Syracuse City School District
Career and Technical Education Program
Geospatial Technology
Summary Overview

Program Overview

At the completion of this program, students will understand and be able to apply the fundamentals of geospatial technology, geographic information science, remote sensing, global positioning systems (GPS) and spatial data analysis. Students will complete hands-on, real-world projects, develop critical thinking, analysis and problem-solving skills. This course will contribute to the preparation of students for post-secondary education and a wide range of careers using GIS, GPS, spatial analyses, remote sensing, and digital mapping. Students will also have the opportunity to receive integrated academic and college credits.

Additional Learning Opportunities

- Micro-credentials: Students may pursue learning experiences and credentials depending on the requirements of the project that they are involved in. Some examples for this pathway include, but are not limited to:
    o Industry based credentials
- Summer Bridge Enrichment: Students will have the opportunity to participate in cross-curricular Summer Bridge programs to enhance and enrich their skills. Students will explore and create solutions that address authentic needs in the school and wider community with the involvement of local industry professionals. Students will build on skills learned during the school year to work collaboratively with students from other pathways and programs.

Integrated High School Academics

ELA 1 credit
Integrated Science 1 Credit
Integrated CFM .5 Credit

Concurrent College Enrollment

Successful completion of the 4-course CTE Geospatial Technology sequence will provide students an opportunity to earn up to nine (9) SUNY college credits in Geospatial studies from Mohawk Valley Community College (MVCC).

Course Calendar

Level	Quarter	Units of Study
Level 100	1	● Getting Started in Our Classroom ● SMART Goal Setting ● What is GIS? ● Basic Principles of GIS, Mapping and GPS
	2	● Introduction to ESRI ArcGIS Online ● Cartography with Map Layouts ● Symbology and Classification
	3	● Selection and Queries 　o SQL 　o Attribute Tables
	4	● Final Project ● Career Interest Surveys and Personality Type ● Career Exploration in Geospatial Technology
Level 200	1	● Getting Started in our Classroom

		● Introduction to Intermediate Geospatial Technology ● Labels and Annotation ● Digitizing and Geocoding
	2	● Geoprocessing Basics ● Joining, Relating and Relationship Classes ● Career Exploration ● Data Frames and Coordinate Systems
	3	● Geodatabases II ● Working with Rasters ● Georeferencing ● Spatial Adjustment
	4	● Digitizing II ● Georeferencing II ● Classification ● Review ● Final Project
Level 300	**1**	● Getting Started in our Classroom: SMART Goals ● Geospatial Technology Skills Review ● Geospatial Technology for Problem-Solving and Decision-Making ● Overview of Geospatial Credentials/Certification and Capstone Project ● Technical Skills Review
	2	● Remote Sensing and the Electromagnetic Spectrum ● Landsat Imagery and Change Detection

	3	● Preparing for Industry Credentials/Certification:
		    o Understanding Geospatial Data and ArcGIS Software
		    o GIS Tools and Processes
		    o Georeferencing, Map Projections and Reprojecting
		    o Symbology and Classification

	4	● Collaborative Geospatial Mapping Project in Conjunction with Drone Technology/RPAS Program using ArcGIS Pro ● College Planning, Research and Preparedness

Level 400	**1**	● SMART Goals Review
		● Geospatial Technology Skills Review
		● Planning for the Future, College Preparedness and Application
		    o Financial Planning
		    o College Preparedness and Exploration
		    o College Essay Writing and Review
		    o College Application Process

	2	● Geospatial Certification Review ● Project Management Overview and Planning ● Project Implementation ● Project Results and Reporting

	3	● Preparing for Certification Exam:
		    o Geospatial Data and ArcGIS Software Review
		    o GIS Tools and Processes Review
		    o Georeferencing, Map Projections and Reprojecting Review
		    o Symbology and Classification Review

	4	● Industry Certification Exam ● CTE Portfolio Development and Wrap-Up ● Social Media Footprint and Networking

Syracuse City School District
Career and Technical Education Program
Course Syllabus
GIT100: Geospatial Technology 100

Program Overview

At the completion of this program, students will understand and be able to apply the fundamentals of geospatial technology, geographic information science, remote sensing, global positioning systems (GPS) and spatial data analysis. Students will complete hands-on, real-world projects, develop critical thinking, analysis and problem-solving skills. This course will contribute to the preparation of students for post-secondary education and a wide range of careers using GIS, GPS, spatial analyses, remote sensing, and digital mapping. Students will also have the opportunity to receive integrated academic and college credits.

Course Description

In this course, students will define and understand the basic concepts of Geospatial Technology, Geographic Information Systems (GIS), identify career opportunities in the field of GIS, and learn key tools used by GIS specialists. Students will participate in hands-on activities and lessons that use professional-level ESRI software to create and analyze maps and display mapping data. This course will contribute to the preparation of students for a wide range of careers using GIS, GPS, spatial analyses, remote sensing, and digital mapping.

Work-Based Learning

Students will be connected with professionals in the geospatial technology field through field trips, job shadowing and career coaching, leading to opportunities for direct job training and real-world experience. Students will create and maintain a portfolio of their experiences to document the development of their skills, including a professional resume.

Pre-Requisites

N/A

Course Objectives

- Students will define GIS and explain its application in a variety of career fields.
- Students will learn how to identify spatial datasets, understand the basic toolsets used in geospatial technology, and apply basic cartography principles.
- Students will learn basic network, computer, file management and file formatting skills.
- Students will understand the Global Positioning System (GPS) and how it works.
- Students will discover the many career opportunities within the field of Geospatial Technology, including education requirements, potential salary and job outlook.
- Students will be able to use basic ESRI ArcGIS online software to manipulate geographic data, create maps and digital datasets.
- Students will be able to use ESRI ArcGIS software to perform basic analyses of geographic data; they will have the opportunity to learn the outdoor, GPS-based treasure hunt called 'Geocaching'.

Integrated Academics

1. Integrated CTE ELA Credit – Students will earn one English 12 credit after completion of their GIT 400 course.
2. Integrated CTE Science Credit – Students will earn one Science credit after completion of their GIT 300 course.

Dual Enrollment College Credit

Successful completion of the 4-course CTE Geospatial Technology sequence will provide students an opportunity to earn up to nine (9) SUNY college credits in Geospatial studies from Mohawk Valley Community College (MVCC).

Equipment and Supplies
- **School will provide:** All necessary lab and classroom equipment.
- **Student will provide:** A notebook for taking and saving notes, pen/pencils, USB thumb drive to save/transfer data.

Textbook
N/A

Grading
25%   Class attendance/ Participation
35%   Lab Assignments
10%   Quizzes (Practical)
30%   Project Work (Practical)

Additional Course Policies
- Students are required to follow all classroom professionalism and safety procedures.
- Please review class policies.
- All work is due at the time and day specified when the assignment is given. Submission details for work to be graded will be given at the time the work is assigned.
- Late Work: Late work will be accepted up to one week past the assigned date. An entire marking period worth of work the day before the marking period ends will not be accepted.

