



Applying Geospatial & Engineering Technology (AGET)

A National Science Foundation Grant Project

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Project Objectives

❖ **Objective 1: Curriculum Development:**

- ❖ Associate of Science in Geospatial Engineering Technology (GET) with directed emphasis areas.
- ❖ Certificate in Land Surveying
 - ❖ An Executive Advisory Board (EAB) has been created to strengthen the development and implementation process.

❖ **Objective 2: Workforce Development:**

- ❖ To increase and enhance the geospatial and engineering technician workforce pool with an emphasis on underrepresented groups while providing a seamless transition from high schools and technical colleges to associate degrees and certificate programs.

❖ **Objective 3: Dissemination:**

- ❖ To disseminate information on products and processes through professional conferences and professional publications.

IESA: Enabling Interdisciplinary Education through Geospatial Science & Technology

- ❖ The Lewis F. Roger's Institute for Environmental and Spatial Analysis (**IESA**) was formed in 2001 on UNG's Gainesville Campus.
- ❖ IESA promotes education through the use of advanced technology, interdisciplinary instruction, collaborative learning, and community service and outreach.

Current Degrees:

B.S. Environmental Spatial Analysis
A.S. Geography Pathway
A.S. Geology Pathway
A.S. Environmental Health Pathway
A.S. Geospatial Engineering Technology

Current Certificates & Minors:

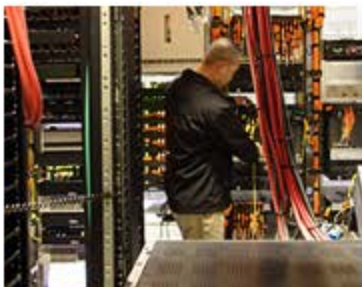
Environmental Science
Earth Science
Space Studies
Environmental Studies
Fundamentals of Geospatial Technology
Geographic Information Science
Land Surveying



Integrating Geospatial Science & Technology and Engineering Technology

Geospatial Engineering Technology

- ❖ Surveying Technicians
- ❖ Construction Management Technicians
- ❖ Infrastructure Design Technicians
- ❖ Forestry Technicians
- ❖ Environmental Technicians
- ❖ Geoscience Technicians



Achieving Objectives

Curriculum Development

- ❖ New Associate of Science degree in Geospatial Engineering Technology (GET)
 - ❖ A.S. degree pathways proposed for UNG academic approval.
- ❖ Certificate in Land Surveying – Courses proposed and developed.
 - ❖ ENVE 2221K – Surveying I
 - ❖ ENVE 2222K – Surveying II
 - ❖ ENVE 3001K – Hydrology for Surveyors (Future Optional course)
 - ❖ ENVE 3465 – Legal Aspects of Surveying



Achieving Objectives

A.S. Degree in Geospatial Engineering Technology

Associate of Science (A.S.)
Geospatial Engineering Technology Pathway

AREA A: Communication and Quantitative Skills (9 hrs)

MATH 1113 or higher

AREA B: Institutional Options (7 hrs)

AREA C: Humanities/Fine Arts (6 hrs)

AREA D: Science, Math, Technology (11 hrs)

Lab Science *

Lab Science *

GIS 2011/L

Select from the following:

BIOL 2210/L & BIOL 2220/L (Agriculture, Forest & Conservation Technician)

CHEM 1211/L & CHEM 1212/L (Environmental Science & Engineering Technician)

GEOL 1121K & GEOL 1122K (Geology Technician)

GEOL 1121K & PHYS 1111/L or PHYS 2211/L (Civil Engineering Technician)

PHYS 1111/L or PHYS 2211/L and GEOG 1111K (Surveying Technician)

AREA E: Social Sciences (9 hrs)

HIST 2111, HIST 2112, or POLS 1101

ANTH 1102

ENST 2030, GEOG 1101 or GEOG 1102

AREA F: (18 hrs)

Required (11 hours):

ENVE 1105 - Introduction to Environmental Professions

ENVE 2221K - Fundamentals of Surveying I

ENVE 2771K - Graphics and Information Visualization

Select (5 hours):

GIS 2012K - Fundamentals of Spatial Analysis

GIS 2201K - Fundamentals of Cartography

GIS 2202K - Fundamentals of Data Acquisition

GIS 2203K - Fundamentals of Remote Sensing

Select (at least 4 more hours):

*Advising Emphasis Areas:

Environmental Engineering & Environmental Science Technician Emphasis

Select at least 4 hours:

