Elements of Physical Geography |
| GEOL A111 & A111L | Planet Earth and Planet Earth Laboratory |
| GEOL A115 & A115L | Dangerous Earth and Dangerous Earth Laboratory |
| PHYS A123 & A123L or PHYS A211 & A211L | College Physics I and College Physics I Laboratory General Physics I and General Physics I Laboratory |
| PHYS A124 & A124L or PHYS A212 & A212L | College Physics II and College Physics II Laboratory General Physics II and General Physics II Laboratory |
| Choose one of the following concentration areas: surveying or geographic information systems (GIS). | |
| Total | 42-44 |
| 97-106 | |

Surveying Concentration

| Code | Title | Credits |
|--|--|---------|
| GEO A146 | Geomatics Computations | 3 |
| GEO A156 & A156L | Geospatial Measurement I and Geospatial Measurement I Laboratory | 3 |
| GEO A267 | Boundary Law I | 3 |
| GEO A357 | Photogrammetry | 3 |
| GEO A359 | Geodesy and Map Projections | 3 |
| GEO A256 & A256L | Engineering Surveying and Engineering Surveying Laboratory | 3 |
| GEO A266 & A266L | Geospatial Measurement II and Geospatial Measurement II Laboratory | 3 |
| GEO A364 | Spatial Data Adjustments | 3 |
| GEO A369 | Cadastral Surveys | 1 |
| GEO A410 | High-Density Surveying | 3 |
| GEO A420 | Point Cloud Analysis | 3 |
| GEO A457 | Boundary Law II | 3 |
| GEO A466 & A466L | Geopositioning and Geopositioning Laboratory | 3 |
| KIN A112 | First Aid and CPR for Professionals | 1 |
| Complete 6 credits from the following: | | 6 |
| CSCE A101 | Introduction to Computer Science | |
| ES A106 | Engineering Graphics | |
| GEO A355 | Land Development and Design | |
| GEO A433 | Hydrographic Surveying | |

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|--------------|---|
| GEO A490 | Selected Advanced Topics in Geomatics |
| GIS A370 | GIS and Remote Sensing for Natural Resources |
| GIS A301 | Web GIS |
| GIS A458 | Spatial Data Management |
| GIS A466 | Spatial Analysis |
| GIS A467 | Image Analysis |
| GIS A498 | Individual Research ¹ |
| Total | 44 |

Geographic Information Systems (GIS) Concentration

| Code | Title | Credits |
|--|--|-----------|
| CSCE A101 | Introduction to Computer Science | 3 |
| GIS A301 | Web GIS | 3 |
| GIS A458 | Spatial Data Management | 3 |
| GIS A466 | Spatial Analysis | 3 |
| GIS A467 | Image Analysis | 3 |
| Complete 12 credits from the following (at least 6 credits must be upper-division courses): | | 12 |
| CSCE A490 | Topics in Computer Science and Computer Systems Engineering | |
| ES A106 | Engineering Graphics | |
| GEO A146 | Geomatics Computations | |
| GEO A156 & A156L | Geospatial Measurement I and Geospatial Measurement I Laboratory | |
| GEO A359 | Geodesy and Map Projections | |
| GEO A490 | Selected Advanced Topics in Geomatics | |
| GEOG A475 | Geospatial and Cartographic Techniques for the Sciences | |
| GIS A370 | GIS and Remote Sensing for Natural Resources | |
| GIS A498 | Individual Research ¹ | |
| Complete an additional 15 credits in CSCE, MATH (excluding MATH A420 and MATH A495A), STAT, GEOG, ECON, BA, or HS. Six of these credits must be upper-division courses. | | 15 |
| Total | | 42 |

¹ A maximum of 6 credits of may be applied to degree requirements.

A minimum of 120 credits is required for the degree, of which 39 must be upper-division.

Honors in Geomatics

The Bachelor of Science in Geomatics recognizes distinguished achievement by conferring programmatic honors in geomatics. In order

to receive honors in geomatics, a student must meet the following requirements:

- Complete all requirements for a BS in Geomatics;
- Meet the UAA requirements for Graduation with Honors (<http://catalog.uaa.alaska.edu/academicpoliciesprocesses/academicstandardsregulations/graduation/>);
- Have a minimum GPA of 3.50 in their courses required for the major;
- Document a minimum of eight weeks of work experience while a student at the University of Alaska Anchorage in geomatics or related position.

Program Student Learning Outcomes

Students graduating with a Bachelor of Science in Geomatics will be able to:

- Identify, formulate, and solve broadly-defined technical or scientific problems by applying knowledge of mathematics and science and/or technical topics to areas relevant to the discipline.
- Formulate or design a system, process, procedure or program to meet desired needs.
- Develop and conduct experiments or test hypotheses, analyze and interpret data and use scientific judgment to draw conclusions
- Communicate effectively with a range of audiences
- Understand ethical and professional responsibilities and the impact of technical and/or scientific solutions in global, economic, environmental, and societal contexts
- Function effectively on teams that establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty.
- Apply knowledge in all six areas of surveying and mapping:
 - Field surveying and methods;
 - Photogrammetric mapping, image interpretation and remote sensing;
 - Surveying calculation and data adjustment;
 - Geodetic coordinates and astronomy;
 - Cartographic representation, projections, and map production;
 - Computer-based multipurpose cadastre, geographic information systems.

