



*Empowering Colleges:  
Expanding the Geospatial Workforce*

# Defining What The Geospatial Workforce Needs to Know

## Focus on Diversity, Equity and Inclusion

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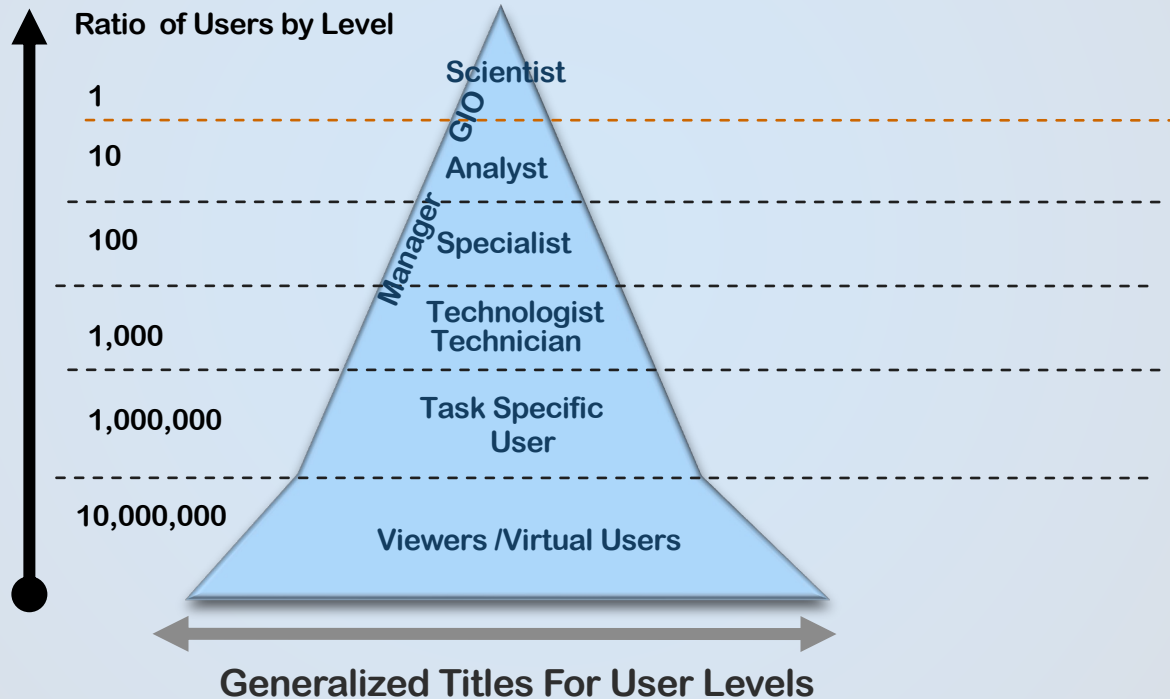