BIOL 1260/1260L - Intro to Environmental Science

ESCI 2111K - Principles of Environmental Science 1

ESCI 2112K - Principles of Environmental Science 2

Note: CHEM 1211/L & CHEM 1212/L should be taken in Area D

Agriculture & Forest and Conservation Technician Emphasis

Select at least 4 hours:

BIOL 1102/1102L - Intro to Ecology

ESCI 2111K - Principles of Environmental Science 1

ESCI 2112K - Principles of Environmental Science 2

Note: BIOL 2210/L & BIOL 2220/L should be taken in Area D

Geology Technician Emphasis

Select at least 4 hours:

ESCI 2111K - Principles of Environmental Science 1

GEO 2911, 2912 or 2913 - Special Topics in Geology: Instrumentation and Field Methods Courses

Note: GEOL 1121K and GEOL 1122K should be completed in Area D

Civil Engineering Technician Emphasis

Select at least 4 hours:

ENVE XXXX - Fundamentals of Surveying II

ESCI 2111K - Principles of Environmental Science 1

Note: PHYS 1111/L or 2211/L & GEOG 1121K should be completed in Area D

CAD & GIS Integration
(Workforce Development)

Achieving Objectives

Certificate in Land Surveying

ENVE 2221K – Surveying I

Course Description: A course which focuses on the basic principles of plane land surveying. Topics include the history, equipment, field methods, and calculations used in plane land surveying. Students will gain valuable field experience in surveying techniques including the measurement of angles, distances, and elevations using a total station and level. Other topics include: elementary traverse computations (traverse adjustments other than least squares, e.g., Compass, Crandall's...), metrics of error, accuracy, and precision, coordinate geometry, areal measurements, and the principles of global navigation satellite systems (GNSS).

Achieving Objectives

Certificate in Land Surveying

ENVE 2222K – Surveying II

Course Description: A course which covers basic construction and route surveying concepts and computations, including horizontal and vertical curves and volumetric measurements. Emphasis is placed on automated data collection methods using total stations and GNSS equipment. Students will also be introduced to adjustments by least squares, basic photogrammetric methods and geographic information systems (GIS). LiDAR application will be shown to students to add in field surveying.

Achieving Objectives

Certificate in Land Surveying

ENVE 3465 – Legal Aspects of Surveying

Course Description: The course covers land surveyor ethics and professional responsibility, the creation of Georgia property statutes, real property law, real and record evidence, records research, conveyances, recording systems, the public domain, eminent domain, legal aspects of boundary establishment, unwritten title, easements, prescription, water boundaries and surveying plans. The students will learn about the technical standards to get acquainted with surveying principles in Georgia and elsewhere.

Achieving Objectives

Certificate in Land Surveying

ENVE 3001K – Hydrology for Surveyors (Future Optional course)

Course Description: A course which offers basic theoretical and practical concepts of hydrology including the hydrologic analysis and design theory, drainage area studies, and storm sewer and culvert design. The course deals with basic hydrologic concepts, such as hydrologic cycle and its individual parameters: precipitation, rainfall interception, infiltration, depression storage, evapotranspiration (evaporation + transpiration), and runoff, rainfall-run off relations, and routing and open channel flow design and monitoring. The course emphasizes on topography design with surveying records and develop drainage characteristics of watersheds. The course also encompasses basic concepts of soil water, ground water, and soil and water interaction in the perspective of erosion and conservation. The course also deals with watershed runoff calculation for infrastructure development such as culverts, bridges, dam, and other soil conservation related structure design. The practical part of the course involves actual field surveying and experiment design along with laboratory projects and modeling using geospatial technology for environmental management and infrastructure development related problem solving.

Achieving Objectives

Workforce Development

- Developing a new geospatial, engineering, and science technician career pathways (Figure 1).
- Contacting high schools with under represented student groups and acquainting them with the new career pathways.
- Developing articulation agreements with technical colleges.
- Creation of an Industry Advisory Board.