Course Calendar

Quarter	Units of Study
1	- Getting Started in Our Classroom - SMART Goal Setting - What is GIS? - Basic Principles of GIS, Mapping and GPS
2	- Introduction to ESRI ArcGIS Online - Cartography with Map Layouts - Symbology and Classification
3	- Selection and Queries - SQL - Attribute Tables
4	- Final Project - Career Interest Surveys and Personality Type - Career Exploration in Geospatial Technology

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Weeks 1-4 **Getting Started in Our Classroom** **SMART Goal Setting** **What is GIS?**	● What are the expectations for students in the Geospatial Technology program? ● What are SMART Goals? ● What is GIS and what is it used for? ● What is the history of Geospatial Technology? ● What kinds of careers are available in the Geospatial field?	● Develop classroom rules and establish relationships. ● Define SMART goals. ● Create personal SMART goals. ● Create a definition for GIS. ● Identify the G.I.S. in Geographic Information Systems. ● Identify three types of Geospatial Technologies. ● Explain how GIS can be used to solve real-world problems. ● Explain how GIS was developed and early historical applications. ● Describe career opportunities in the geospatial field.	**Independent Assignments:** ● Data sources quiz ● Class participation ● GIS worksheet assignments ● Virtual job shadow assignments ● Infographic for career choices.	**Career Ready Practices** CRP 2,4,5 **Cluster Standards** ST 2,5 **Pathway Standards** ST-ET 2 ST-SM 3	**ELA** 9-10R 1,2,4,7,8,9 9-10W 2,5,6,7 9-10SL 1,2,3,4,5,6 9-10L 1,2,3,4,5,6 **Literacy** 9-10RST 1,2,4,6,7,8,9 9-10WHST 2,4,5,6,7 **Math** **Science**
Weeks 6-10 **Basic Principles of GIS, Mapping and GPS**	● How is data stored and retrieved? ● How does Geography fit into GIS? ● What is a topographic map? ● What is the Global Positioning System and how does it work? ● What is geocaching? ● How is GPS used to geocache? ● How do we use a scale?	● Use computer files, folders and network drives effectively and efficiently. ● Explain the concepts of latitude and longitude. ● Read topographic maps and explain what they represent. ● Define the basic principles of photogrammetry and why it is important in GIS. ● Create a pair of 3D anaglyph glasses. ● Define GPS and how it works. ● Identify uses for GPS. ● Describe and demonstrate how to use handheld Garmin GPS receivers. ● Describe and demonstrate how to geocache. ● Identify two types of data used in GIS. ● Identify three different types of	**Exercises:** ● Topics quiz ● Class work ● Successful field trip to geocache ● Completed anaglyph assignment ● Geocache survey	**Career Ready Practices** CRP 2,4,5,7,8,11 **Cluster Standards** ST 2,4,6 IT 2 **Pathway Standards** ST-SM 2,4	**ELA** 9-10R 1,2,4,7,8,9 9-10W 2,5,6,7 9-10SL 1,2,3,4,5,6 9-10L 1,2,3,4,5,6 **Literacy** 9-10RST 1,2,4,6,7,8,9 9-10WHST 2,4,5,6,7 **Math** **Science**

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
		Vector Data and their uses. ● Identify three types of Raster Data and their uses.			
Weeks 11-14 **Introduction to ESRI ArcGIS Online** **Cartography with Map Layouts**	● What is ESRI? ● What are the basic tools of ESRI's software? ● What is the difference between points, lines, and polygons? ● What is ArcCatalog? ● What can ArcGIS be used for? ● How do we add data? ● What is a basemap? ● How does ArcGIS Online work? ● How does one create a map layout? ● What elements need to be included in a map layout?	● Define what ESRI stands for. ● Describe the difference between ArcGIS Online and ArcGIS Pro. ● Operate the ArcGIS interface. ● Compare and contrast points, lines, and polygons. ● Describe ArcCatalog and uses. ● Identify, select and locate ArcGIS's menus and toolbars. ● Illustrate how to add data to ArcGIS (including BaseMaps). ● Explain different geospatial file formats such as: Shapefiles, Geodatabases, Coverages and Raster. ● Describe the difference between Windows Explorer and ArcCatalog ● Recognize data view versus map view. ● Identify the common map elements to a map layout. ● Create a blank map document that can be populated with geospatial data for analysis. ● Create an inset map with an extent indicator to provide the spatial context for the main data frame. ● Demonstrate the use of a map template to create uniform looking maps. ● Set up a map page layout, determine the legend content and settings, choose which map elements to include, and export the map to share with others.	**Exercises:** ● Introduction to ArcGIS ● Introduction to ArcCatalog ● Shapefile formats exercise ● Map layout vs. map view lab ● Map document lab exercise ● Inset map exercise ● Map template lab exercise **Independent Assignments:** ● Cartography with map layouts ● Complete map layout ● Vocabulary quiz ● Performance quiz	**Career Ready Practices** CRP 2,8,11 **Cluster Standards** ST 2,4 IT 2 **Pathway Standards** ST-ET 2,3	**ELA** 9-10R 1,2,4,7,8,9 9-10W 2,5,6,7 9-10SL 1,2,3,4,5,6 9-10L 1,2,3,4,5,6 **Literacy** 9-10RST 1,2,4,6,7,8,9 9-10WHST 2,4,5,6,7 **Math** **Science**
Weeks 16-20 **Symbology and Classification**	● What is symbology? ● How can we use ArcGIS to predict deforestation?	● Explain symbology and how it is used. ● Describe the various methods for symbolizing data.	**Exercises:** ● Single symbol classification ● Quantities – graduated colors and symbols	**Career Ready Practices** CRP 2,11	**ELA** 9-10R 1,2,4,7,8,9 9-10W 2,5,6,7 9-10SL 1,2,3,4,5,6

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
		● Choose an appropriate method of symbology for any given circumstance. ● Explain what layer files are and how they can be useful.	● Categories – unique values **Independent Assignments:** ● Symbology quiz		9-10L 1,2,3,4,5,6
				Cluster Standards ST 2,4,6	**Literacy** 9-10RST 1,2,4,6,7,8,9 9-10WHST 2,4,5,6,7
				Pathway Standards ST-ET 6	**Math**
					Science
Week 21-30 **Selection and Queries** **SQL** **Attribute Table**	● How is data organized in ArcGIS? ● How do we manipulate attribute tables? ● How do we apply GIS to a real-world, crime mapping analysis? ● What is Structured Query Language (SQL)? ● What is Structured Query Language (SQL)? ● How does all of this fit together? ● How can we apply our knowledge in a specific area of discipline within our school (i.e., work in conjunction with another course)?	● Identify how data is organized and stored in ArcGIS. ● Retrieve stored information on geographic features. ● Illustrate the proper approach to creating a new field to store data. ● Select the appropriate data type to use when adding a field to an attribute table. ● Perform text and mathematical operations with the field calculator to manipulate data stored in an attribute table. ● Evaluate the appropriate use of the summarize and statistical functions within the attribute table. ● Demonstrate selection by attributes. ● Demonstrate selection by location. ● Apply knowledge and skills to a project, including collaborating with team members to identify a specific project of interest, implementing the project plan and analyzing results, and creating a final output (map, poster display, presentation, etc.) which assimilates the findings.	**Exercises:** ● Exploring coordinate systems ● Measuring tools ● Projection corrections ● Attribute tables ● Data manipulation ● Select by attributes ● Select by location **Independent Assignments:** ● Data frames and coordinate systems ● Information fundamentals ● Selections and queries ● Quiz **Project:** ● Crime mapping analysis project in collaboration with Forensic Science class. ● Project outputs include group discussion, student-led inquiry, hypothesis development, research, evaluation of findings, technology/oral presentations to an authentic audience, and reflection.	**Career Ready Practices** CRP 2,4,7,8,11	**ELA**
				Cluster Standards ST 2,4,6	**Literacy** 9-10RST 1,2,4,6,7,8,9 9-10WHST 2,4,5,6,7
				Pathway Standards ST-ET 2 ST-SM 2,4	**Math**
					Science
Weeks 31-33 **Final Project**	● How does all of this fit together? ● How can we apply our knowledge in a specific area of discipline within our school (i.e., work in conjunction with another course)?	● Apply knowledge and skills to a final project. ● Collaborate with team members to identify a specific project of interest. ● Implement the project plan and analyze results.	**Final Project** ● Project plan assessment ● Project plan implementation ● Final output creation ● Collaborative and peer review	**Career Ready Practices** CRP 2,4,6,7,8,11,12	**ELA** 9-10R 1,2,4,7,8,9 9-10W 2,5,6,7 9-10SL 1,2,3,4,5,6 9-10L 1,2,3,4,5,6
				Cluster Standards ST 1,2,3,6	**Literacy** 9-10RST 1,2,4,6,7,8,9 9-10WHST 2,4,5,6,7