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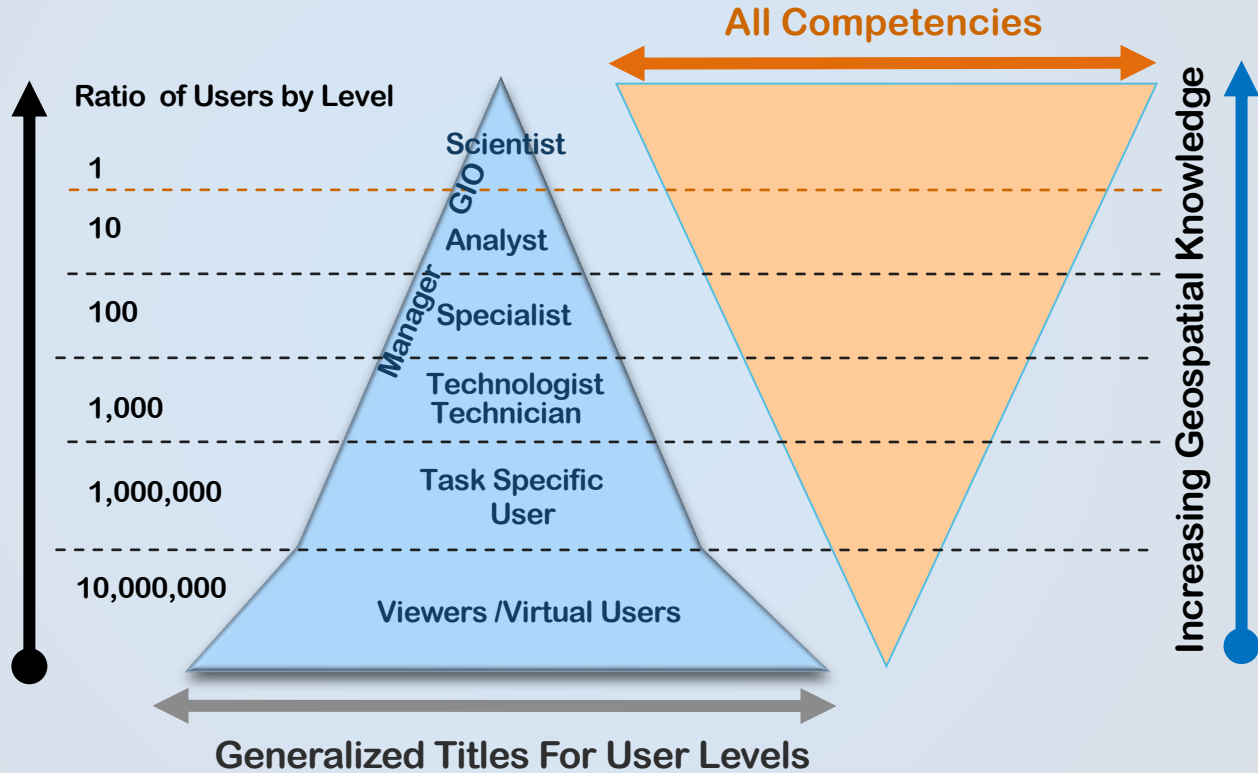
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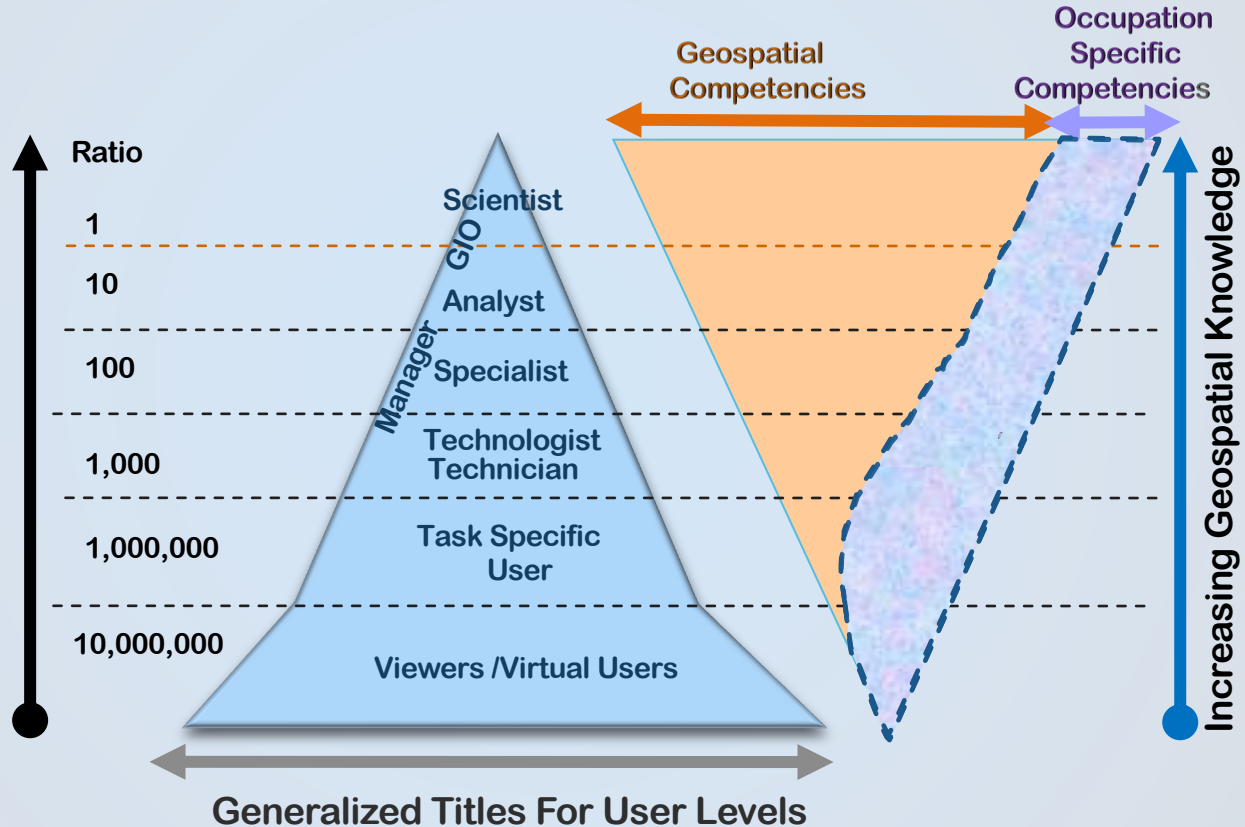
# Geospatial Workforce and Users of the Technology



