Geospatial Programs in Higher Education: Lessons Learned and Resources Leveraged by Current NSF-ATE Projects
October 28, 2015

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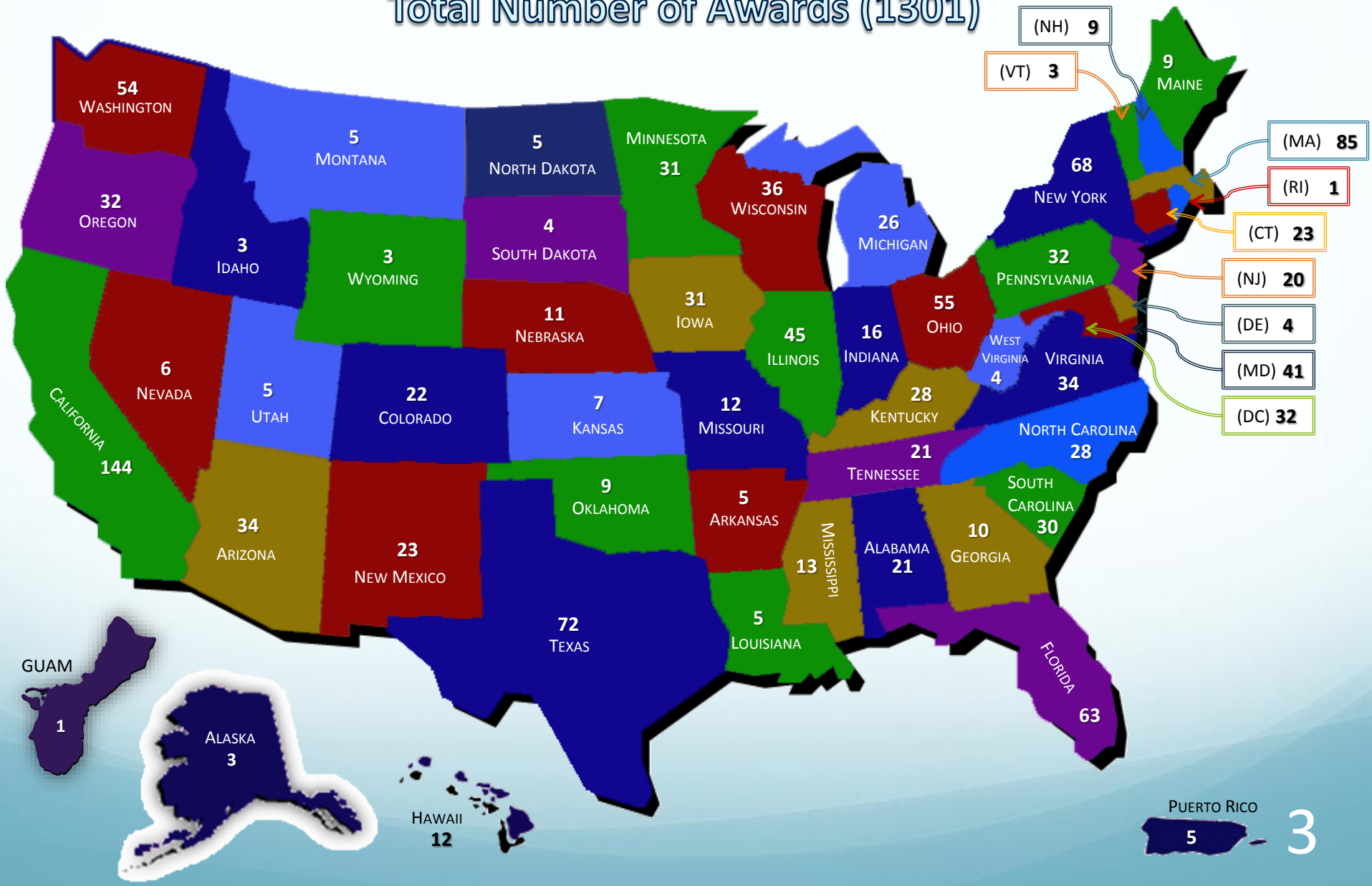
PI NSF-ATE Project Geospatial Advantage
DUE# 1304531

Advanced Technological Education Program (ATE)

- The education of highly qualified science and engineering technicians for advanced-technology fields that drive the nation's economy.
  - **Community colleges** have leadership roles on all projects.
  - Grades 7-12, 2yr- and 4-yr institutions can be supported. (**Pathways**)
  - **Partnerships** with Industry and Economic Development Entities

Number of Awards per State in ATE's 20 Year History

Total Number of Awards (1301)



ATE Program Tracks

- **Projects** (up to $300,000 /yr, 3yrs.)
  - Program Development, Implementation and Improvement;
  - Professional Development for Educators;
  - Curriculum and Educational Materials Development;
  - Teacher Preparation;
  - Small Grants for Institutions New to the ATE Program ($200K,3yrs);
  - Coordination Networks (ATE-CN) (up to $200,000/yr., 4 yr.)
- **Centers** National, Regional, Support ($1.6M-4M, 3-5 yrs.)
- **Targeted Research** on Technician Education (Planning, Exploratory, Full-Scale; $150,000-$800,000, 2-3 yrs.)

ATE Program Funding Rate

Program Overall: 20% (flat-funding)
Small, New to ATE: 60-70%
----consider the odds

Issues of a Strong Proposal

- **Great problem facing STEM Education and Development**
  - **Updating or modernizing curriculum**
  - **Strengthening ties with unmet needs for technicians in your regional economy with local industry**
  - **Forming partnerships with other educational institutions in developing K-16 career pathways**

- **Building a strong team!**
  - **Principal Investigator (PI) – Faculty Lead (Reporting)**
  - **Co-Principal Investigator (Co-PI) – Faculty (Targeted Issues)**
  - **Administrative Lead – Key administrator directing the link back to college resources and departments**
  - **External Evaluator – Outside independent agency or group to verify the completion and work on the grant for the NSF in the form of a report documenting success with grant outcomes and objectives.**
  - **Internal Evaluator (optional) – Someone internal to organization to assist the team with gathering internal data for the external evaluator (i.e., surveys, data collection on student and classes, ect…).**
  - **Marketing (optional) – Someone to assist the team with developing and managing the project website and running any social media to connect the project to outside partners (dissemination).**

Grant Team

Mike Rudibaugh, PI	Bruce Fink, Co-PI	Art Borum (GST Program Director)	Dr. Greg Labyak	Elaine Craft External Evaluator	Jeffery Ebel Internal Evaluator
GST Adjunct Faculty – KC	Chair of Life Science Department (Faculty-KC)	Director of Industrial & Continuing Education - KC	Vice-President of Instructional Services – KC	Co-PI for the SC ATE National Resource Center for Expanding Excellence in Technician Education	Dean of Institutional Effectiveness - KC
Curriculum development, professional development with teachers, and supervise interns with regional employers	Coordinates GST STEM integration with college and high school faculty	Coordinates grant outreach special events and GST Advisory Board for KC	Administrative oversight on grant work, budgets, and college resources	Gathers data and results to confirm grant objectives and goals are being met or not relating to the funded proposal	Gathers data, survey, and institutional information needed by external evaluator

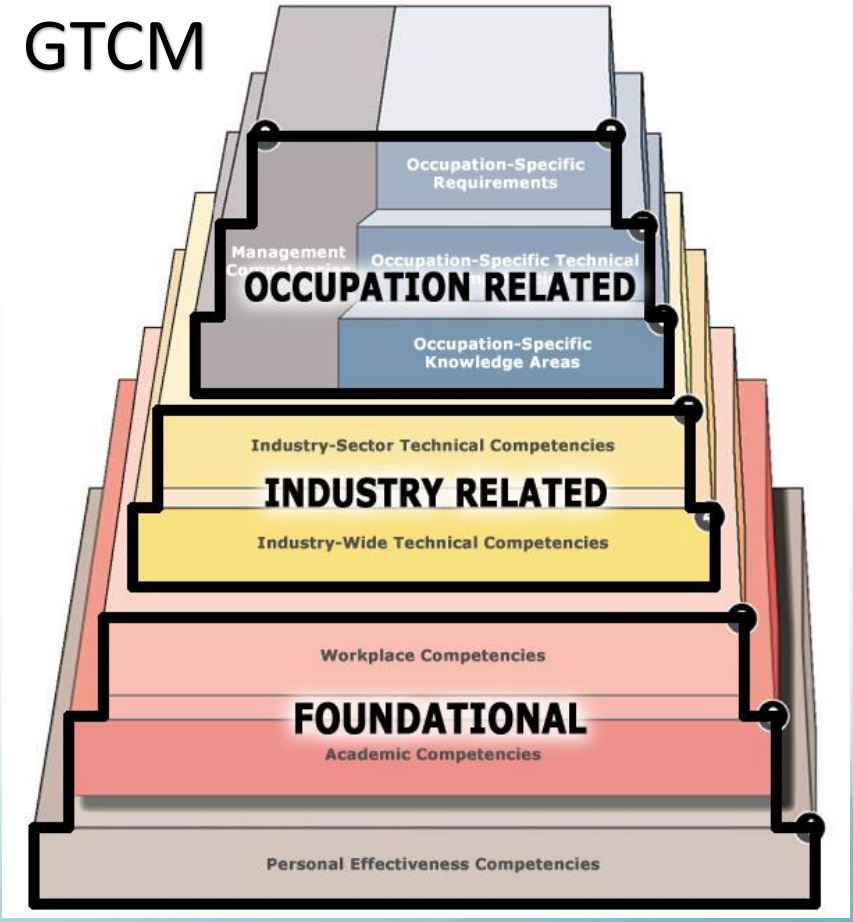
National Science Foundation (NSF) – The Geospatial Technology Advantage: Preparing GST Technicians and GST-Enabled Graduates for Southern Illinois Business and Industry