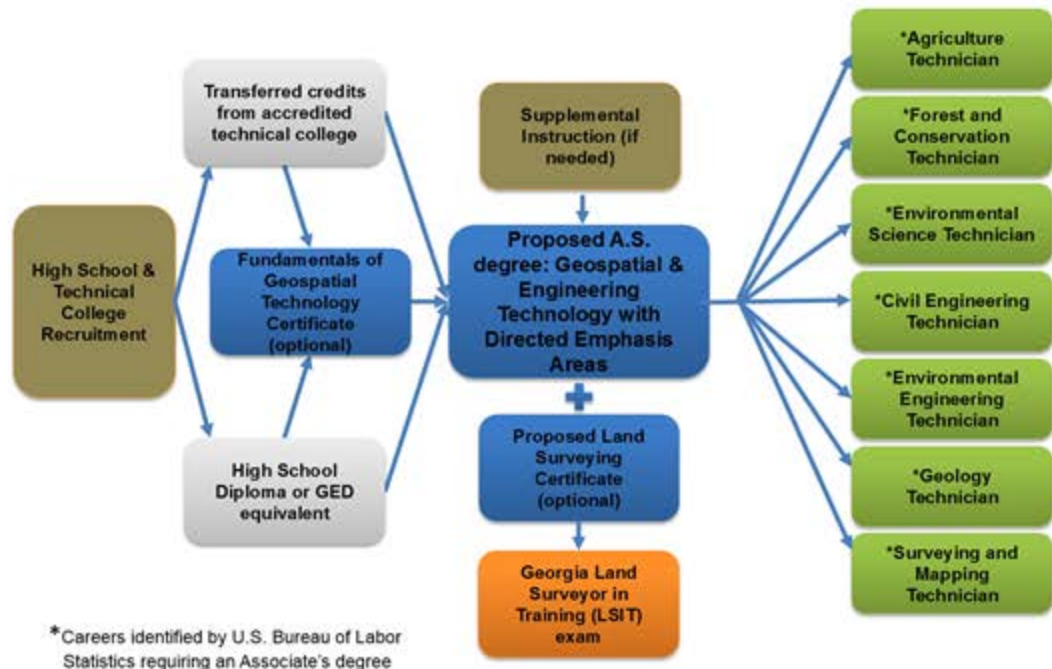


FIGURE 1 - AGET Technician Career Pathways

Achieving Objectives

Workforce Development



Involving High Schools in Recruitment Strategy:

- ❖ Conduct recruiting visits to minority-majority high schools in the area including Clarke Central, East Hall, Gainesville, Johnson and West Hall as well as other high schools in the region (**Continuing...**)
- ❖ Develop recruitment materials in collaboration with IESA, Enrollment Services and the Financial Aid Office (**Already developed**)
- ❖ Disseminate information through UNG recruitment activities including high school recruiting trips, brochures and Financial Aid and UNG websites (**Already started and continuing....**)
- ❖ Work closely with high school liaisons in UNG Enrollment Services who make high school recruiting visits by having IESA faculty accompanying liaisons when possible (**Our team is working on this...**)
- ❖ Focus recruiting efforts on high schools that serve high numbers of students from underrepresented groups by providing evening presentations to students' families and one-on-one meetings with parents upon request to discuss GET opportunities (**These schools are earmarked and we have visited and will visit for recruiting effort**)
- ❖ Invite high school science and math teachers to identify potential GET students (**In the process of doing it...**)
- ❖ Invite prospective students identified through the recruitment process to UNG for campus visits, open houses, tours and prospective student orientations (**Is being conducted...**)
- ❖ Introduce prospective students to IESA department representatives, student organization members, and financial aid representatives (**Team is working on it**)
- ❖ Invite prospective students to attend sessions on admission requirements (**Team is working on it**)
- ❖ Develop articulation agreements that link high school students to associate and baccalaureate levels in science and geospatial technologies through **UNG's Dual Enrollment Program** (GISC 2011/L) (**Team is working on it**)

Achieving Objectives

Recruiting Efforts

- ❖ **2017** – Had booths at 4 open houses of potential incoming students to UNG to provide information about this program. Recruited three students to begin in Spring 2018.
- ❖ **10/13/2017** -- Forsyth County schools – We presented info to all engineering programs on October 13, 2017 at an event hosted by Forsyth County Chamber of Commerce. Approximately 165 students were in attendance.
- ❖ **12/1/2017** -- Area high school guidance counselors on December 1, 2017. We gave a presentation and give a brief tour of our labs to show our surveying and data collection equipment. Approximately 24 guidance counselors in attendance.
- ❖ **January 26, 2018** – Project team member presented to industry partners and alumni regarding the K-12 outreach IESA is doing, the NSF grant, and asked for mentors from the engineering and surveying fields for high school students working on geospatial projects for state competition. Approximately 45 industry partners, alumni, and others in attendance. Recruited 1 incoming student for Fall 2018.
- ❖ **February 20, 2018** – Project team member presented at Lumpkin County High School to 40 students.
- ❖ **March 2018** – Class presentations at Lumpkin County High School Environmental Science classes (approximately 120 students)
- ❖ **April 2018** - Class presentations at West Hall High School Geology classes (approximately 120 students)
- ❖ **May 2018** – Two informational sessions on AGET and applying to UNG to rising juniors and current seniors to be held on the Cumming campus (admissions will send invitations and register participants from public schools in counties: Forsyth, Fulton, Cherokee, Dawson) and the Gainesville campus (admissions will send invitations and register participants from public schools in counties: Hall, Gwinnett, Jackson)