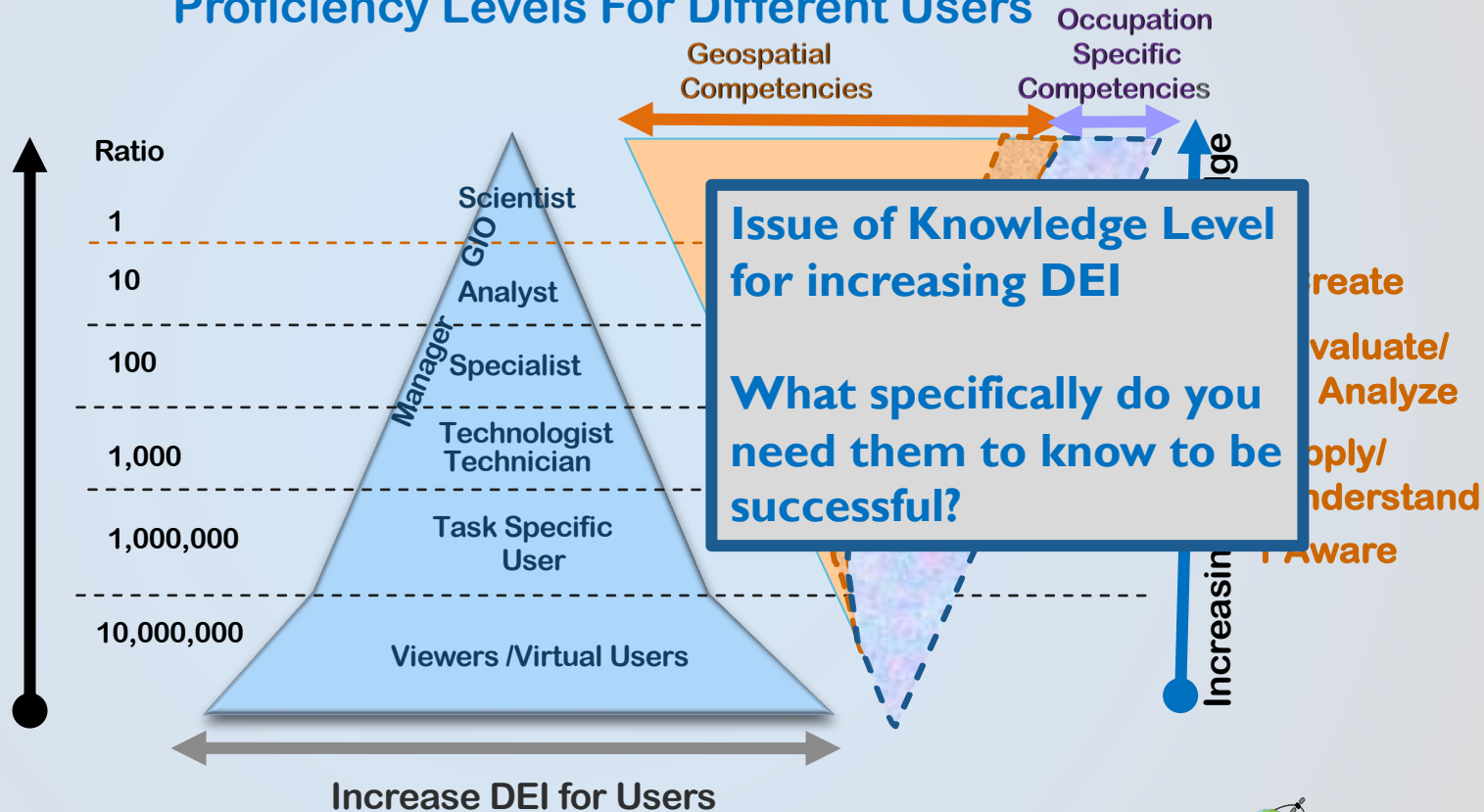
# All Competencies For User Levels



# Geospatial and Occupation Specific Competencies



# Proficiency Levels For Different Users



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## Filling the Geospatial Knowledge Bucket - Nine Competency Categories

1. **Conceptual Foundations including Spatial and Critical Thinking**
2. **Geospatial Data Fundamentals**
3. **Data Acquisition**
4. **Database Design and Management**
5. **Geospatial Analysis**
6. **Cartography and Visualization**
7. **Application Development**
8. **Remote Sensing Fundamentals**
9. **Professional Practice**

Note: acknowledge use of similar terms and language from GISCI , GTCM and UCGIS Body of Knowledge

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## Focus on DEI - skill levels and competency requirements still depend on employee work assignment

### Example from Category I – Conceptual Foundations

- 1: **Aware** of critical and spatial thinking related to spatial patterns in places and timeframes for applications but cannot apply them independently
- 2: **Understand** use of critical and spatial thinking related to spatial patterns in places and timeframes for applications and can **apply** them with **signification guidance**
- 3: **Ability to use** critical and spatial thinking to analyze and evaluate patterns in places and timeframes for applications with **minimal guidance**.
- 4: **Ability to** use critical and spatial thinking related to spatial patterns in places and timeframes for different applications **without assistance** and **create** possible new methodology

# List of Skills and Competencies

- Personal Assessment Tool
  - Worker does a “Self Assessment”
- Matching skill levels based on needed knowledge