Goals

- Establish Certificate/Associate Degree Program in GST
  - Leveraged GeoTech resources and products as a partner in our proposal
- Provide GST field internships with regional employers
  - Leverage regional advisory board
- Incorporate GST into STEM programs at KC and regional high schools
- Conduct outreach events

GeoTech

GTCM



Grant Challenges and Opportunities

Challenges

- Institutional Awareness
  - Educational
  - Administrative
  - Student
- Technical
  - Access
- Cost
  - High cost and low enrollment programs

Opportunities

- Industry demand is growing
  - More paid internship opportunities than students in programs
- Cross-disciplinary nature to be both a stand-alone and a supporting certificate program for numerous STEM fields
- Growth of geospatial programs at universities
  - Career pathway

ATE Grant Resources
Geospatial Advantage

Grant Resources

Grant Website Resources: http://www.kcgst.com/

- GeoTech Model Courses –
  - Certificate Program
  - Mini-Certificate
- Counselors support brochure
- STEM Teacher Professional Development Modules (Biology, Law Enforcement, Earth Science, Information Technology and Agriculture
  - ArcGIS Online
  - Student Versions
  - Teacher Versions (Answer Keys - Password Protected)
- Evaluation Surveys
  - Advisory Board
  - Teacher Professional Development
  - Student and Faculty Surveys
- YouTube Video Series on Employer Testimonials in Agriculture and Utilities (COMING SOON)

Northern Utah Geospatial Technology Education Program (NUGeoTec)

Geospatial Programs in Higher Education: Lessons Learned and Resources Leveraged by Current NSF-ATE Projects

Eric C. Ewert, PhD, Weber State University, GeoTECH Webinar, Oct. 2015

Co-PI: Michael Hernandez, PhD

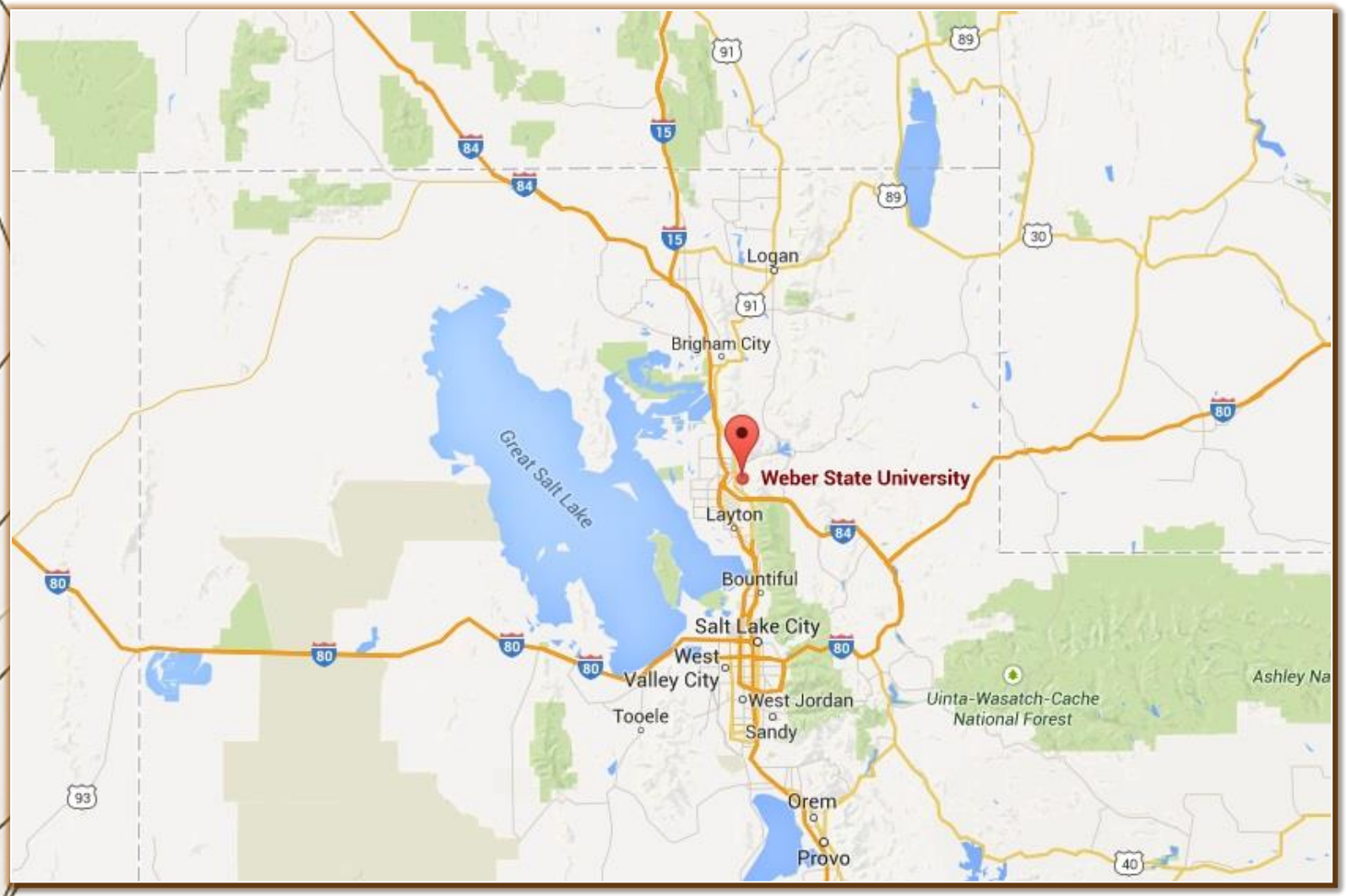
The NUGTEP development project is funded through a NSF-ATE DUE-1304888 grant.

WEBER STATE UNIVERSITY

Worthy of Your Dreams

About WSU: 126-year-old, 24,000 student public university offering 250 Certificate and Degree Programs, and 11 Graduate Degrees as part of its Dual Mission (2 and 4-year)

Located primarily in Ogden, Utah, WSU serves northern Utah and parts of adjacent states.