Sample Plan

The academic plan below is one pathway through the degree/certificate. It includes all requirements, taking into account recommendations from program faculty. Each student's plan may vary according to their initial course placement (<http://catalog.uaa.alaska.edu/academicpoliciesprocesses/academicstandardsregulations/courseplacement/>), intended course load, additional majors and/or minors, and their placement into required prerequisite courses. Any change in the plan below can have an unforeseen impact on the rest of the plan. **Therefore, it is very important to meet with your academic advisor to verify your personal academic plan.**

Please review the following terms, definitions, and resources associated with the sample academic plan below.

- Each course in the far left column links to a pop-up bubble with a course description, prerequisite requirements, and associations with university requirements. For example, if a course fulfills a general education requirement, you will see that in the pop-up bubble.
- **GER:** indicates a General Education Requirement (<http://catalog.uaa.alaska.edu/undergraduateprograms/baccalaureaterequirements/gers/>). GERs that also count toward degree/certificate requirements appear as a specific course in the plan. For these courses, "GER" is not indicated explicitly in the table, but if you click on the course, you will see the course's GER status in the pop-up bubble.
- **Program Elective:** indicates a specific course selection determined by program faculty to fulfill a degree/certificate requirement. Students should seek assistance from their academic advisor.
- **Elective:** indicates an open selection of 100-400 level university courses to fulfill elective credits needed to meet the minimum total credits toward the degree/certificate.
- **Upper Division Program Elective:** indicates a specific 300-400 level course selection determined by the program faculty to fulfill a degree/certificate requirement. Students should seek assistance from their academic advisor.
- **Upper Division Elective:** indicates an open selection of 300-400 level courses to fulfill elective credits needed to meet the minimum total credits toward the degree/certificate. These courses must be upper division in order to meet General University Requirements for the particular degree/certificate type.

| Course | Title | Credits |
|--|--|-----------|
| First Year | | |
| Fall | | |
| CSCE A101 | Introduction to Computer Science | 3 |
| GIS A101 | Introduction to Geographic Information Systems | 3 |
| MATH A151 | College Algebra for Calculus | 4 |
| WRTG A111 | Writing Across Contexts | 3 |
| Credits | | 13 |
| Spring | | |
| MATH A152 | Trigonometry | 3 |
| GER Humanities ¹ | | 3 |
| GER Oral Communication Skills | | 3 |
| GER Social Sciences ¹ | | 3 |
| GER Written Communication Skills (200-level) | | 3 |
| Credits | | 15 |
| Second Year | | |
| Fall | | |
| BA A241 | Business Law I | 3 |
| MATH A251 | Calculus I | 4-6 |
| or | or F.A.T. Calculus I | |
| MATH A251F | | |
| STAT A253 | Applied Statistics for the Sciences | 4 |
| GER Fine Arts | | 3 |

| | | |
|---|---|----------------|
| Program Elective ² | | 3 |
| Credits | | 17-19 |
| Spring | | |
| GIS A201 | Intermediate Geographic Information Systems | 3 |
| MATH A252 | Calculus II | 4-6 |
| or | or F.A.T. Calculus II | |
| MATH A252F | | |
| Elective | | 3 |
| Program Elective (w/ lab) ² | | 4 |
| GER Social Sciences | | 3 |
| Credits | | 17-19 |
| Third Year | | |
| Fall | | |
| GIS A351 | Remote Sensing | 3 |
| GIS A301 | Web GIS | 3 |
| MATH A314 | Linear Algebra | 3 |
| Program Elective ² | | 3 |
| Program Elective (GIS Concentration) | | 3 |
| Credits | | 15 |
| Spring | | |
| BA A300 | Organizational Theory and Behavior | 3 |
| GIS A466 | Spatial Analysis | 3 |
| PHIL A305 | Professional Ethics | 3 |
| Elective | | 3 |
| Program Elective (GIS Concentration) | | 3 |
| Credits | | 15 |
| Fourth Year | | |
| Fall | | |
| GIS A458 | Spatial Data Management | 3 |
| GIS A467 | Image Analysis | 3 |
| Elective | | 3 |
| Program Elective | | 3 |
| Upper Division Program Elective (GIS Concentration) | | 3 |
| Credits | | 15 |
| Spring | | |
| ESM A450 | Economic Analysis and Operations | 3 |
| GEO A460 | Geomatics Capstone Project | 3 |
| Upper Division Elective | | 3 |
| Upper Division Elective | | 3 |
| Upper Division Program Elective (GIS Concentration) | | 3 |
| Credits | | 15 |
| Total Credits | | 122-126 |

¹ Choose a course that also fulfills the Alaska Native-Themed GER.² Three Natural Science Program Electives must be a PHYS selection.