- Customize the list for specific workforce user level
- Use it to identify strengths and weaknesses

2	<input type="radio"/>	0	Unaware - No knowledge of competency		
3	<input type="radio"/>	1	Aware- Can explain basic facts about competency		
4	<input type="radio"/>	2	Apply - Use competency with significant guidance		
5	<input type="radio"/>	3	Analyze - Use competency with some guidance		
6	<input type="radio"/>	4	Evaluate - Use competency with little guidance		
7	<input checked="" type="radio"/>	5	Create - Use competency with no guidance and extend application		
8					
9			<b>1. Conceptual Foundations</b>		
10			1001 Conceptual foundations on which geographic information systems are based	<input type="radio"/>	1
11			1002 Spatial patterns and knowledge of how people and places are linked using spatial and critical thinking	<input type="radio"/>	1
12			1003 Geographic information relating to the Human-Environment Interaction, Regional Geography, Physical Geography, Cultural Geography	<input type="radio"/>	1
13			1004 Principles of geography applied to geospatial projects	<input type="radio"/>	1
14			1005 Problem statement outlining the problem and ways to solve it using geospatial technology	<input type="radio"/>	1
15			1006 Tobler's First Law: "everything is related to everything else, but near things are more related than distant things"	<input type="radio"/>	1
16			1007 Geometric approximations of the Earth's shape such as spheroids, ellipsoids, and geoids	<input type="radio"/>	1
17			1007 Map scale	<input type="radio"/>	1
18			1008 Map scale effect on collection or creation of data	<input type="radio"/>	1
19			1009 Datums	<input type="radio"/>	1
20			1010 Vertical datums	<input type="radio"/>	1
21			1011 Horizontal datums	<input type="radio"/>	1