Achieving Objectives

Workforce Development

❖ Industry Advisory Board

- ❖ Julian Byrd: Map Shots, Data Management Solutions for Agriculture
- ❖ Sheila L. Caldwell: UNG Advisor to the President on Diversity Issues
- ❖ Jeremy Rylee: City of Gainesville Department of Water Resources, Utility Senior Database/AMI Analyst
- ❖ Christopher Semerjian: Georgia Department of Natural Resources
- ❖ Jeff Simmons: Platinum Geomatics
- ❖ Mark Chastain: Chastain & Associates, P.C., Surveying, Planning & Consulting
- ❖ Danielle Ayan: Booz, Allen & Hamilton
- ❖ Steven Hooks: Engineering 303, LLC Stream Restoration & Land Surveying
- ❖ Danielle Hambrick: GIS LLC
- ❖ Charles Bailey: Georgia Forest Commission
- ❖ Dax Flynn: City of Atlanta, Department of Watershed Management
- ❖ Josh Proctor: Georgia Power
- ❖ Brian Rochester: Rochester and Associates
- ❖ Douglass Sherrill: Sherrill Associates, Inc.
- ❖ Tom True: Wolverton

Industry Advisory Board met twice:

- ❖ September 29th, 2017 (1st meeting)
- ❖ March 28th, 2018 (2nd meeting)
- ❖ November 9th, 2018 (Coming up)

Advisory Board Comments

- ❑ Steven Hooks ([Engineering 303, LLC Stream Restoration & Land Surveying](#)) commented *"The course information you sent is in line with what I hoped for. It definitely hits the 'high points' as well as the more technical details. I am happy to see that it includes topics from significant figures, kinematic GPS, through mapping and GIS."*
- ❑ Christopher Semerjian ([Georgia Department of Natural Resources](#)) commented *"I wanted to respond to the meeting and the materials that you sent. I greatly appreciate you asking me to participate. I think the concept of what you are doing with the "geoenginerring" degrees are great and true to the original intent of the Institute."*
- ❑ Mark Chastain ([Chastain & Associates, P.C., Surveying, Planning & Consulting](#)) commented during the Industry Advisory Committee Meeting that *"This AGET initiative would certainly meet the demands of now booming surveying industry in Atlanta and Georgia along with other parts of United States."*
- ❑ Jeff Simmons ([Platinum Geomatics](#)) suggested during the Industry Advisory Committee meeting that *"Expertise in LiDAR, UAV, and other advanced geospatial engineering & technology skills of IESA would innovate the way of surveying and construction management field."*
- ❑ Discussion was conducted and decided that [Engineering Hydrology](#) course in the Surveying Certificate program will be optional as it is now not required for Georgia Surveying Certification.
- ❑

External Evaluation

- ❖ Two goals are central to the evaluation of AGET:
 - 1) To help the project better serve its constituents and improve its effectiveness related to technician education
 - 2) To serve the geospatial, engineering, and technologies education communities by documenting accomplishments and disseminating findings
- ❖ The evaluation is informing the project's activities and outcomes:
 - Curriculum development and design
 - Collaboration with industry partners and the K-12 community
 - Establishment of articulation agreements and experiential opportunities
 - Student scholarship and work readiness

External Evaluation

❖ Demographics of the students enrolled in *Surveying I* during spring 2018.

2 out of 9 students identified as female



4 out of 9 students identified as a first-generation college student



5 out of 9 students were enrolled in the Bachelor of Science in Environmental Spatial Analysis



Source: University of North Georgia Office of Institutional Effectiveness

Going Forward

- ❖ AGET team coordination with local high schools and technical colleges.
- ❖ Regular industry advisory board meetings to obtain feedback on project implementation.
- ❖ Teaching the developed courses and programs.
- ❖ Obtaining internships for students in the field of surveying and construction management and other technician positions.
- ❖ Future Professional Track Surveying Certificate

Land Surveying Education Evaluation Policy 2018

This policy replaces the 2005 Land Surveying Course Acceptance Policy

The 2018 policy seeks to achieve two objectives. First, to transition away from course and school specific acceptance to a format and content approach. Secondly, to respond to statutory changes in the education requirement in OCGA 43-15-12 and 43-15-12 by SB 425 which become effective July 1, 2018.