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards		
		● Create a final output (map, poster display, presentation, etc.) which assimilates the findings.		**Pathway Standards** ST-SM 1,2,4 ST-ET 1,2,3,5,6	**Math**		
					Science		
Week 34-40 **Career Interest and Personality Type** **Career Exploration in Geospatial Technology**	● How does personality affect career choice? ● What types of careers and opportunities are available within the field of geospatial technology? ● Why is knowing your own personality, likes and dislikes important to being successful in the future?	● Determine personal strengths, weaknesses, likes and dislikes through personality and career choice surveys. ● Research the wide variety of Geospatial Technology career pathways. ● Research the education requirements, job outlook and salary for different careers. ● Investigate careers and college programs that align and are of interest based on surveys and career research.	**Personality Surveys** ● Myers-Briggs assessment. ● Holland code assessment. ● Virtual job shadow assignments and career survey. ● Complete career choice research and essay. ● Complete a career choice infographic.	**Career Ready Practices** CRP 1,2,4,6,7,8,10,11	**ELA** 9-10R 1,2,4,7,8,9 9-10W 2,5,6,7 9-10SL 1,2,3,4,5,6 9-10L 1,2,3,4,5,6		
				Cluster Standards ST 2,4,5	**Literacy** 9-10RST 1,2,4,6,7,8,9 9-10WHST 2,4,5,6,7		
				Pathway Standards ST-ET 2 ST-SM 4	**Math**		
					Science		

Syracuse City School District
Career and Technical Education Program
Course Syllabus
GIT200: Geospatial Technology 200

Program Overview

At the completion of this program, students will understand and be able to apply the fundamentals of geospatial technology, geographic information science, remote sensing, global positioning systems (GPS) and spatial data analysis. Students will complete hands-on, real-world projects, develop critical thinking, analysis and problem-solving skills. This course will contribute to the preparation of students for post-secondary education and a wide range of careers using GIS, GPS, spatial analyses, remote sensing, and digital mapping. Students will also have the opportunity to receive integrated academic and college credits.

Course Description

In this course, students will define and understand the basic concepts of Geospatial Technology, Geographic Information Systems (GIS), identify career opportunities in the field of GIS, and learn key tools used by GIS specialists. Students will participate in hands-on activities and lessons that use professional-level ESRI software to create and analyze maps and display mapping data. This course will contribute to the preparation of students for a wide range of careers using GIS, GPS, spatial analyses, remote sensing, and digital mapping.

Work-Based Learning

Students will be connected with professionals in the geospatial technology field through field trips, job shadowing and career coaching, leading to opportunities for direct job training and real-world experience. Students will create and maintain a portfolio of their experiences to document the development of their skills, including a professional resume.

Pre-Requisites

GIT 100: Geospatial Technology 100

Course Objectives

- Describe the fundamental concepts and applications of geographic information science and technology and their use in collecting, analyzing, and displaying geospatial data.
- Students will understand the basic concepts of remote sensing, Global Positioning Systems and satellite imaging.
- Describe and explain the principles of mapping, spatial analysis and coordinate systems.
- Describe different sources of spatial data and demonstrate how to acquire spatial data, including the fundamental concepts and use of Global Positioning Systems (GPS).
- Discuss the fundamental principles of remote sensing and image analysis.
- Identify remote sensing platforms and their respective functions.
- Discuss and demonstrate fundamental cartographic concepts and principles.

Integrated Academics

1. Integrated CTE ELA Credit – Students will earn one English 12 credit after completion of their GIT 400 course.
2. Integrated CTE Science Credit – Students will earn one Science credit after completion of their GIT 300 course.

Dual Enrollment College Credit

Successful completion of the 4-course CTE Geospatial Technology sequence will provide students an opportunity to earn up to nine (9) SUNY college credits in Geospatial studies from Mohawk Valley Community College (MVCC).

Equipment and Supplies

- **School will provide:** All necessary lab and classroom equipment.
- **Student will provide:** A notebook for taking and saving notes, pen/pencils, USB thumb drive to save/transfer data.

Textbook
        N/A

Grading
        20%   Class attendance/ Participation
        10%   Oral Presentation
        30%   Assignments
        20%   Mid-Term Exam (Practical)
        20%   Final Exam (Practical)

Additional Course Policies
- Students are required to follow all classroom professionalism and safety procedures. Please review specific classroom policies.
- All work is due at the time and day specified when the assignment is given. Submission details for work to be graded will be given at the time the work is assigned.

Course Calendar

Quarter	Units of Study
1	- Getting Started in our Classroom - Introduction to Intermediate Geospatial Technology - Labels and Annotation - Digitizing and Geocoding
2	- Geoprocessing Basics - Joining, Relating and Relationship Classes - Career Exploration - Data Frames and Coordinate Systems
3	- Geodatabases II - Working with Rasters - Georeferencing - Spatial Adjustment
4	- Digitizing II - Georeferencing II - Classification - Review - Final Project