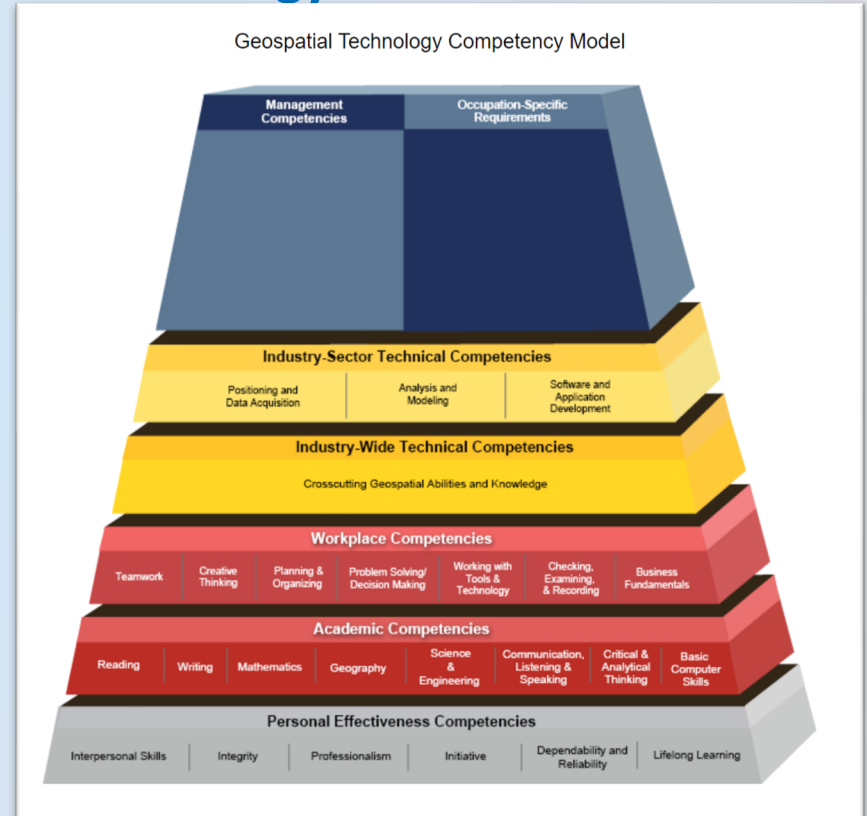


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# Resources Used to Create a List of Skills and Competencies

# USA Department of Labor Geospatial Technology Competency Model - GTCM

- Interactive 3D Model
- GTCM Updated in 2022/23 with industry input
  - provides one source for defining the skills and competencies needed by the workforce
- Tier 4 and 5 lists specific geospatial skills and competencies
  - Tier 5 divided into 3 areas: Data Acquisition, Analysis, and software development



<https://www.careeronestop.org/competencymodel/competency-models/geospatial-technology.aspx>



# GeoTech Center Webpage

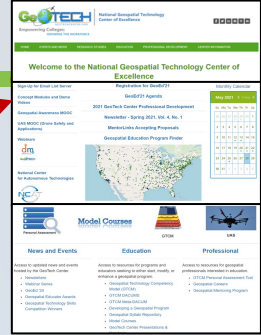
geotechcenter.org

Resources to help fill in the knowledge gaps

Assessment Tool  
10 Model Courses  
Concept Module PPTs  
Demonstration Videos  
Learning Modules  
MOOC 's