The education requirement transitions from the pre-SB425 requirements to the new requirements with a 2 year grandfathering period which expires for new applications starting July 1, 2020. This specifically affects 1) the amount of formal education required and the 2) optional hydrology course work and exam depending on the path taken. Courses will be acceptable if successfully passed at a college or university where the degree or certificate program has achieved applicable accreditation. Applicants will be asked to provide which courses in their transcript satisfy the Board's specific criteria. Applicants will also be responsible for providing any requested information such as syllabi, accreditation, course descriptions, etc. to aid the Board in evaluating courses presented. The required content may be provided in different courses, but credit will not be given for redundant material.

1) During the transition period, applicants may qualify to reexamination as an SI or PLS under either the prior requirements or the new. The prior requirements are set forth in 43-15-12(b) which is 15 quarter hours (9 semester hours) in land surveying and 5 quarter hours (3 semester hours) in applied hydrology and applicable prerequisites. The new requirements are set forth in 43-15-12(a)(2) and consist of 18 semester hours in surveying.

43-15-12(b) applicants are required to provide courses which meet criteria S1, S2, and S3 as set forth below, as well as HP1, HP2, and AH.

43-15-12(a)(3) applicants are required to provide courses which meet criteria S1, S2, S3, S4, and additional course work needed to satisfy the 18 semester hour requirement.

2) Beginning July 1, 2018 the hydrology examination is optional for all applicants. Professional Land Surveyors who opt to be examined in hydrology and design will be indicated on their license record as "Hydrology and Design Authorized" (see OCGA 43-15-13.1(2)). All other new licensees will be indicated simply as "current" (standard) licensure status. Applicants wishing to be examined to become a Hydrology and Design Authorized PLS are required to provide courses which meet criteria HP1, HP2, and AH as well as pass the Georgia Hydrology Exam. Courses and programs that are being accepted and recognized prior to July 1, 2018 will continue to be recognized through the 2 year period, until July 1, 2020.

Required Course Criteria

S1: Foundation in surveying. The course would cover the basics of surveying coordinate geometry, surveying calculations, traversing and leveling, topography & contours, proper field procedures, and basic cartography. Prerequisites should include trigonometry and a course in drafting, engineering graphics, CAD, cartography, or similar background. Course should include lab in surveying, measurements, etc. This course might be offered under names such as "Elementary Surveying", "Surveying 1", "Geomatics Measurements", etc.

S2: Advanced surveying course. The course would cover state plane coordinates, mapping projections, advanced field techniques, route and alignment surveys, volumetric calculations, construction staking techniques, and data collection. Appropriate lab applications should be included in the course. This course might be offered under names such as "Advanced Surveying", "Route Surveying", "Surveying 2", etc.

S3: Legal Aspects course. The course would include history of land division systems, basic property rights, legal descriptions, written conveyances, unwritten conveyances, retracing the footsteps of older surveys, junior-senior rights, prescription and adverse possession, hierarchy of controlling monuments and title elements, disputes and

Land Surveying Education Evaluation Policy 2018

This policy replaces the 2005 Land Surveying Course Acceptance Policy.
(continued)

litigation. This course might be offered under names such as "Legal Aspects of Surveying", "Boundary Law", "Property Law", etc.

S4: Professional Practice course. The course would prepare the applicant for professional practice as a Professional Land Surveyor and would include subdivision design, site layout, zoning and land use regulations, professional ethics, and business practice.

S5+: Additional courses in surveying and related applicable fields include higher level material such as GIS, geodesy, geodetic surveying, photogrammetry, advanced boundary law, remote sensing, dendrology, spatial analysis, and surveying adjustments. Partial credit may be given for some courses which contain partially applicable material.

HP1: Hydrology Prerequisite 1. This course would follow a physics sequence and cover the general engineering principles of mechanics and statics.

HP2: Hydrology Prerequisite 2: This course would follow the mechanics/statics course and concentrate in fluid mechanics, pressurized flow, and hydraulics.

AH: Applied Hydrology: This course covers watershed analysis and the design of culverts, multi-structure systems, retention ponds, and open channel flow.





Some of Our Partners



External Recognition

UNG-Gainesville Partnership Day

Proclamation of March 3, 2015 - in recognition of work done by IESA students for the tourism department of the city of Gainesville, GA

2012 Regents' Award for Teaching Excellence

Regents' Award for Teaching Excellence for a Department /Program

Georgia Economic Development Association T.E.R.R.I.F.I.C. Education Award

Gainesville State College's Geographic Information Science initiatives were recognized in 1998

National Center of Academic Excellence in Geospatial Science

Designated by the National Geospatial-Intelligence Agency (NGA) and United States Geological Survey (USGS) for 2017-2018