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Weeks 1-2 **Getting Started in our Classroom** **Introduction to Intermediate GIS**	● What activities and cooperative strategies build a solid team? ● What are the expectations for students in the Geospatial Technology program? ● What is GIS and what is it used for? ● What kinds of careers are available in the Geospatial Technology field?	● Develop classroom rules and re-establish relationships. ● Review the G.I.S. in Geographic Information Systems. ● Identify three types of Geospatial Technologies. ● Create a definition for GIS. ● Explain how GIS can be used to solve real-world problems. ● Describe career opportunities in the geospatial field.	● Assignments ● Participation grades ● Team building activity grade ● Classwork/review ● Quiz	**Career Ready Practices** CRP 2 **Cluster Standards** ST 2,6 IT 2 **Pathway Standards** ST-ET 2,3	**ELA** 9-10R 1,2,4,7,8,9 9-10W 2,5,6,7 9-10SL 1,2,3,4,5,6 9-10L 1,2,3,4,5,6 **Literacy** 9-10RST 1,2,4,6,7,8,9 9-10WHST 2,4,5,6,7 **Math** **Science**
Weeks 3-5 **Labels and Annotation**	● How are features labeled? ● When is labeling appropriate? ● How can a labeling schema be saved? ● How can labels change the highlighted features of the map?	● Add dynamic labels to a map using data layers attribute information. ● Make custom labels using expressions that can combine multiple fields. ● Change the appearance of a label using symbol selector. ● Convert dynamic labels to an annotation. ● Explain the circumstances that would require the establishment of an annotation feature class vs annotations within the map document. ● Add graphic text labels to a map using the drawing toolbar.	● Exercises: labels and annotations ● Independent assignment: labels and annotations ● Guided Lab Exercises: data download file; dynamic hyperlinking file; field-based hyperlinking file; geodatabase hyperlinking file ● Participation lab exercise ● Classwork/participation ● Quiz	**Career Ready Practices** CRP 2,4,8,11 **Cluster Standards** ST 2,6 IT 2 **Pathway Standards** ST-ET 2,3	**ELA** 9-10R 1,2,4,7,8,9 9-10W 2,5,6,7 9-10SL 1,2,3,4,5,6 9-10L 1,2,3,4,5,6 **Literacy** 9-10RST 1,2,4,6,7,8,9 9-10WHST 2,4,5,6,7 **Math** **Science**
Weeks 6-10 **Digitizing and Geocoding**	● What is digitizing? ● Why is it necessary to digitize? ● How is a feature digitized? ● What are land use and land cover classifications and	● Explain and demonstrate basic digitizing concepts. ● Create new vector data layers and edit them. ● Digitize and manipulate points, lines, and polygons. ● Explain how to add aerial imagery.	● Guided lab exercises: points file, lines file, polygons file, data download file, introduction to geocoding file, geocoding using XY	**Career Ready Practices** CRP 2,5,8,11 **Cluster Standards** ST 2,6 IT 2	**ELA** 9-10R 1,2,4,7,8,9 9-10W 2,5,6,7 9-10SL 1,2,3,4,5,6 9-10L 1,2,3,4,5,6 **Literacy** 9-10RST 1,2,4,6,7,8,9 9-10WHST 2,4,5,6,7

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	what are they used for? ● What is geocoding and why is it important? ● What is geocoding used for?	● Explain the difference between land use and land cover and how to use the land-based classification standards through advanced digitizing. ● Explain geocoding and its application. ● List the steps involved in converting a descriptive location to geographic coordinates.	coordinates file,; iMAP ServerFile ● Participation assignments: points, lines, polygons, introduction to geocoding, geocoding using XY coordinates, iMAP Server ● Independent assignments ● Quizzes	**Pathway Standards** ST-ET 2,3	**Math** **Science**

Weeks 11-12
 	
Geoprocessing Basics
	● What are geoprocessing tools and how are they used?
	● How are geoprocessing tools used to answer a real-world question (ArcGIS Lesson Gallery example)?
	● How can geoprocessing be used to analyze geographic data?
		● Locate and use different Geoprocessing tools, including:
		  - Clip.
		  - Dissolve.
		  - Intersect.
		  - Buffer.
		  - Multiple Ring Buffer.
		  - Merge.
		  - Append.
		● Determine the appropriate tool for different situations.
		● Determine the appropriate workflow for each tool to complete a given task.
			● Guided lab exercise: geoprocessing
			● Exercises: clipping; dissolve and intersect; buffer and multiple ring buffer; merge and append
			● Independent assignments: geoprocessing basics
			● Quiz
			● Build a graphic organizer
			● Complete the ArcMap deforestation project (lesson gallery)
				Career Ready Practices
				CRP 2,4,5,8,11
				
				Cluster Standards
				ST 2,6
				IT 2
				Pathway Standards
				ST-ET 2,3,6
				ST-SM 2,4
					ELA
					9-10R 1,2,4,7,8,9
					9-10W 2,5,6,7
					9-10SL 1,2,3,4,5,6
					9-10L 1,2,3,4,5,6
					Literacy
					9-10RST 1,2,4,6,7,8,9
					9-10WHST 2,4,5,6,7
					Math
					
					Science

Weeks 13-15 **Joining, Relating, and Relationship Classes**	● What are the join, relate and relationship classes and what are they used for? ● How are these tools different? ● When should these tools be used?	● Understand how to use join, relate, and relationship tools to simplify and improve data management. ● Identify which tool is best under which circumstance by matching a tool to a scenario. ● Create and save a map with joins and relates. ● Create a relationship class.	● Guided lab exercise: joining, relating and relationship classes file ● Participation assignment: joining, relating and relationship classes ● Independent assignment: joins and relates ● Performance quiz ● Student choice mid-term project to run concurrently until end of quarter	**Career Ready Practices** CRP 2,4,8,11 **Cluster Standards** ST 2,6 IT 2 **Pathway Standards** ST-ET 2,6 ST-SM 2,4	**ELA** 9-10R 1,2,4,7,8,9 9-10W 2,5,6,7 9-10SL 1,2,3,4,5,6 9-10L 1,2,3,4,5,6 **Literacy** 9-10RST 1,2,4,6,7,8,9 9-10WHST 2,4,5,6,7 **Math** **Science**

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Week 16 **Career Exploration**	● What careers are available in this field? ● What skills and experiences are desirable for this field? ● What are the career outlooks for this field? ● What career may be of interest?	Identify a variety of carers in or related to Geospatial Technology Identify skills and experiences necessary for careers in geospatial technology. Summarize employment trends and benefits for careers in geospatial technology. Identify potential careers of personal interest..	● Student research assignment ● Student presentations ● Student written assignments ● Student reflection	**Career Ready Standards** CRP 2,4,7,10 **Cluster Standards** ST 5 **Pathway Standards**	**ELA** 9-10 R 1,2 9-10 W 2,5,6,7 9-10SL 1,2,3,4,5,6 9-10L 1,2,3,4,5,6 **Literacy** 9-10 RST 2 9-10 WHST 2,5 **Math** **Science**
Weeks 17-20 **Data Frames and Coordinate Systems**	● What are data frames? ● How does projection affect map making?	● Identify the data frame within ArcMap. ● Locate the map projection within the data frame properties. ● Recognize the map unit. ● Demonstrate use of the measure tool. ● Identify the projection of a shapefile by exploring the layer properties. ● Interpret the projection of a shapefile with an unknown projection. ● Locate and complete the use of the project and define projection tools. ● Explain the difference between "on-the-fly" projection and defining projection.	● Guided lab exercise: data download file ● Exercises: exploring coordinate systems; measuring tools; projection corrections; attribute tables; data manipulation ● Independent assignments: data frames and coordinate Systems ● Quiz	**Career Ready Practices** CRP 2,4,5,8,11 **Cluster Standards** ST 2,4,6 IT 2 **Pathway Standards** ST-ET 2,6 ST-SM 2,4	**ELA** 9-10R 1,2,4,7,8,9 9-10W 2,5,6,7 9-10SL 1,2,3,4,5,6 9-10L 1,2,3,4,5,6 **Literacy** 9-10RST 1,2,4,6,7,8,9 9-10WHST 2,4,5,6,7 **Math** **Science**
Weeks 21-23 **Geodatabases II**	● What is a geodatabase and how is it used? ● How are geodatabases manipulated? ● How do geodatabases work in ArcCatalog?	● Identify how data is organized and stored in ArcGIS. ● Retrieve stored information on geographic features. ● Illustrate the proper approach to creating a new field to store data. ● Select the appropriate data type to use when adding a field to an attribute table. ● Perform text and mathematical operations with the field calculator to manipulate data stored in an attribute table. ● Evaluate the appropriate use of the summarize and statistic functions within the attribute table.	● Exercises ● Guided lab exercise: geodatabases II File ● Participation assignment: geodatabases II- personal geodatabase JPEG ● Participation assignment: geodatabases II- geodatabase map ● Quiz	**Career Ready Practices** CRP 2,4,5,8,11 **Cluster Standards** ST 2,4,6 IT 2 **Pathway Standards** ST-ET 2,3,6 ST-SM 2,4	**ELA** 9-10R 1,2,4,7,8,9 9-10W 2,5,6,7 9-10SL 1,2,3,4,5,6 9-10L 1,2,3,4,5,6 **Literacy** 9-10RST 1,2,4,6,7,8,9 9-10WHST 2,4,5,6,7 **Math** **Science**
Weeks 24-27	● What is a raster image?			**Career Ready Practices**	**ELA** 9-10 R 1,2,4,7,8,9