Sample Plan

The academic plan below is one pathway through the degree/certificate. It includes all requirements, taking into account recommendations from program faculty. Each student's plan may vary according to their initial course placement (<http://catalog.uaa.alaska.edu/academicpoliciesprocesses/academicstandardsregulations/courseplacement/>), intended course load, additional majors and/or minors, and their placement into required prerequisite courses. Any change in the plan below can have an unforeseen impact on the rest of the plan. **Therefore, it is very important to meet with your academic advisor to verify your personal academic plan.**

Please review the following terms, definitions, and resources associated with the sample academic plan below.

- Each course in the far left column links to a pop-up bubble with a course description, prerequisite requirements, and associations with university requirements. For example, if a course fulfills a general education requirement, you will see that in the pop-up bubble.
- GER:** indicates a General Education Requirement (<http://catalog.uaa.alaska.edu/undergraduateprograms/baccalaureaterequirements/gers/>). GERs that also count toward degree/certificate requirements appear as a specific course in the plan. For these courses, "GER" is not indicated explicitly in the table, but if you click on the course, you will see the course's GER status in the pop-up bubble.
- Program Elective:** indicates a specific course selection determined by program faculty to fulfill a degree/certificate requirement. Students should seek assistance from their academic advisor.
- Elective:** indicates an open selection of 100-400 level university courses to fulfill elective credits needed to meet the minimum total credits toward the degree/certificate.
- Upper Division Program Elective:** indicates a specific 300-400 level course selection determined by the program faculty to fulfill a degree/certificate requirement. Students should seek assistance from their academic advisor.
- Upper Division Elective:** indicates an open selection of 300-400 level courses to fulfill elective credits needed to meet the minimum total credits toward the degree/certificate. These courses must be upper division in order to meet General University Requirements for the particular degree/certificate type.

| Course | Title | Credits |
|-------------------------------|--|-----------|
| First Year | | |
| Fall | | |
| GEO A146 | Geomatics Computations | 3 |
| GEO A156 & A156L | Geospatial Measurement I and Geospatial Measurement I Laboratory | 3 |
| MATH A151 | College Algebra for Calculus | 4 |
| WRTG A111 | Writing Across Contexts | 3 |
| Program Elective ¹ | | 3 |
| Credits | | 16 |
| Spring | | |
| KIN A112 | First Aid and CPR for Professionals | 1 |

| | | |
|--|--------------|---|
| MATH A152 | Trigonometry | 3 |
| GER Oral Communication Skills | | 3 |
| GER Social Sciences ² | | 3 |
| GER Written Communication Skills (200-level) | | 3 |
| Program Elective ¹ | | 3 |

Credits 16

Second Year

Fall

| | | |
|-------------------------------|--|-----|
| GEO A266 & A266L | Geospatial Measurement II and Geospatial Measurement II Laboratory | 3 |
| GIS A101 | Introduction to Geographic Information Systems | 3 |
| MATH A251 or MATH A251F | Calculus I or F.A.T. Calculus I | 4-6 |
| STAT A253 | Applied Statistics for the Sciences | 4 |
| GER Fine Arts ² | | 3 |

Credits 17-19

Spring

| | | |
|-------------------------------|--|-----|
| GEO A267 | Boundary Law I | 3 |
| GIS A201 | Intermediate Geographic Information Systems | 3 |
| MATH A252 or MATH A252F | Calculus II or F.A.T. Calculus II | 4-6 |
| GER Humanities ² | | 3 |
| GER Social Sciences | | 3 |

Credits 16-18

Third Year

Fall

| | | |
|---------------------|---|---|
| BA A241 | Business Law I | 3 |
| GEO A256 & A256L | Engineering Surveying and Engineering Surveying Laboratory | 3 |
| GEO A359 | Geodesy and Map Projections | 3 |
| GIS A351 | Remote Sensing | 3 |
| MATH A314 | Linear Algebra | 3 |

Credits 15

Spring

| | | |
|--|------------------------------------|---|
| BA A300 | Organizational Theory and Behavior | 3 |
| GEO A357 | Photogrammetry | 3 |
| GEO A364 | Spatial Data Adjustments | 3 |
| GEO A369 | Cadastral Surveys | 1 |
| PHIL A305 | Professional Ethics | 3 |
| Program Elective (w/ lab) ¹ | | 4 |

Credits 17

Fourth Year

Fall

| | | |
|----------|----------------------------------|---|
| ESM A450 | Economic Analysis and Operations | 3 |
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|--|---|---|
| GEO A410 | High-Density Surveying | 3 |
| GEO A466 & A466L | Geopositioning and Geopositioning Laboratory | 3 |
| Program Elective | | 3 |
| Program Elective (Surveying Concentration) | | 3 |

Credits 15

Spring

| | | |
|--|----------------------------|---|
| GEO A420 | Point Cloud Analysis | 3 |
| GEO A457 | Boundary Law II | 3 |
| GEO A460 | Geomatics Capstone Project | 3 |
| Program Elective (Surveying Concentration) | | 3 |

Credits 12

Total Credits 124-128

¹ Three Natural Science Program Electives must be a PHYS selection.

² Choose a course that also fulfills the Alaska Native-Themed GER.