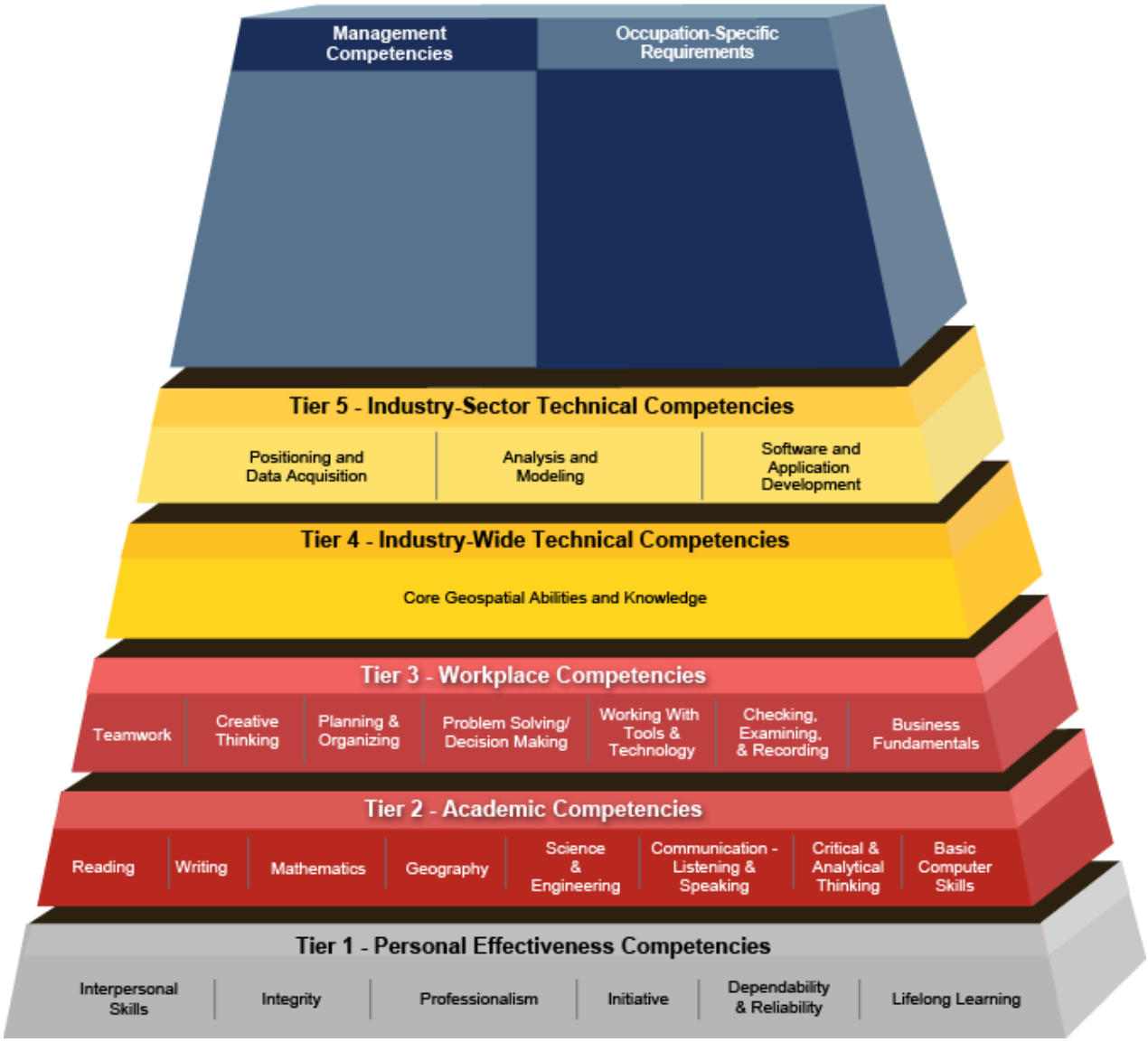


NUGeoTec Objectives

- Develop a Geospatial Training Program
- Make it Two-tiered: Technician & Analyst
- Be Guided by the Geospatial Technology Competency Model (U.S. Dept. Labor)
- Use the Best Practices as Compiled by the National GeoTECH Center (Louisville, Kentucky)
- Assemble a Geospatial Advisory Board
- Administer a Workforce Needs Survey
- Build Appropriate Curriculum
- Offer Classes and Evaluate

Geospatial Technology Competency Model

(US. Department of Labor and GeoTECH, 2014)



GeoTECH
GEOTECHCENTER.ORG

National Geospatial Technology Center of Excellence

Empowering Colleges:
EXPANDING THE GEOSPATIAL WORKFORCE

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Search

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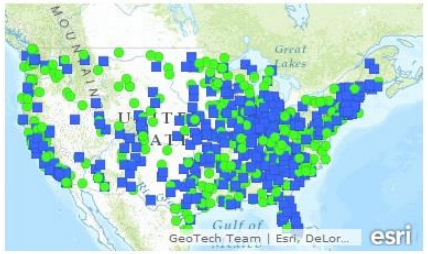


Geospatial Education Program Finder

Site Visits

2015 Undergraduate Geospatial Technology Skills Competition

Professional Development Activities

Calendar

Model Courses

GTCM

Partners

Mentoring Program

File Edit View History Bookmarks Tools Help

Fwd: Webinar - eewert@... | weber.edu - Calendar - ... | GEOG 4810 WSU Fall 15 ... | NUGeoTec Home | http://www....techcenter/ | GST 100 Awareness Cou... | Logged In Model Cours...

www.geotechcenter.org/logged-in-model-courses.html

GeoTECH GEOTECHCENTER.ORG

National Geospatial Technology Center of Excellence

Empowering Colleges:
EXPANDING THE GEOSPATIAL WORKFORCE

HOME | EVENTS AND NEWS | GTMC | EDUCATION RESOURCES | PROFESSIONAL RESOURCES | CENTER INFORMATION | CONTACT US

GeoTech Center Model Courses

Stand Alone Geospatial Awareness Course:

GST 100 – Exploring Our World Fundamentals of Geospatial Science – Content

Certificate Module Course

GST 101 – Introduction to Geospatial Technology - Content
GST 102 - Spatial Analysis - Content
GST 103 – Data Acquisition & Management - Content
GST 104 – Cartographic Design - Content
GST 105 – Introduction to Remote Sensing - Content
GST 106 – Introduction to Geospatial Programming - Content
GST 107 – Geospatial Web Applications and Development - Content
GST 108 – Capstone in Geospatial Technology - Content
GST 109 – Internship in Geospatial Technology - Content

Elective Model Courses

Google Drive

eewert@weber.edu

Open in Drive

GST 100 Awareness Course 9 items

Assessments
Assignments
Course Outline, Sy...
Lecture_VoiceOvers
Lectures
Projects
Readings & Cours...
Study Guide & Ge...
Syllabus

Survey

NUGeoTec

Demographic Information

Note:
GIS/Geospatial TECHNICIANS may also have the following job titles: Engineering Tech
CAD Tech, Survey Tech, GIS Specialist, Cartographer, GIS Coordinator, Planner I/Tech, Technical Support Specialist.

GIS/Geospatial ANALYSTS may also have the following job titles: Geospatial Analyst, GIS Data Specialist, GIS Specialist, GIS Mapping Assistant, GIS Application Specialist, Planner II, Planner III, Engineering Aide

5. Please enter the number of GIS/Geospatial Technicians and Analysts currently employed in your organization.

Total number of GIS/Geospatial TECHNICIANS:

Total number of GIS/Geospatial ANALYSTS:

6. Select all the minimum education levels for your current GIS\Geospatial TECHNICIANS and ANALYSTS:

	High School with GIS experience	Vocational/Technical School	2-year Community College: GIS-focused degree	2-year Community College: non-GIS degree	4-year College/University Degree: GIS-focused major	4-year College/University Degree: non-GIS major
GIS Technician	☐	☐	☐	☐	☐	☐
GIS Analyst	☐	☐	☐	☐	☐	☐

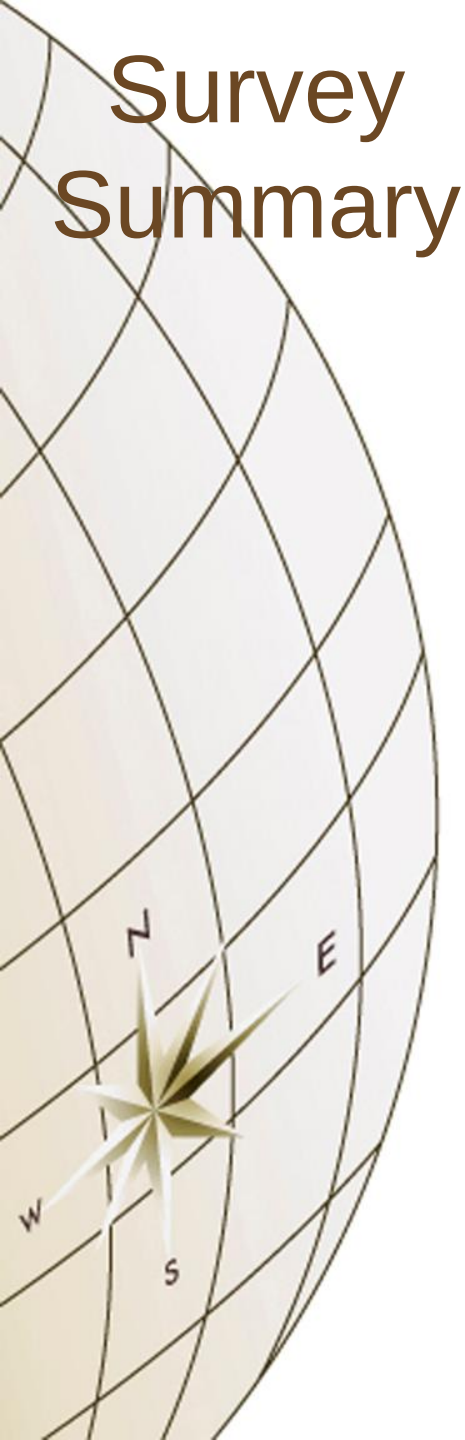
Other (please specify)

7. Select the minimum education level required by your organization if hiring an entry-level GIS TECHNICIAN and GIS ANALYST

	High School with GIS experience	Vocational/Technical School	2-year Community College: GIS-focused degree	2-year Community College: non-GIS degree	4-year College/University: GIS-focused major	4-year College/University: non-GIS major
GIS Technician	☐	☐	☐	☐	☐	☐
GIS Analysts	☐	☐	☐	☐	☐	☐

Other (please specify)

Survey Summary



Northern Utah Geospatial Technology Workforce Needs Assessment– Survey Highlights:

Nineteen (19) Organizations participated in the preliminary survey were from State, Federal, and Private Sectors working in northern Utah.