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Working with Rasters **Georeferencing**	● What does the resolution mean? ● What is georeferencing and what is it used for? ● How is georeferencing applied to raster imagery?	● Explain what raster imagery is, the types of raster imagery, and raster resolution. ● Outline the steps of aligning a raster image to a map coordinate system. ● Describe process of georeferencing. ● Create a personal geodatabase. ● Create a georeferenced image.	● Guided lab exercises: raster imagery; geodatabases II file ● Classwork ● Raster quiz ● Participation assignment: geodatabases II- personal geodatabase JPEG ● Independent assignment: geodatabases II- geodatabase map ● Georeferencing quiz	CRP 2,8,11 **Cluster Standards** ST 1 IT 2 **Pathway Standards** ST-ET 2,3,6 ST-SM 2,4	9-10W 2,5,6,7 9-10SL 1,2,3,4,5,6 9-10L 1,2,3,4,5,6 **Literacy** 9-10RST 1,2,4,6,7,8,9 9-10WHST 2,4,5,6,7 **Math** **Science**
Weeks 28-31 **Spatial Adjustment**	● What is a map projection? ● What does transformation mean? ● When are spatial adjustments performed and why are they necessary? ● What are potential sources of error?	● Explain map projection and describe different types of projections. ● Explain and use coordinate systems and transformations. ● Apply transformations and transformation methods. ● Create displacement links and use rubbersheeting techniques. ● Analyze work for potential errors.	● Guided lab exercise: spatial adjustments ● Participation assignment: map projections and coordinate systems ● Independent assignment: transformation ● Performance quiz	**Career Ready Practices** CRP 2,8,11 **Cluster Standards** ST 4,6 IT 2 **Pathway Standards** ST-ET 2,3,6 ST-SM 2,4	**ELA** 9-10R 1,2,4,7,8,9 9-10W 2,5,6,7 9-10SL 1,2,3,4,5,6 9-10L 1,2,3,4,5,6 **Literacy** 9-10RST 1,2,4,6,7,8,9 9-10WHST 2,4,5,6,7 **Math** **Science**
Weeks 32-36 **Digitizing II**	● How can digitizing be used in relation to spatial adjustment and georeferencing? ● What are the downsides of digitizing?	● Explain and demonstrate basic digitizing concepts. ● Describe the uses of digitizing in relation to spatial adjustment and georeferencing concepts. ● Explain digitizing sources of error and limitations. ● Apply digitizing concepts to specific, real-world examples. ● Begin final quarter project utilizing techniques from the entire year.	● Guided lab exercise: Digitizing II; Digitizing II File ● Participation assignments #1 and #2 ● Performance quiz ● Student-choice project selected to run concurrently until the end of the quarter	**Career Ready Practices** CRP 2,8,11 **Cluster Standards** ST 4,6 IT 2 **Pathway Standards** ST-ET 2,3,5 ST-SM 2,4	**ELA** 9-10R 1,2,4,7,8,9 9-10W 2,5,6,7 9-10SL 1,2,3,4,5,6 9-10L 1,2,3,4,5,6 **Literacy** 9-10RST 1,2,4,6,7,8,9 9-10WHST 2,4,5,6,7 **Math** **Science**
Weeks 37-40	● How can georeferencing be	● Create a georeferenced image from a scanned paper map.	● Guided lab exercises: single symbol classification file,	**Career Ready Practices** CRP 2,4,8	**ELA** 9-10R 1,2,4,7,8,9 9-10W 2,5,6,7

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Georeferencing II **Classification** **Review** **Final Project**	used for a scanned map? ● What are classifications in geospatial terms? ● What are the different types of classification schemas? ● How does the classification and symbology change the viewer perspective of the data? ● How are skills and knowledge applied to real-world problems? ● What did you learn over the course of the year?	● Describe the classification methods available to sort data for visual representation in a map. ● Explain and demonstrate concepts behind standard classification methods. ● Identify scenario/usage of each classification method. ● Customize and manipulate symbology in a map. ● Explain when and how to use categories, quantiles and other symbology schemas. ● Demonstrate application of skills from levels 100 and 200 to complete a project based on real world problem. ● Present and evaluate final projects. ● Demonstrate and apply knowledge and skills learned throughout the year.	quantities-graduated colors and symbols file, categories-unique values file ● Participation assignments: hospital symbology, graduated colors, graduated symbols, unique value assignment ● Final project presentations and review ● Final exam (includes practical portion)	**Cluster Standards** ST 1 **Pathway Standards** ST-ET 2,3,5 ST-SM 2,4	9-10SL 1,2,3,4,5,6 9-10L 1,2,3,4,5,6 **Literacy** 9-10RST 1,2,4,6,7,8,9 9-10WHST 2,4,5,6,7 **Math** **Science**

Syracuse City School District
Career and Technical Education Program
Course Syllabus
GIT300: Geospatial Technology 300

Program Overview
At the completion of this program, students will understand and be able to apply the fundamentals of geospatial technology, geographic information science, remote sensing, global positioning systems (GPS) and spatial data analysis. Students will complete hands-on, real-world projects, develop critical thinking, analysis and problem-solving skills. This course will contribute to the preparation of students for post-secondary education and a wide range of careers using GIS, GPS, spatial analyses, remote sensing, and digital mapping. Students will also have the opportunity to receive integrated academic and college credits.

Course Description
In this course, students will continue to build on the basic concepts of Geospatial Technology as they collect, analyze and display geospatial data, and use the data to answer authentic questions. Students will learn about the electromagnetic spectrum and how sensors can show very different images using wavelengths beyond the visible spectrum. Students will have the opportunity to analyze remote sensing platforms and use Landsat imagery, and use it for change detection and analysis. Students will participate in hands-on activities and lessons that use professional-level software to create and analyze maps and display mapping data. Geospatial Technology students will also work collaboratively with students in the RPAS (Remotely Piloted Aircraft System) Pathway on a long-term project combining the two disciplines. Finally, students will also work to prepare for successful completion of industry based credentials or certification.

