

GEOMATICS - BACHELOR OF SCIENCE IN ENGINEERING (ONLINE)

Geomatics (<https://et.nmsu.edu/academics%20/geomatics-surveying.html>) is a rapidly developing engineering discipline that focuses on acquiring and analyzing precise spatial information. Geomatics engineers use a variety of technologies such as Unmanned Aerial Vehicles, Global Navigation Satellite Systems, High-Definition 3D Laser scanners, High-resolution satellite images, and Geographic Information Systems. They measure terrestrial and three-dimensional positions of points on, above, and below the earth's surface and the distance and angles between them at a high level of precision. Geomatics engineers aid in the design of infrastructure including roads, bridges and legal boundaries for ownership. They provide precise data for natural resource managers, subdivision developers, and coastal monitoring systems.

The program is designed to provide cutting-edge industrial needs as well as to meet the educational requirements for registration as a Professional Land Surveyor in different states.

The mission of the Department of ETSE is to provide men and women with the rigorous, fundamental education needed to enter and succeed in the Geomatics and related professions. To accomplish this mission, the department will introduce students to the theory and application of recognized geomatics principles.

The Geomatics degree is offered online. Students can start as freshmen or transfer. As part of the curriculum requirements, transfer students must complete college-level work that includes General Education Area I, IV, V, and VI (19 credit: see the [General Education \(https://catalogs.nmsu.edu/nmsu/general-education-viewing-wider-world/#viewingawiderworldtext\)](https://catalogs.nmsu.edu/nmsu/general-education-viewing-wider-world/#viewingawiderworldtext) section of this catalog for a full list of courses), Calculus I and II (6-8 credit), Physics I (4 -credit), elective science with lab (4 credit), computer drafting (3 credit), statistics (A ST 311 or equivalent: 3 credit), computer programming (3 credit), plane surveying (3 credit), introduction to GIS (3-4 credit), surveying/civil drafting (3 credit), and approved electives to bring total transfer credits to 59.

Requirements (120 Credits)

Students must complete all University degree requirements, which include: General Education requirements, Viewing a Wider World requirements, and elective credits to total at least 120 credits with 48 credits in courses numbered 300 or above. Developmental coursework will not count towards the degree requirements and/or elective credits but may be needed in order to take the necessary English and Mathematics coursework.

Students must also take the Fundamentals of Surveying examination prior to graduation.

| Prefix | Title | Credits |
|--|--------------------------------------|---------|
| General Education | | |
| <i>Area I: Communications</i> ¹ | | 10 |
| | <i>English Composition - Level 1</i> | |
| | <i>English Composition - Level 2</i> | |
| | <i>Oral Communication</i> | |
| <i>Area II: Mathematics</i> ¹ | | |

| | | |
|--|--|-----|
| MATH 1511G or MATH 1435 | Calculus and Analytic Geometry I ² Applications of Calculus I | 3-4 |
| <i>Area III: Laboratory Sciences</i> ¹ | | 8 |
| PHYS 1230G & PHYS 1230L or PHYS 1310G & PHYS 1310L | Algebra-Based Physics I and Algebra-Based Physics I Lab Calculus -Based Physics I and Calculus -Based Physics I Lab | |
| One additional Area III: Laboratory Sciences for 4 credits ¹ | | |
| <i>Area IV: Social and Behavioral Sciences</i> ¹ | | 3 |
| <i>Area V: Humanities</i> ¹ | | 3 |
| <i>Area VI: Creative and Fine Arts</i> ¹ | | 3 |
| <i>General Education Elective</i> ¹ | | |
| MATH 1521G or MATH 1440 | Calculus and Analytic Geometry II ² Applications of Calculus II | 3-4 |
| Viewing A Wider World ¹ | | 6 |
| Departmental/College Requirements | | |
| The Geomatics degree is offered online. Students can start as freshmen or transfer. ^{4,5} | | |
| A ST 311 | Statistical Applications | 3 |
| BLAW 2110 or BLAW 316 or BLAW 325 | Business Law I Legal Environment of Business Real Estate Principles and Law I | 3 |
| C S 151 or C S 152 or C S 153 | C++ Programming Java Programming Python Programming I | 3 |
| ET 109 | Computer Drafting Fundamentals | 3 |
| ET 143 | Civil/Survey Drafting I | 3 |
| ET 355 | Site/Land Development and Layout | 3 |
| GEOG 381 | Cartography and Geographic Information Systems | 4 |
| GEOG 481 | Fundamentals of Geographic Information Science (GIS) | 4 |
| I E 451 | Engineering Economy | 3 |
| MATH 2415 or MATH 2530G or MATH 377 or MATH 391 or MATH 392 | Introduction to Linear Algebra ³ Calculus III Introduction to Numerical Methods Vector Analysis Introduction to Ordinary Differential Equations | 3 |
| <i>Program-Specific Requirements</i> | | |
| SUR 222 | Introduction to Geomatics | 3 |
| SUR 285 | Precise Digital Mapping | 3 |
| SUR 292 | Legal Principles and Boundary Law I | 3 |
| SUR 312 | Public Land Survey System Boundaries | 3 |
| SUR 328 | Construction Surveying & Automation Technologies | 3 |
| SUR 351 | Spatial Data Adjustment I | 3 |
| SUR 361 | Geodesy/Geodetic Control Surveying | 3 |
| SUR 401 | Ethics and Professionalism in Surveying and Mapping | 3 |
| SUR 450 | Senior Project | 3 |
| SUR 451 | Spatial Data Adjustment II | 3 |
| SUR 452 | Spatial Data Integration and Analysis | 3 |
| SUR 461 | GNSS Positioning | 3 |
| SUR 464 | Legal Principles and Boundary Law II | 3 |
| SUR 485 | Emerging Techniques in Geospatial Technologies | 3 |
| Second Language: (not required) | | |