ENTRY-LEVEL GIS/GEOSPATIAL TECHNICIANS

Participants have hired GIS/Geospatial technicians with these education levels:

High School with some GIS
Vocational/Technical School
2-year and 4-year colleges with non-GIS majors
2-year and 4-year colleges with GIS majors
None have military as only education

Participants in the future, would hire ONLY entry-level GIS/Geospatial technicians with 2-year community college or 4-year college/university GIS-focused major.

Top three technical skills needed:

- Maintaining good credible data and having established effective review processes built into their work Or recognize when one needs to be established
- Proficiency in creating good maps that display information
- Basic understanding of how GIS can be integrated with other programs used

Current skills/proficiencies that will INCREASE five to ten years in the future:

- COGO Legal descriptions
- Perform data conversions
- Georeference data
- Create scripts
- Create charts
- Create tables
- Archive/retrieve data

New skills that will be NEEDED when entering the job market five to ten years from now:

- A physical relationship and understanding of what they are truly doing.
- Mobile GIS
- Some application development/programming
- Internet mapping skills
- Some database administration and programming

Basic programming/language/software skills you expect entry-level GIS Technicians to have at time of hire: Java, Basic model builder, attribute field calculations

ENTRY-LEVEL GIS/GEOSPATIAL ANALYSTS

Participants have hired GIS/Geospatial Analysts with these education levels:

4-year College/University with non-GIS majors and GIS majors

Participants in the future, would hire ONLY GIS/Geospatial Analysts with 4-year College/university with non-GIS majors and GIS majors

Top Three Technical Characteristics/Competencies:

- ArcGIS/ESRI experience
- Data management skills
- Desire to seek out data

Skills/proficiencies that will INCREASE five to ten years in the future:

- Research available data
- Purchase new data
- Develop databases
- Define feature behaviors
- Determine data conversions
- QA/QC data
- Perform image analysis
- Develop a data maintenance
- Develop GIS procedures
- Create models
- Pre-process data
- Conduct Geoprocessing
- Generate statistics
- Interpret results
- Define user software needs
- Determine applications
- Enhance existing customers applications
- Establish data custodianship
- Organize file structure
- Train GIS end-user(s)
- Coordinate GIS projects
- Represent GIS at meetings
- Supervise interns
- Develop project timelines/schedules
- Acquire professional credentials
- Review job related resources

GIS/Geospatial Analysts will need some database administration and program skills when entering the job market five to ten years from now.

Course Canvas Homepage

WSUonline Courses Grades Calendar

As: Test Student Logout Help

canvas™

GEOG 4810 WSU Fall 15 22153

Fall 2015

- Home
- Announcements
- Assignments
- Discussions
- Grades
- People
- Pages
- Files
- Syllabus
- Quizzes
- Conferences
- Collaborations
- Chi Tester
- Chat

> GEOG 4810 WSU Fall 15 22153

GEOG 4810 WSU Fall 15 22153

Welcome to Geog/Geo 2810/4810: Exploring Our World Through Geospatial Science

Full Class Syllabus

Videos

Geospatial Revolution Questions

Readings

Lectures

Assignments/Exercises

Master Study Guide and Questions

COURSE OBJECTIVES

This exploratory course introduces you to the fundamental concepts of geospatial science and how geospatial technologies are used to solve real-world problems across both space and time. You will learn the basic techniques of mapping, GPS (global satellite navigation system or GNSS), GIS (Geographic Information Systems), spatial analysis, cartography, and remote sensing. Geospatial science incorporates powerful tools and

View Course Stream

To Do

- Turn in Assignment 2: Map Projections — *due: Sep 20 at 11:59pm*
- Turn in Assignment 3: Mapping Locations — *due: Sep 27 at 11:59pm*
- Turn in Geospatial Revolution 2 — *due: Sep 27 at 11:59pm*
- Turn in Assignment 4: GPS and Collector App — *due: Oct 4 at 11:59pm*
- Turn in Geospatial Revolution 3 — *due: Oct 4 at 11:59pm*
- Turn in Geospatial Revolution 4 — *due: Oct 11 at 11:59pm*
- Turn in Assignment 5: ArcGIS Online Hazards — *due: Oct 18 at 11:59pm*

Coming Up View Calendar

- Assignment 5: ArcGIS Online Hazards — *Sunday*

Recent Feedback

Nothing for now

Website:
NUGeoTec

WEBER STATE UNIVERSITY

Worthy of Your Dreams

NUGeoTec

What is NUGeoTec?

Weber State University, with support from the National Science Foundation, is developing the Northern Utah Geospatial Technology Education Program (NUGeoTec).

Geospatial Technology includes :

- Geographic Information Systems (GIS)
- Remote Sensing (airborne and satellite imagery)
- Computer Cartography (digital mapmaking)
- Global Positioning and Navigation Systems (e.g., GPS).

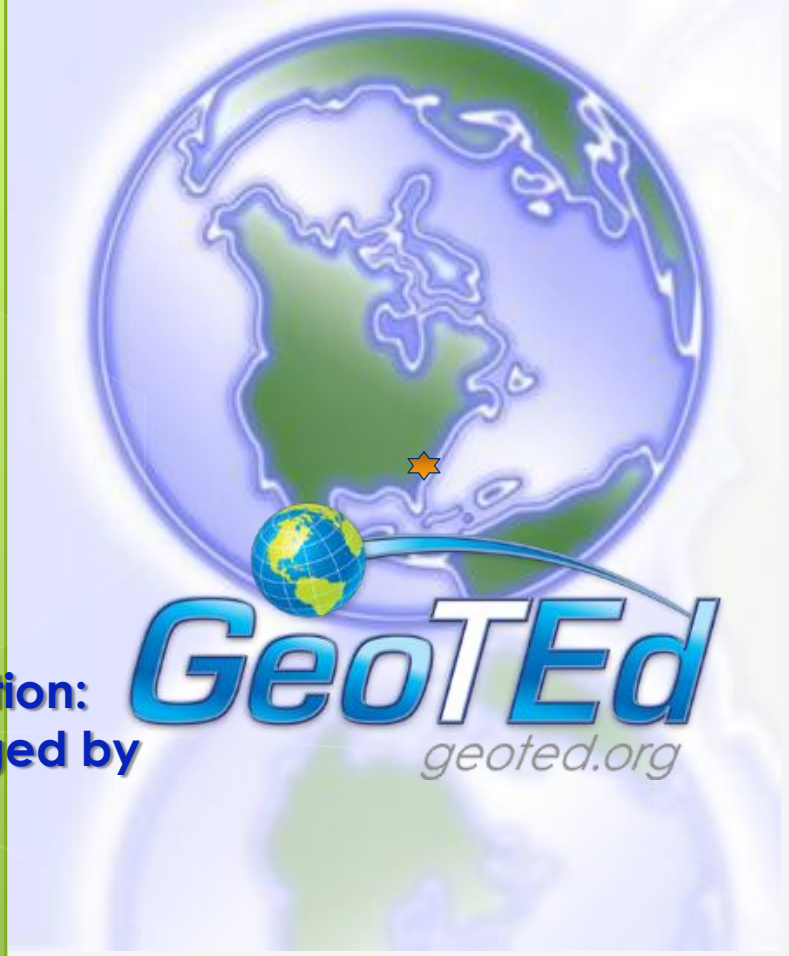
There is great demand for these skills among employers nationwide. WSU has a unique dual role mission as the regional community college for much of northern Utah and also as a large, public, comprehensive university. NUGeoTec will prepare post-secondary students for successful employment in the rapidly growing geospatial workforce, and will also create advanced educational opportunities for people with existing training and experience in the geospatial technologies fields. These goals will be achieved by developing a new Certificate and a related Associate Degree in Geospatial Technology (Community College Tier) and updating the existing Certificate and Minor in Geospatial Analysis at WSU (University Tier). A local advisory board (comprised of university, industry, government, and community leaders) is assisting in the development of these programs, guided by the U.S. Department of Labor Geospatial Technology Competency Model and the best practices recommendations compiled by the national GeoTech Center. NUGeoTec is expected to serve a broad and growing group of students, educators, and employers in northern Utah.