Work-Based Learning
Students will be connected with professionals in the geospatial technology field through field trips, job shadowing and career coaching, leading to opportunities for direct job training and real-world experience. Students will create and maintain a portfolio of their experiences to document the development of their skills, including a professional resume.

Pre-Requisites
GIT 100: Geospatial Technology 100
GIT 200: Geospatial Technology 200

Course Objectives
By the end of this course, students will be able to:
- Describe and perform the fundamental concepts and applications of geographic information science and technology and their use in collecting, analyzing, and displaying geospatial data.
- Describe and explain how Geospatial Technologies can be utilized for decision-making across a wide variety of disciplines and industries.
- Explain what the electromagnetic spectrum is and how sensors can take advantage of the different wavelengths beyond what we can see.
- Identify and analyze remote sensing platforms and their respective functions.
- Describe Landsat imagery and how to use it for change detection and analysis.
- Create a research poster including an abstract, references and figures.
- Use data from the RPAS program in a combined project.

Integrated Academics
1. Integrated CTE ELA Credit – Students will earn one English 12 credit after completion of their GIT 400 course.
2. Integrated CTE Science Credit – Students will earn one Science credit after completion of their GIT 300 course.

Dual Enrollment College Credit
Successful completion of the 4-course CTE Geospatial Technology sequence will provide students an opportunity to earn up to nine (9) SUNY college credits in Geospatial studies from Mohawk Valley Community College (MVCC).

Equipment and Supplies
- **School will provide:** All necessary lab and classroom equipment.
- **Student will provide:** A notebook for taking and saving notes, pen/pencils, USB thumb drive to save/transfer data.

Textbook
N/A

Grading
20%   Class attendance/ Participation
10%   Oral Presentation
30%   Assignments
20%   Mid-Term Exam (Practical)
20%   Final Exam (Practical)

Additional Course Policies
- Students are required to follow all classroom professionalism and safety procedures. Please review specific classroom policies.
- All work is due at the time and day specified when the assignment is given. Submission details for work to be graded will be given at the time the work is assigned.

Course Calendar

Quarter	Units of Study
1	- Getting Started in our Classroom: SMART Goals - Geospatial Technology Skills Review - Geospatial Technology for Problem-Solving and Decision-Making - Overview of Geospatial Credentials/Certification and Capstone Project - Technical Skills Review
2	- Remote Sensing and the Electromagnetic Spectrum - Landsat Imagery and Change Detection
3	- Preparing for Industry Credentials/Certification: - Understanding Geospatial Data and ArcGIS Software - GIS Tools and Processes - Georeferencing, Map Projections and Reprojecting - Symbology and Classification
4	- Collaborative Geospatial Mapping Project in Conjunction with Drone Technology/RPAS Program using ArcGIS Pro - College Planning, Research and Preparedness

Syracuse City School District
Career and Technical Education Program
Scope and Sequence
GIT300: Geospatial Technology 300

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Weeks 1-5 **Getting Started in our Classroom: SMART Goals** **Geospatial Technology Skills Review** **Geospatial Technology for Problem-Solving and Decision-Making**	How can we track our SMART goals for the future? What are the key vocabulary terms and concepts used in geospatial technology? What skillsets are used in ArcGIS to perform spatial analysis? Why is geospatial technology important and how is it used in our everyday lives? How is geospatial technology applied to solve problems and inform decision-making processes?	Describe a variety of disciplines and career pathways that geospatial technology skills can be applied to. Describe how geospatial technology is used to: analyze data, perform spatial analyses, visualize information, and answer questions. Define key geospatial terms and concepts, and explain how they are related. Perform basic and some advanced geospatial analyses using ESRI ArcGIS software. Define academic and career goals.	Current events article summary from ArcNews, ArcUser or similar trade journal Vocabulary exam Key concept exam Computer application performance task: quiz for key ArcMap functions/tools SMART goals poster and presentation	**Career Ready Practices** CRP 1,2,4,7,11 **Cluster Standards** ST 2,5 IT 11 **Pathway Standards** ST-SM 3 ST-ET 2	**ELA** 11-12R 1,2,4,7,8,9 11-12W 2,4,5,6 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6 **Literacy** 11-12RST 1,2,4,6,7,8,9 11-12WHST 2,4,5,6,7 **Math** **Science** NGSS-4, NGSS-8
Week 6-7 **Overview of Potential Geospatial Credentials** **Employability Skills**	● What are potential certification and credentials? ● Why are credentials and certifications beneficial? ● What is URISA and the code of ethics for GIS professionals? ● What personal skills and traits are important for employability?.	● Explain the benefit of credentials and certifications. ● Identify specific skills and experiences needed for successful completion of specified credentials or certification. ● Examine the GIS professional code of ethics. ● Identify and demonstrate employability skills such as good communication, appropriate use of social media and cell phones on the site, punctuality, time management and effective teamwork.	● Class assignments ● Student written work ● Student presentation ● Observation of student interactions and employability skills ● Student self-assessment of employability skills	**Career Ready Practices** CRP 2,10,11 **Cluster Standards** ST 5 **Pathway Standards** ST-SM 3	**ELA** 11-12R 1,2,4,7,8,9 11-12W 2,4,5,6 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6 **Literacy** 11-12RST 1,2,4,6,7,8,9 11-12WHST 2,4,5,6,7 **Math** **Science**
Weeks 8-10 **Technical Skills Review**	What are the basic and most frequent tools used in ArcGIS Pro? Why is file management and data organization important?	Explain what network drives, shared folders, Windows Explorer, ArcCatalog, and files do. Apply common file management protocols.	Geospatial terms and file extensions vocabulary quiz Tools prediction worksheet File management and organization activity Data log and activity tracking spreadsheet development	**Career Ready Practices** CRP 2,4,7,9 **Cluster Standards** ST 1,6	**ELA** 11-12R 1,2,4,7,8,9 11-12W 2,4,5,6 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6 **Literacy** 11-12RST 1,2,4,6,7,8,9