The screenshot shows the GeoTech Center website homepage. At the top, there is a navigation bar with links for HOME, NEWS AND EVENTS, RESEARCH STUDIES, EDUCATION, PROFESSIONAL DEVELOPMENT, CENTER INFORMATION, and CONTACT US. Below the navigation bar, there are several featured sections: 'Sign-Up for Email List Server', 'Concept Modules and Demo Videos', 'Geospatial Awareness MOOC', 'UAS MOOC (Drone Safety and Applications)', and 'Webinars'. A central banner features a map of the United States with numerous green location markers, titled 'Geospatial Education Program Finder'. To the right of the map is a 'Monthly Calendar' for May 2022. Below the main content area, there are three columns of featured resources: 'Personal Assessment' (with a magnifying glass icon), 'Model Courses' (with a stack of books icon), and 'UAS' (with a drone icon). The bottom section of the page is divided into three columns: 'News and Events', 'Education', and 'Professional'. Each column contains a brief description and a list of links to relevant resources. At the very bottom, there is a footer with copyright information and contact details.

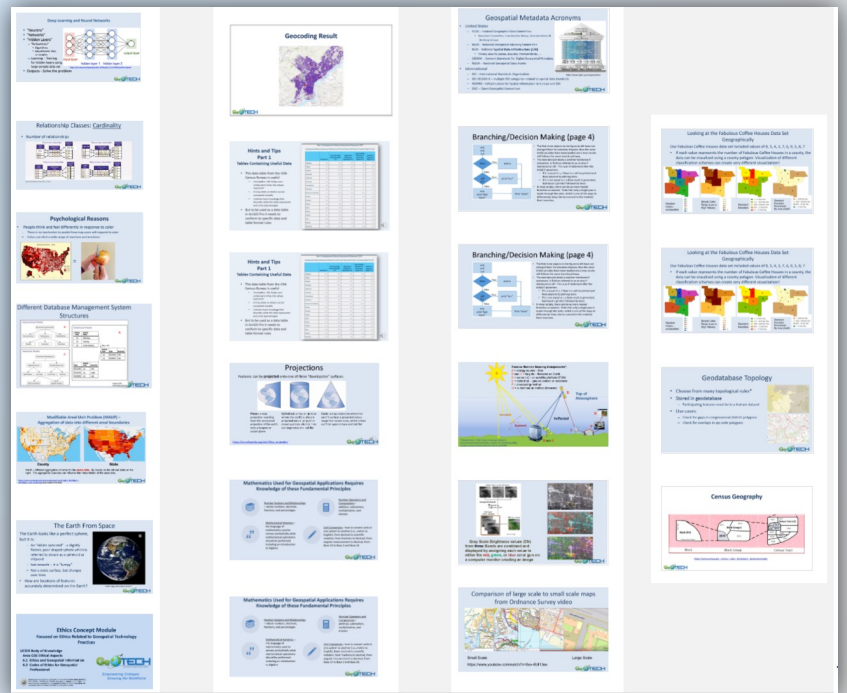




# Concept Modules – Video Review of Important Concepts

- Artificial Intelligence, Machine Learning, Deep Learning & Internet of Things
- Data Management and Metadata
- Data Visualization and MAUP, Colors
- Map Projections, Datums, Scale
- Ethics
- Excel and CSV tables – hints and tips
- Mathematics and Statistics
- Geocoding
- Programming
- Remote Sensing
- Topology
- US Census

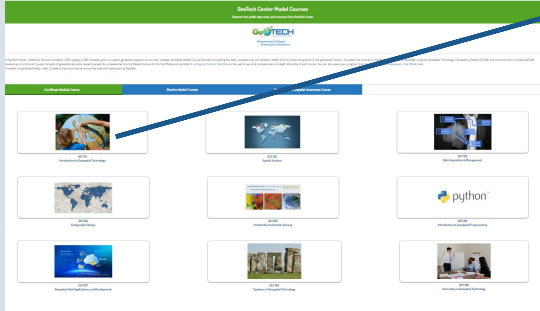
<https://www.geotechcenter.org/concept-modules-and-demonstration-videos8203.html>