Go to our website to find out more.
www.weber.edu/nugeotec

NSF DUE -1304888

Expanding Geospatial Technician Education Through Virginia's Community Colleges (GeoTEd)

Geospatial Programs in Higher Education: Lessons Learned and Resources Leveraged by Current NSF-ATE Projects



NSF ATE DUE-0903270; 1205110

Chris Carter (PI)
Deputy Director, Virginia Space Grant Consortium

Chérie Aukland (Co-PI)
Program Head for GIS, Thomas Nelson Community College

VIRGINIA SPACE GRANT CONSORTIUM

VIRGINIA WESTERN The Community's College

THOMAS NELSON The Peninsula's Community College

SWCC

VirginiaGeospatial ExtensionProgram http://www.gep.frec.vt.edu

GeoTECH GEOTECHCENTER.ORG

Who Else is GeoTEd?

- **David Webb (Co-PI; GeoTEd Consultant)**
  - Retired Program Head (Mechanical Engineering Technology and GIS), Virginia Western Community College
- **Dr. John McGee (Co-PI)**
  - Virginia Geospatial Extension Agent, Virginia Tech
- **Sandy Stephenson (Co-PI)**
  - Professor of Information Systems Technology, Southwest Virginia Community College
- **6-state Region (NC, TN, KY, WV, MD)**
- **Many industry, government, and education partners**

Geospatial Technology Initiatives

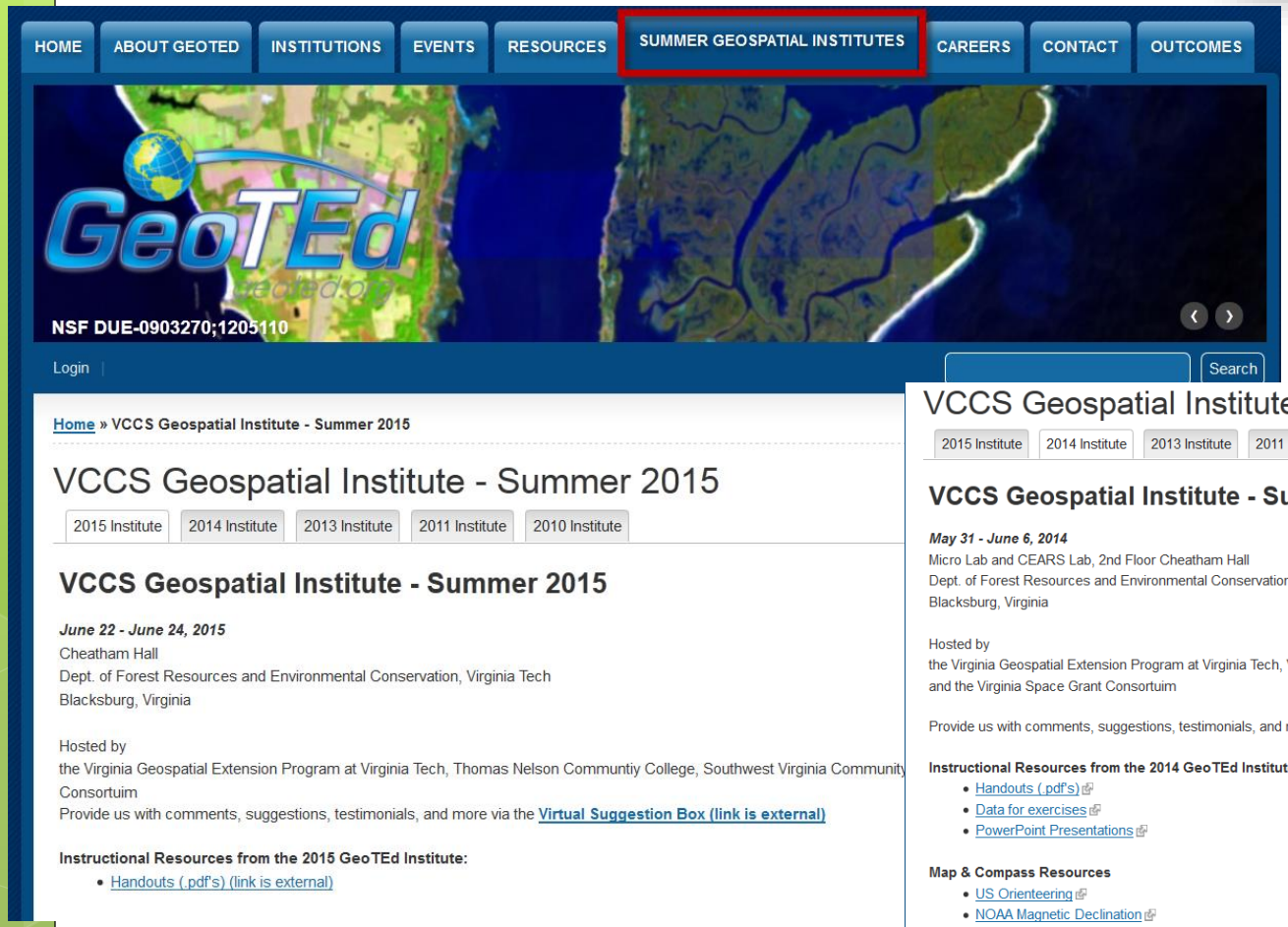
- 3 NSF-ATE awards
- Increase Number of Trained GIS Technicians

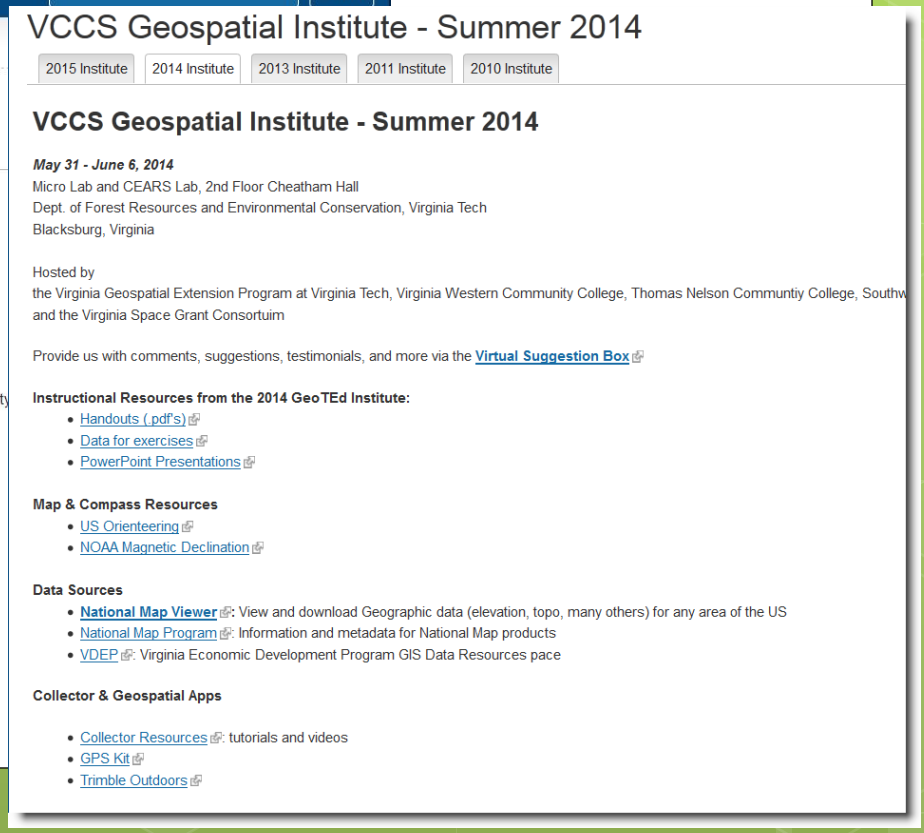
1. Planning Grant (2007)(1.5 yrs)
   - Statewide needs survey; DACUM for GIS Technician
2. Statewide Project Grant (2009-12)
   - Pathways; curriculum; faculty and teacher professional development; webportal
3. GeoTEd (2012-16) – Regional Project

Major Components

- Courses and Pathways Aligned with National Geospatial Technology Competency Model
- Distance Learning Courses in GIS
- Professional Development for Community College Faculty and High School Teachers
- Faculty Mentoring and Webinars
- Mobile App for Campus Navigation (CampusNav)
- Service Learning Courses and Virtual Internships