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	How are project activity, errors, and accuracy tracked to improve future efficiency?	Identify different file formats and extensions and know what data they represent. Apply appropriate Geospatial tools in ArcGIS Pro for the correct functions. Utilize Geospatial tools for projected outcomes.	Review test		11-12WHST 2,4,5,6,7
				Pathway Standards ST-SM 2 ST-ET 1,2	**Math**
					Science **NGSS-1**
Weeks 11-15 **Remote Sensing and the Electromagnetic Spectrum**	What is remote sensing and why is it important? What is the electromagnetic spectrum? How can energy be transmitted? What is the relationship between the energy, wavelength and frequency of a wave? How do sensors on satellites take advantage of the electromagnetic spectrum? What can be 'seen' using wavelengths outside of the visible range?	Define remote sensing and applications. Define the electromagnetic spectrum. Explain the relationship between the size of a wave and frequency. Explain the transmission of energy. Explain the relationship between a wave's energy and wavelength. Compare all EM waves in terms of their energy and wavelengths. Describe how sensors on satellites can take advantage of the electromagnetic spectrum. Explain the differences in wavelengths and how they are used. ● Define spectral imagery and bands in Rasters.	Video with discussion worksheet Hands on flashlight and use of prism activity Self-assessment checklist Complete a graphic organizer Unit test	**Career Ready Practices** CRP 1,4,5,6,7,8,11	**ELA** 11-12R 1,2,4,7,8,9 11-12W 2,4,5,6 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6
				Cluster Standards ST 2,6	**Literacy** 11-12RST 1,2,4,6,7,8,9 11-12WHST 2,4,5,6,7
				Pathway Standards ST-SM 1,2 ST-ET 2,4,5	**Math**
					Science NGSS-2,3,4,5
Weeks 16-20 **Landsat Imagery and Change Detection**	What is the Landsat satellite program and why is it important? How are long-term changes of our planet monitored? What has been learned from recent advances in remote sensing technology? How does increasing population impact the landscape and natural resources of our planet?	Investigate remote sensing imagery from various locations throughout the world. Explain what Landsat imagery is, how it is collected, how to download it, and what it can be used for. Describe change detection and how it affects the Earth. Visualize land cover change over a certain time period. Research specific locations on earth and their characteristics. Demonstrate how to stimulate and train memory through pattern recognition. Develop research skills. Create a research poster including abstract, figures and cited sources.	Complete Landsat imagery lab in Landsat viewer app Discuss EarthShots gallery in classroom groups Complete journal article for recent technology advances Read Earth Observatory articles and discuss with a follow- up quiz Submit research for change detection poster Complete abstract for research poster Submit 24 x 36-inch change detection research poster, with student topic of choice	**Career Ready Practices** CRP 2,4,5,6,9,11	**ELA** 11-12R 1,2,4,7,8,9 11-12W 2,4,5,6 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6
				Cluster Standards ST 2,4,6	**Literacy** 11-12RST 1,2,4,6,7,8,9 11-12WHST 2,4,5,6,7
				Pathway Standards ST-SM 1,4 ST-ET 5,6	**Math**
					Science NGSS-6, 7, 8
Weeks 21-23	What are the basic data formats in geospatial	Distinguish the differences between raster and vector data.	ArcMap software student exercise	**Career Ready Practices** CRP 2,4,8,11	**ELA** 11-12R 1,2,4,7,8,9

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Credential Preparation: Understanding Geospatial Data and ArcGIS Software	technology and what do they represent? What are the primary geospatial software techniques and how are they applied? ● How is metadata used and why is it important?	Demonstrate use of ArcCatalog software. Manage geospatial data. Utilize metadata structures and formats. ● Manage a data inventory.	ArcCatalog student exercise Quiz: spatial data vocabulary; software tools functions; metadata Performance task: navigating ArcMap and ArcCatalog software		11-12W 2,4,5,6 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6
				Cluster Standards ST 2,4	**Literacy** 11-12RST 1,2,4,6,7,8,9 11-12WHST 2,4,5,6,7
				Pathway Standards ST-SM 2 ST-ET 5	**Math**
					Science NGSS-7,8
Weeks 24-25 **Credential Preparation: GIS Tools and Processes**	When should geospatial data be processed and/or manipulated and how is it done? How is geocoding important to spatial data analysis?	Use the processing tools Joins/Relates, Buffer, Clip, Dissolve and Intersect in ArcMap software to edit/create new datasets. Geocode address information and edit/create geospatial data layers.	Complete a geocoding performance task exercise Complete a heads-up digitizing exercise Performance task quiz: Geoprocessing Tools	**Career Ready Practices** CRP 2,4,8,11	**ELA** 11-12R 1,2,4,7,8,9 11-12W 2,4,5,6 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6
				Cluster Standards ST-SM 2 ST-ET 5	**Literacy** 11-12RST 1,2,4,6,7,8,9 11-12WHST 2,4,5,6,7
				Pathway Standards ST-SM 2 ST-ET 5	**Math**
					Science NGSS-7,8
Weeks 26-27 **Credential Preparation: Georeferencing, Map Projections and Reprojecting**	● What is the importance of having a spatial reference for data layers? ● How is a reference for layers created when one does not exist? ● Why is a correct map projection important?	● Create a spatial reference for an image file in ArcMap software using control points. ● Explain and demonstrate the residual error and total error by using the root mean square method. ● Describe the most commonly used map projections and explain the needs they address.	● Performance task quiz: georeference an aerial photograph in ArcMap ● Quiz: map projections and their uses	**Career Ready Practices** CRP 2,4,8,11	**ELA** 11-12R 1,2,4,7,8,9 11-12W 2,4,5,6 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6
				Cluster Standards ST 2,4	**Literacy** 11-12RST 1,2,4,6,7,8,9 11-12WHST 2,4,5,6,7
				Pathway Standards ST-SM 2 ST-ET 5	**Math**
					Science NGSS-7,8
Weeks 28-30 **Credential Preparation: Symbology and Classification**	● How can changing symbology emphasize different results of an analysis? ● How can different symbology influence an audiences' interpretation of the data?	● Read and summarize an article such as 'How to Lie with Maps'. ● Articulate how presentation can influence interpretation. ● Apply symbology methods appropriate to the task. ● Explain ethical mapping.	● Essay: How to Lie with Maps ● Quiz: Symbology map types and uses	**Career Ready Practices** CRP 2,4,8,11	**ELA** 11-12R 1,2,4,7,8,9 11-12W 2,4,5,6 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6
				Cluster Standards ST 2,4	**Literacy** 11-12RST 1,2,4,6,7,8,9 11-12WHST 2,4,5,6,7

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	● What are the responsibilities of a good cartographer?			**Pathway Standards** ST-SM 2 ST-ET 5	**Math**
					Science NGSS-7,**8**

Week 31-38
 	
Credential Preparation
 	
Collaborative Mapping Geospatial Project in Conjunction with Drone Technology/RPAS Program using ArcGIS Pro
	● What does it take to be successful in college and the workplace?
	● How do I link academic knowledge to everyday practice?
	● How can geospatial technology and drone technology work together to complete a real-world project?
	● How is collaboration over a long-term project different from working independently?
	● What types of problems can be addressed using these related technologies?
		● Demonstrate and apply the following skills to collaborative project:
		  ○ Communication skills.
		  ○ Interpersonal skills.
		  ○ Problem solving skills.
		  ○ Team work skills.
		  ○ Analytical skills.
		  ○ Strong work ethic.
		  ○ Organizational skills.
		  ○ Leadership skills.
		  ○ Initiative.
			● Credential or Industry Certification Exam
			● Community project/internship/work study completion
			● Work study/internship may run concurrently with capstone project, depending on selected activities
				Career Ready Practices CRP 1,2,4,5,6,7,8,9,10, 11,12
				
				Cluster Standards ST 1,2,3,6
				
				Pathway Standards ST-SM 1,2,4 ST-ET 1,2,3,5,6
					ELA 11-12R 1,2,4,7,8,9 11-12W 2,4,5,6 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6
					