Click Here First

# Model Courses

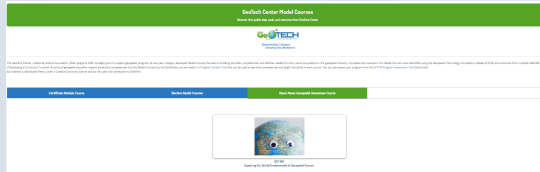
Certificate Model Courses



Elective Model Courses



Awareness Model Course



### GST 101 - Introduction to Geospatial Technology

**Course Description:** Introduction to the fundamentals of Geospatial Technology, including Geographic Information Systems (GIS), Global Positioning Systems (GPS), cartography, remote sensing, and spatial analysis through a series of hands-on computer-based exercises. Participants will learn how to utilize geospatial technology to address social and environmental issues. This course is designed to be used as an ancillary course to complement other disciplines or as an entry-level course into a geospatial program. Course content is based upon the revised State Department of Labor's Geospatial Technology Competency Model for entry-level geospatial occupations including Geospatial or IS Technicians and Technologists.

**Student Learning Outcomes (SLOs):**

1. The student will describe the fundamental concepts of Geographic Information Science and Technology.
2. The student will demonstrate proficiency in the basic functions of geospatial software and hardware.
3. The student will demonstrate basic awareness of fundamental remote sensing and spatial analysis techniques.
4. The student will demonstrate basic proficiency in map creation and design principles, including thematic map display, employment of map projections and cartographic design.
5. The student will demonstrate proficiency in the creation and acquisition of spatial data including the use of the Global Positioning System.
6. The student will demonstrate how to access different sources of data, demonstrate the process of creating data, and discuss the fundamental concepts of data quality.

**Student Learning Outcomes (SLOs):**

1. The student will describe the fundamental concepts of Geographic Information Science and Technology.

2. The student will demonstrate proficiency in the basic functions of geospatial software and hardware.

3. The student will demonstrate basic awareness of fundamental remote sensing and spatial analysis techniques.

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[Syllabus](#)   [Course Materials](#)   [Back to Model Courses](#)

### GST 101 - Introduction to Geospatial Technology

- Course Materials -

[Home](#)   [Events and News](#)   [Research Studies](#)   [Education](#)

[Introduction and Self Assessment and Study Guide](#)   [Syllabus](#)

### Unit 1 - Introduction Overview

**Unit 1 - Introduction Overview**

Unit 1.1: Module 1.1: Intro of GST - V8 Jan 16 2015

Unit 1.2: Module 1.2: View of GST - V7 Jan 7 2016

Unit 1.3: Module 1.2: View of GST - V8 Jan 7 2016 - Narration

Unit 1.4: Module 1.3: History and Context - V8 Jan 7 2016

Unit 1.5: Module 1.3: History and Context - V8 Jan 7 2016 - Narration

Unit 1.6: Module 1.1: Overview of GST - V8 Jan 7 2016 - Narration

[Unit 1.1: Introduction Overview](#)   [Unit 1.2: Introduction Overview](#)   [Unit 1.3: Introduction Overview](#)   [Unit 1.4: Introduction Overview](#)   [Unit 1.5: Introduction Overview](#)   [Unit 1.6: Introduction Overview](#)

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Intro to Geo... 16.2016.pptx   Open with

### Introduction to Geospatial Technology Unit 1

Module 1.1 - Overview of Geospatial Technology

**Geospatial Technology**

Empowering Colleges: Expanding the Geospatial Workforce

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# Thank You!

- Please contact me if you need help finding a resource or if you have suggestions for a resource you would like the GeoTech Center to **create** or **improve**!
- Ann Johnson – [ann@baremt.com](mailto:ann@baremt.com)