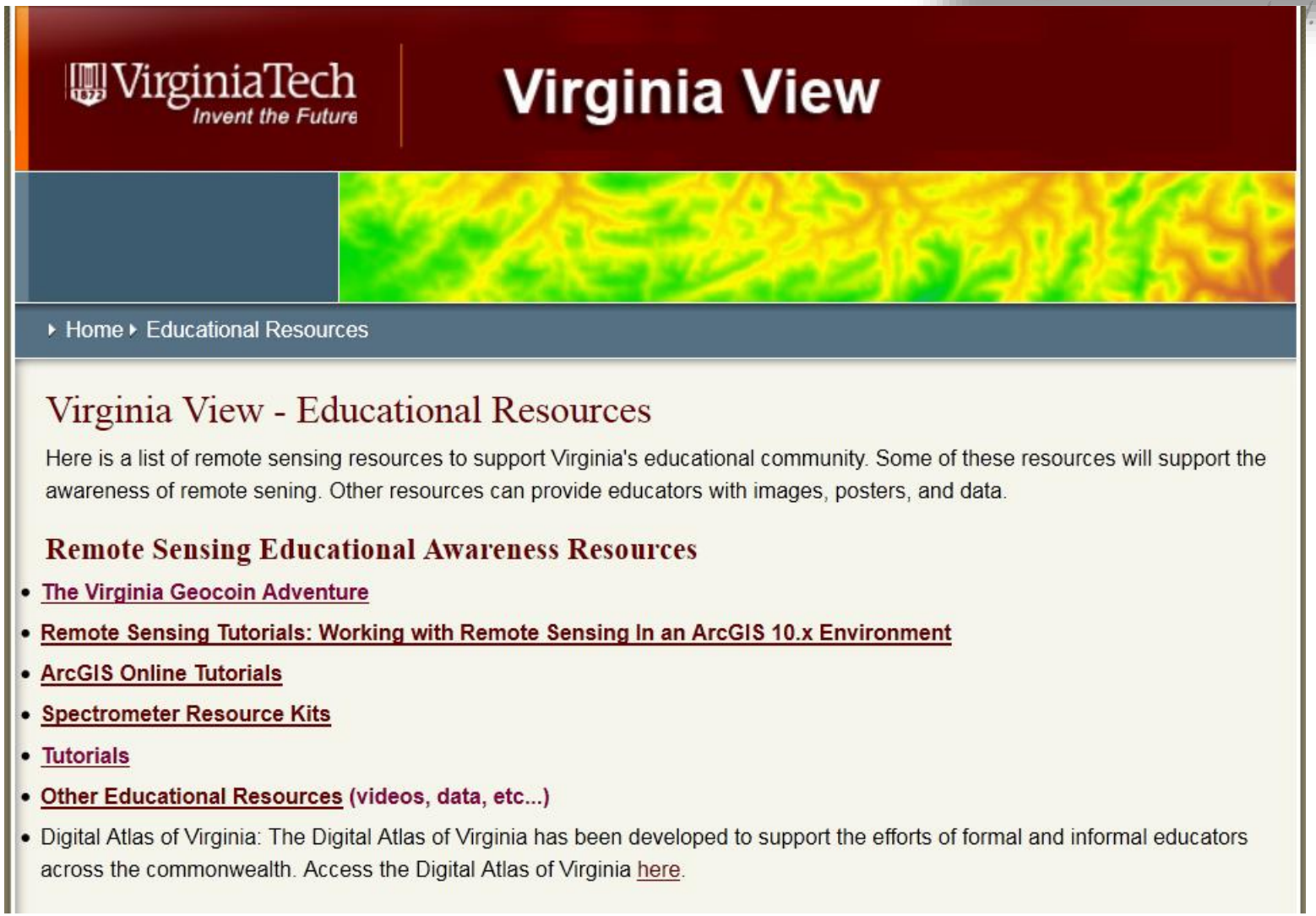
Resources for Instruction





GeoTEd.org

Resources for Instruction

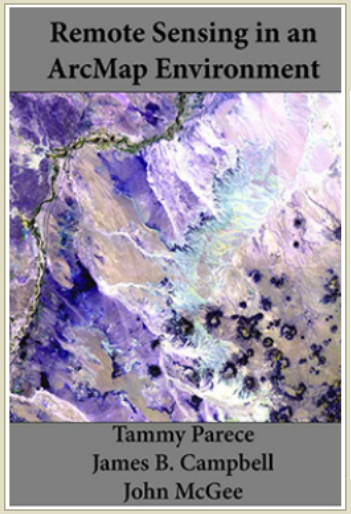


http://virginiaview.cnre.vt.edu/education.html

Resources for Instruction

Remote Sensing Tutorials - *Working with Remote Sensing Within an ArcGIS 10.x Environment.*

These lesson plans and online videos can be acquired as a Kindle eBook. The Workbook is ~348 pages in length, and costs $2.99. You can access the eBook from here: . You can also browse and view videos associated with each chapter in the Remote Sensing Workbook below, or via the VAView / Virginia Geospatial Extension YouTube Channel.



Remote Sensing Analysis in an ArcMap Environment Kindle Edition

by Tammy Parece (Author), James B. Campbell (Author), John McGee (Author)

See all formats and editions

Kindle
$0.00 kindleunlimited

Subscribers read for free
$2.99 to buy
Prime Borrow for free

Remotely sensed images are widely available and have countless potential applications. However, analyzing these images used to be a difficult and expensive process. Now, Esri's ArcGIS 10.x with Image Analysis extension provides tools that can be used by novice and experienced ArcGIS users alike. In this manual, we provide a series of easy-to-understand tutorials to guide you through image analysis processes. By

New Chapter! Streaming and Displaying Landsat Imagery (accompanies Chapter 10 of the above text)

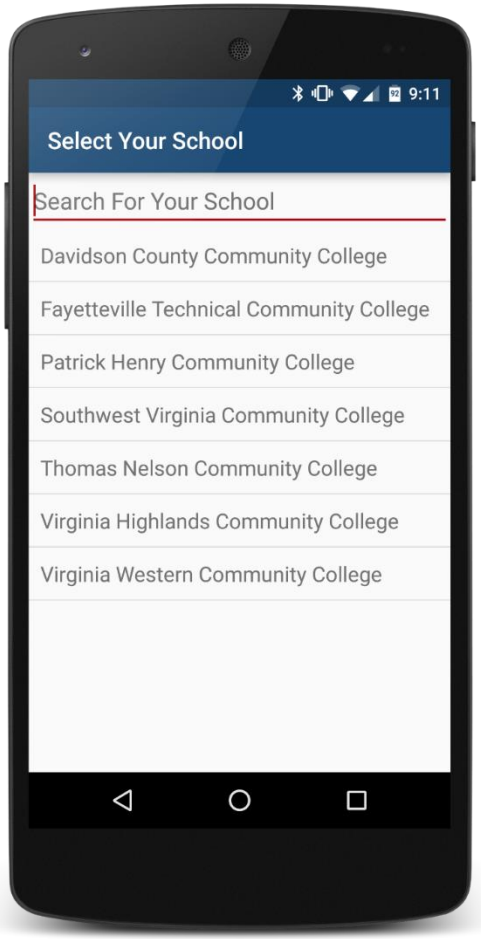
Access Video Turtorials that Accompany Each Chapter
Video - Opening an Existing Map Document in ArcMap
Video - Adding Data to a Map Document
Video - Connecting to a Drive in ArcMap
Video - Saving and Exporting Map Documents in ArcGIS
Video - Repairing a Data Address in ArcG
Video - Displaying Raster and Vector Data