Electives, to bring the total credits to 120⁵ **7-5**
Total Credits **120**

1
 See the General Education (<http://catalogs.nmsu.edu/nmsu/general-education-viewing-wider-world/>) section of the catalog for a full list of courses. See the Viewing a Wider World (<http://catalogs.nmsu.edu/nmsu/general-education-viewing-wider-world/#viewingawiderworldtext>) section of this catalog for a full list of courses.

2
 For students wishing to pursue a technical master's degree, MATH 1511G Calculus and Analytic Geometry I (or equivalent) and MATH 1521G Calculus and Analytic Geometry II(or equivalent) are recommended and will satisfy both the Area II and General Education Elective requirements. Students who take MATH 1435 Applications of Calculus I (or equivalent) and MATH 1440 Applications of Calculus II (or equivalent), will need to have an exception made for their degree audit.
**for either Mathematics course selection students may need to take any prerequisites needed to enter the class(es) first.*

3
 Or any MATH 400 or above

4
 Transfer students must complete college-level work that includes General Education Area I, IV, V, and VI (19 credit: see the [General Education](https://catalogs.nmsu.edu/nmsu/general-education-viewing-wider-world/#viewingawiderworldtext) (<https://catalogs.nmsu.edu/nmsu/general-education-viewing-wider-world/#viewingawiderworldtext>) section of this catalog for a full list of courses), Calculus I and II (6-8 credit), Physics I (4 -credit), elective science with lab (4 credit), computer drafting (3 credit), statistics (A ST 311 or equivalent: 3 credit), computer programming (3 credit), plane surveying (3 credit), introduction to GIS (3-4 credit), surveying/civil drafting (3 credit), and approved electives to bring total transfer credits to 59.

5
 Elective credit may vary based on prerequisites, dual credit, AP credit, double majors, and/or minor coursework. The amount indicated in the requirements list is the amount needed to bring the total to 120 credits and may appear in variable form based on the degree. However, students may end up needing to complete more or less on a case by case basis and students should discuss elective requirements with their academic advisor.

A Suggested Plan of Study for Students

The contents and order of this roadmap may vary depending on the students' transfer credits, some courses may need to be completed in addition to the ones listed below. It is only a suggested plan of study for students and is not intended as a contract. Course availability may vary from fall to spring semester and may be subject to modification or change.

| First Year | Credits |
|--------------------------------------|-----------|
| Transfer 29 Credits ^{1,4,5} | 29 |
| Credits | 29 |
| Second Year | Credits |
| Transfer 30 Credits ^{1,4,5} | 30 |
| Credits | 30 |

| Third Year | | |
|------------------------------------|--|---|
| Fall | | |
| BLAW 2110 | Business Law I | 3 |
| or BLAW 316 | or Legal Environment of Business | |
| or BLAW 325 | or Real Estate Principles and Law I | |
| MATH 2415 | Introduction to Linear Algebra ³ | 3 |
| or MATH 2530G | or Calculus III | |
| or MATH 377 | or Introduction to Numerical Methods | |
| or MATH 391 | or Vector Analysis | |
| or MATH 392 | or Introduction to Ordinary Differential Equations | |
| SUR 292 | Legal Principles and Boundary Law I | 3 |
| SUR 361 | Geodesy/Geodetic Control Surveying | 3 |
| Viewing a Wider World ¹ | | 3 |

| Credits | | 15 |
|----------------|--|-----------|
| Spring | | |
| ET 355 | Site/Land Development and Layout | 3 |
| SUR 285 | Precise Digital Mapping | 3 |
| SUR 312 | Public Land Survey System Boundaries | 3 |
| SUR 328 | Construction Surveying & Automation Technologies | 3 |
| SUR 351 | Spatial Data Adjustment I | 3 |
| Credits | | 15 |

| Fourth Year | | |
|----------------|--|-----------|
| Fall | | |
| GEOG 481 | Fundamentals of Geographic Information Science (GIS) | 4 |
| I E 451 | Engineering Economy | 3 |
| SUR 451 | Spatial Data Adjustment II | 3 |
| SUR 464 | Legal Principles and Boundary Law II | 3 |
| SUR 485 | Emerging Techniques in Geospatial Technologies | 3 |
| Credits | | 16 |

| Spring | | |
|------------------------------------|---|-----------|
| SUR 401 | Ethics and Professionalism in Surveying and Mapping | 3 |
| SUR 450 | Senior Project | 3 |
| SUR 452 | Spatial Data Integration and Analysis | 3 |
| SUR 461 | GNSS Positioning | 3 |
| Viewing a Wider World ¹ | | 3 |
| Credits | | 15 |

Total Credits **120**

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