Resources for Instruction

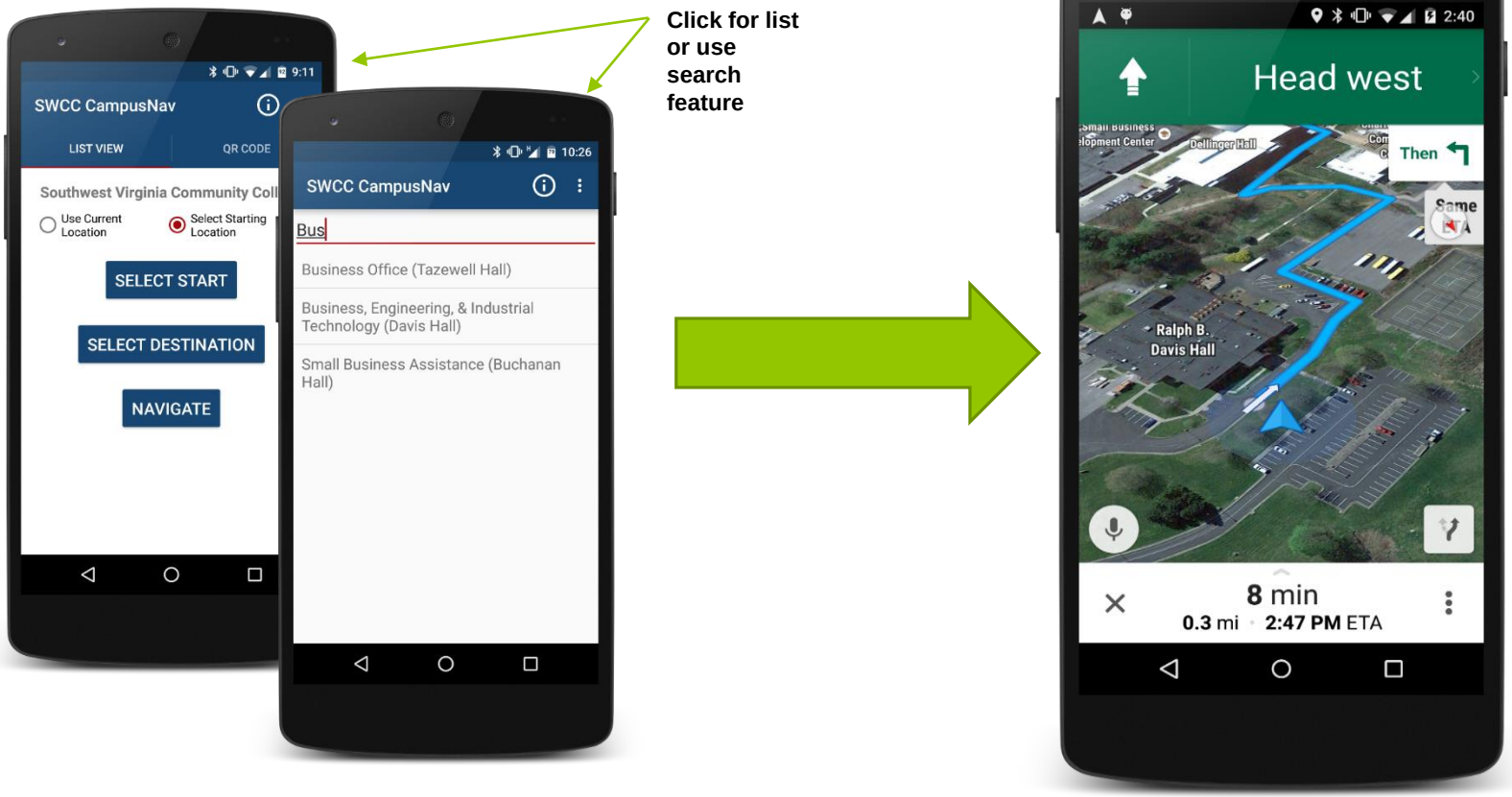
http://www.igettremotesensing.org/

Resources for your campus

Mobile App for Campus Navigation

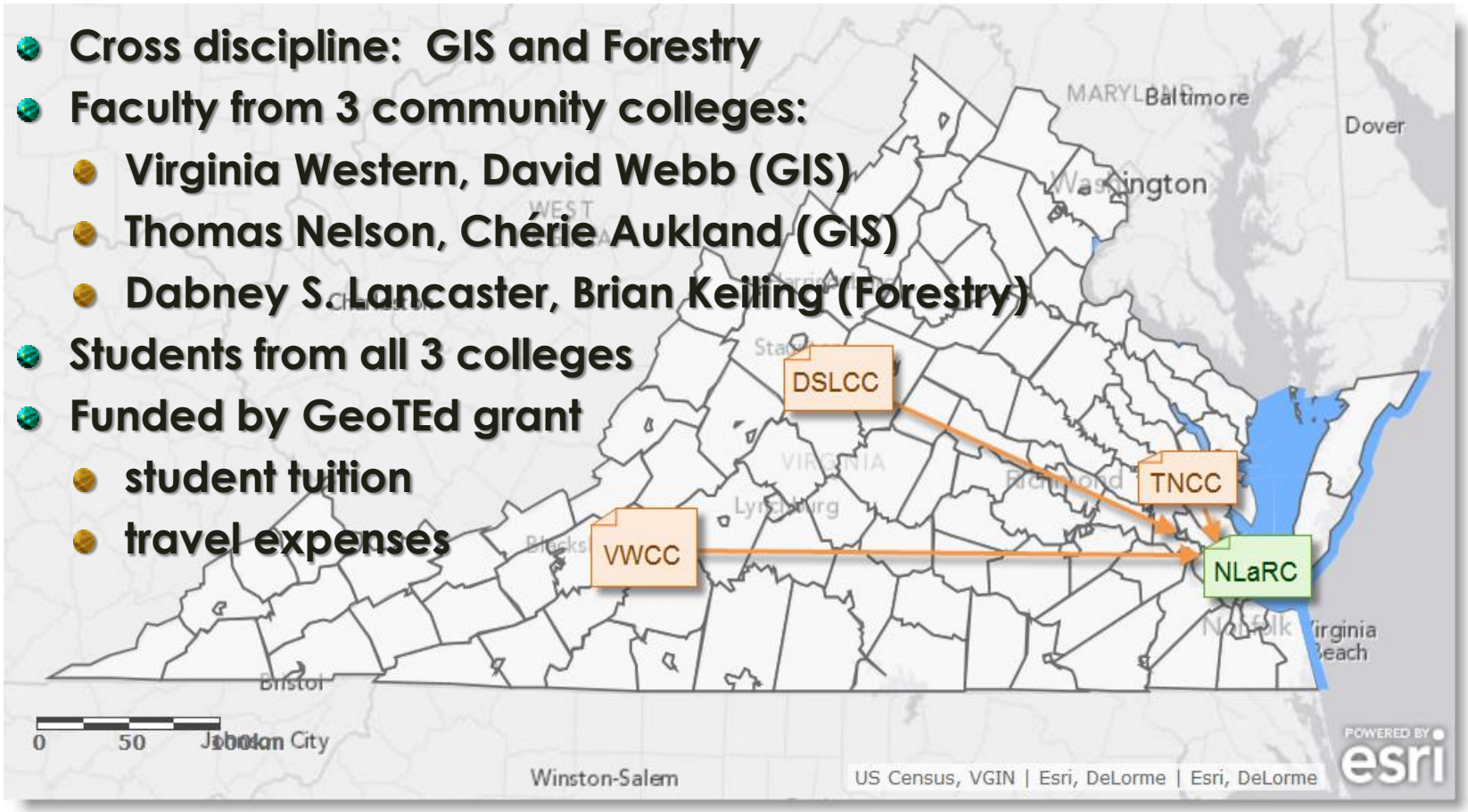


The current GPS location of the device can be used or the starting location and destination can both be set from a list displayed. The user can also scan QR Codes on maps or buildings.

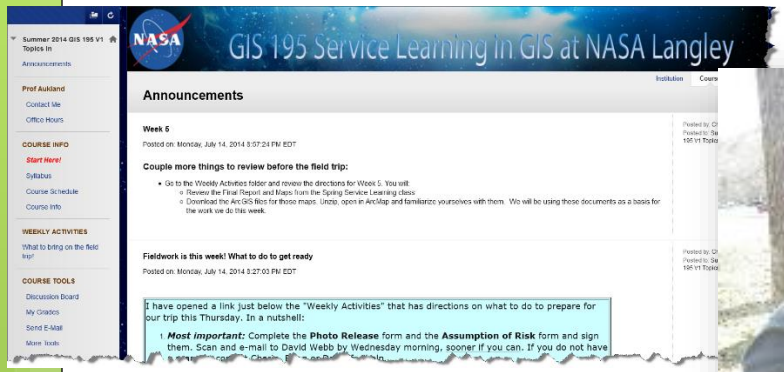


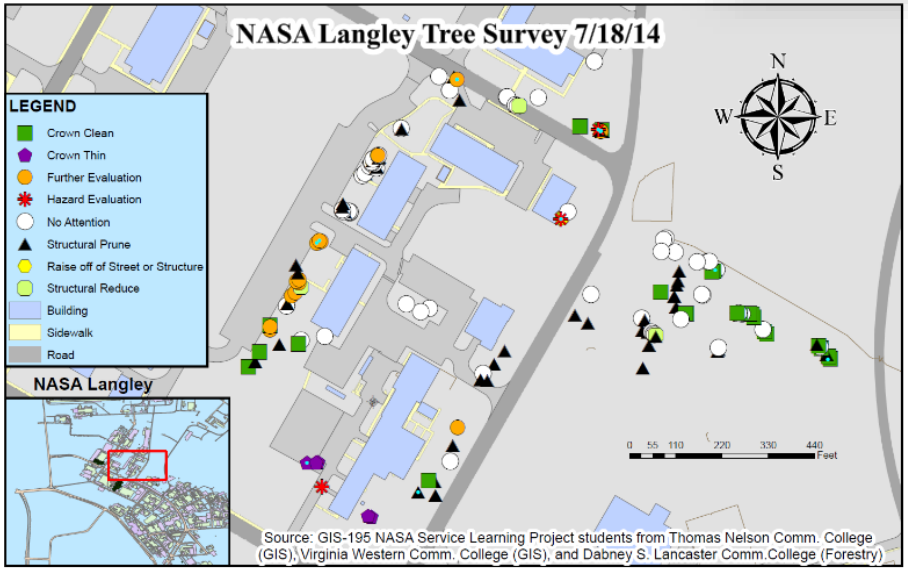
Geospatial Service Learning Courses

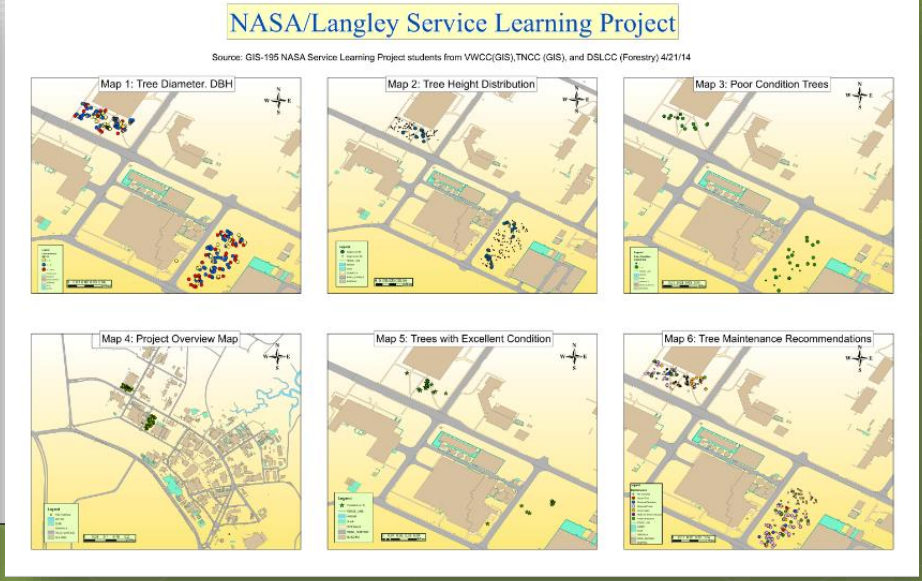
- Cross discipline: GIS and Forestry
- Faculty from 3 community colleges:
  - Virginia Western, David Webb (GIS)
  - Thomas Nelson, Chérie Aukland (GIS)
  - Dabney S. Lancaster, Brian Keiling (Forestry)
- Students from all 3 colleges
- Funded by GeoTEd grant
  - student tuition
  - travel expenses



Geospatial Service Learning Course







Geospatial Service Learning Course-NASA Wallops Island, 2016

SERVICE LEARNING COURSE OPPORTUNITY AT NASA WALLOPS ISLAND

HELP NASA INVESTIGATE SEA LEVEL RISE AND INVASIVE SPECIES

Thomas Nelson Community College is offering a three-credit Sea Level Rise Service Learning course. All expenses paid for course tuition and four days of fieldwork including travel, lodging, and food! Open to Virginia community college. Competitive application process, students from all disciplines are encouraged to apply. Sponsored by Virginia Space Grant Consortium (VSGC) and offered through the STEM Takes Flight Program in partnership with NASA Wallops Flight Facility and Thomas Nelson Community College.

GIS 295 - Topics in Service Learning in GIS.
This online course contains four days of outdoor fieldwork at NASA Wallops on Virginia's Eastern Shore. Field work will likely be completed over a weekend (Thursday-Sunday) in April 2016.

Faculty-led student teams will engage with NASA scientists to tackle the issue of sea level rise, invasive species and their impact on coastal communities and ecosystems including NASA Wallops. Using GIS, global positioning system (GPS), unmanned aircraft systems, and other technologies students will model various sea level rise scenarios and gauge their impacts to NASA infrastructure and habitats. Students will compare data with existing datasets and develop a report to be presented to NASA staff.

Application: *https://www.surveymonkey.com/r/9HXDL88*
Application Due Date: December 1, 2015
Notification of acceptance by December 5

http://www.vsgc.odu.edu/STEMtakesFlight/sealevelrise.html

WFF

VIRGINIA SPACE GRANT CONSORTIUM

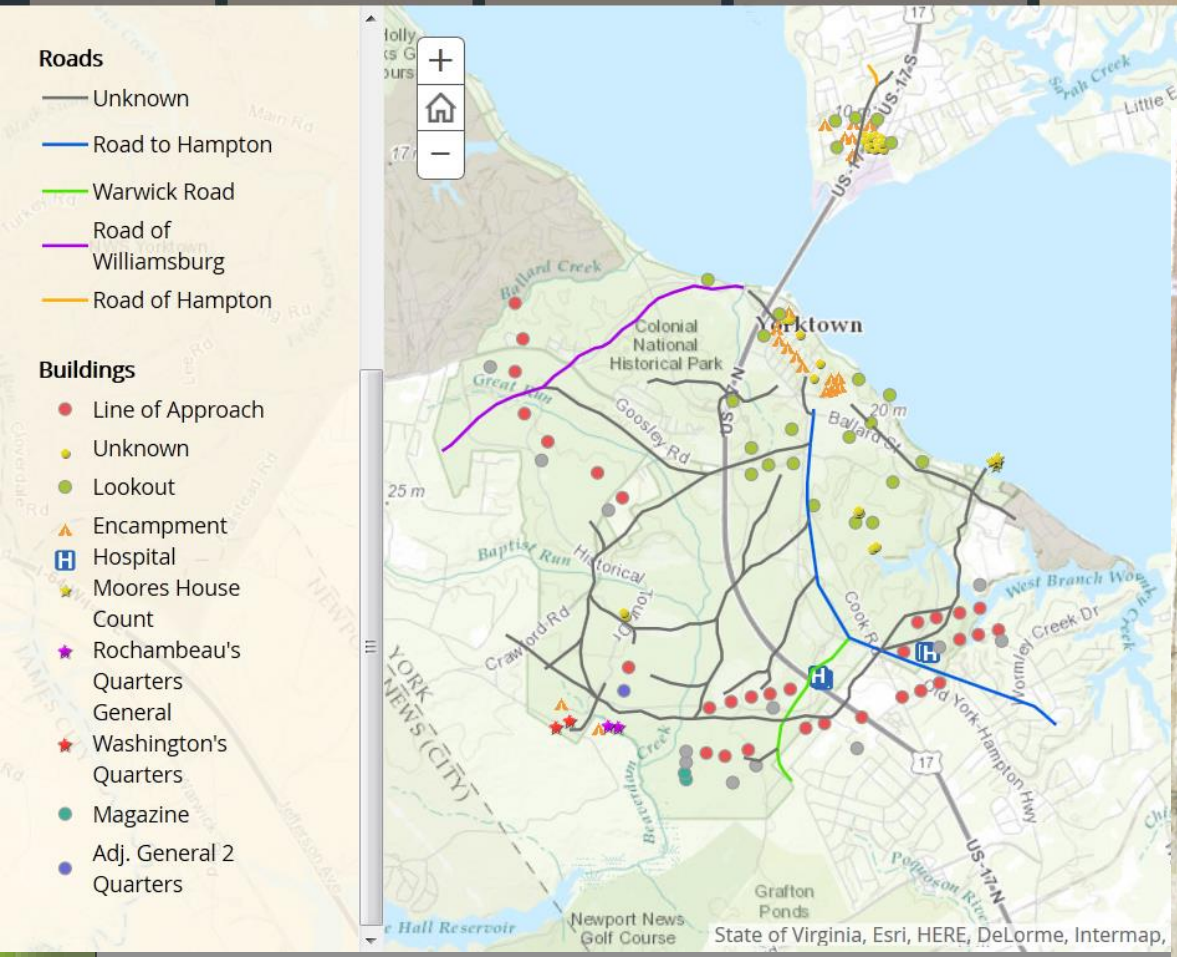
Thomas Nelson COMMUNITY COLLEGE
Explore. Excel. Succeed.

During the course you will
- Learn about service learning.
- How to use and operate an Unmanned Aircraft Systems (UAS) to collect data
- Develop or acquire geographic information system GIS skills in analyzing data collected with a UAS. (Prior GIS knowledge is not a pre-requisite for this cross-discipline course)
- Learn about remote sensing and how to use regular imagery, near infrared imagery and Lidar to answer questions using a GIS.
- Help NASA solve a problem, work side-by-side with NASA scientists
- Gain real world experience collecting and analyzing data
- Tour the facilities and observe the research being completed at the site.

Virginia Peninsula Historic Mapping Project

A story map esri

Brief Overview | Military Map of 1862 | USACE EUSTIS 1918 | Cartes Des Environs 1782 | Bauman Yorktown 1781



Virtual Internship