					Literacy 11-12RST 1,2,4,6,7,8,9 11-12WHST 2,4,5,6,7
					
					Math
					
					Science NGSS-3, 4, 7, 8

Weeks 39-40 **College Planning, Research and Preparedness**	● What are my plans for after graduation? ● What career pathways am I interested in? ● Which colleges have the programs I want? ● How do I use my past surveys and goals to develop awareness of my strengths, values and interests to better enable future direction?	● Research colleges and college programs. ● Determine individual strengths, weaknesses, likes and dislikes as related to jobs and careers. ● Research the different types of education opportunities. ● Develop a plan for senior year that aligns with their post-high school goals.	● Completed college research assignment ● Completed career interest survey and employability profile ● Revised SMART goals ● Completed post-high school plan	**Career Ready Practices** CRP 2,4,6,7,8,10,11 **Cluster Standards** ST 1,2,3,6 **Pathway Standards** ST-SM 1,2,4 ST-ET 1,2,3,5,6	**ELA** 11-12R 1,2,4,7,8,9 11-12W 2,4,5,6 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6 **Literacy** 11-12RST 1,2,4,6,7,8,9 11-12WHST 2,4,5,6,7 **Math** **Science**

Syracuse City School District
Career and Technical Education Program
Course Syllabus
GIT400: Geospatial Technology 400

Program Overview
At the completion of this program, students will understand and be able to apply the fundamentals of geospatial technology, geographic information science, remote sensing, global positioning systems (GPS) and spatial data analysis. Students will complete hands-on, real-world projects, develop critical thinking, analysis and problem-solving skills. This course will contribute to the preparation of students for post-secondary education and a wide range of careers using GIS, GPS, spatial analyses, remote sensing, and digital mapping. Students will also have the opportunity to receive integrated academic and college credits.

Course Description
This course will complete the Geospatial Technology sequence. Students will complete an approved project, including all project aspects, from project planning to implementation and presentation of results. Students will review Geospatial software skills and knowledge to prepare for the STARS (or other industry) Certification. Students will have the opportunity to take the STARS (or other) Certification exam at the end of the year. The STARS Exam covers material from all previous Geospatial Technology courses, and prepares students for either an entry-level Geospatial Technician position or college.

Work-Based Learning
Students will be connected with professionals in the geospatial technology field through field trips, job shadowing and career coaching, leading to opportunities for direct job training and real-world experience. Students will create and maintain a portfolio of their experiences to document the development of their skills, including a professional resume.

Pre-Requisites
GIT 100: Geospatial Technology 100
GIT 200: Geospatial Technology 200
GIT 300: Geospatial Technology 300

Course Objectives
By the end of this course, students will be able to:
- Analyze and debate the future of geospatial technologies, ethical questions related to the field, and societal implications.
- Research college and career pathway choices, apply for college, write a college essay, and identify career outlooks and opportunities.
- Create a financial budget and demonstrate financial awareness for post-high school planning.
- Understand the project planning process, from defining a problem statement through project implementation and results reporting.
- Develop research papers, essays or project reports using an approved college format style.
- Pass the STARS (or other industry) Project and Certification Exam.
- Explain the importance of a resume and cover letter, and demonstrate how to write them.
- Explain the job application process and how to apply for jobs, internships and scholarships.
- Develop a professional CTE portfolio.

Integrated Academics
1. Integrated CTE ELA Credit – Students will earn one English 12 credit after completion of their GIT 400 course.
2. Integrated CTE Science Credit – Students will earn one Science credit after completion of their GIT 300 course.

Dual Enrollment College Credit
Successful completion of the 4-course CTE Geospatial Technology sequence will provide students an opportunity to earn up to nine (9) SUNY college credits in Geospatial studies from Mohawk Valley Community College (MVCC).

Equipment and Supplies
- **School will provide:** All necessary lab and classroom equipment.
- **Student will provide:** A notebook for taking and saving notes, pen/pencils, USB thumb drive to save/transfer data.

Textbook
N/A

Grading
20%   Class attendance/ Participation
10%   Oral Presentation
30%   Assignments
20%   Mid-Term Exam (Practical)
20%   Final Exam (Practical)

Additional Course Policies
- Students are required to follow all classroom professionalism and safety procedures. Please review specific classroom policies.
- All work is due at the time and day specified when the assignment is given. Submission details for work to be graded will be given at the time the work is assigned.

Course Calendar

Quarter	Units of Study
1	- SMART Goals Review - Geospatial Technology Skills Review - Planning for the Future, College Preparedness and Application - Financial Planning - College Preparedness and Exploration - College Essay Writing and Review - College Application Process
2	- Geospatial Certification Review - Project Management Overview and Planning - Project Implementation - Project Results and Reporting
3	- Preparing for Certification Exam: - Geospatial Data and ArcGIS Software Review - GIS Tools and Processes Review - Georeferencing, Map Projections and Reprojecting Review - Symbology and Classification Review
4	- Industry Certification Exam - CTE Portfolio Development and Wrap-Up - Social Media Footprint and Networking

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Weeks 1-3 **SMART Goals Review** **Geospatial Technology Skills Review**	● SMART Goals – How should they be refined for the senior year? ● What are the key vocabulary terms and concepts used in geospatial technology? ● What skillsets are used in ArcGIS to perform spatial analysis? ● Why is geospatial technology important and how is it used in our everyday lives? ● How do we apply geospatial technology to solve problems and inform decision-making processes?	● Understand a variety of disciplines and career pathways that geospatial technology skills can be applied to. ● Describe how geospatial technology is used to: analyze data, perform spatial analyses, visualize information, and answer questions. ● Define key geospatial terms and concepts, and understand how they are related. ● Perform basic and some advanced geospatial analyses using ESRI ArcGIS software.	● SMART Goals poster and plan ● Current events article summary from ArcNews, ArcUser or similar trade journal ● Vocabulary exam ● Key concept exam ● Computer application performance task: quiz for key ArcMap functions/tools	**Career Ready Practices** CRP 1,2,4,7,11 **Cluster Standards** ST 2,5 IT 11 **Pathway Standards** ST-SM 3 ST-ET 2	**ELA** 11-12R 1,2,4,7,8,9 11-12W 2,4,5,6 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6 **Literacy** 11-12RST 1,2,4,6,7,8,9 11-12WHST 2,4,5,6,7 **Math** **Science** NGSS-4,8
Weeks 4-10 **Planning for the Future, College Preparedness and Application:** ● **Financial Planning** ● **College Preparedness and Exploration** ● **College Essay Writing and Review** ● **College Application Process**	● How do I build a successful life after high school? ● What do I want my future to look like? ● What college or career am I interested in? ● How do I apply for college? ● How do I write a college essay? ● What is financial stability and why is it important to have a real-life budget?	● Identify research and apply to at least four colleges of choice. ● Understand the FAFSA application process. ● Demonstrate financial knowledge about after-school budgets, including rent, auto costs, food, etc. ● Write a college essay for submission. ● Request letters of recommendation. ● Understand the job application process. ● Find job boards and postings related to their area of interest. ● Create a realistic budget that can be used post-high school. ● Use NYS and IRS tax table information.	● College essay submittal ● College research assignment ● Job posting assignment ● Real-world budget in MS Excel that includes post-high school estimates ● Virtual job shadow assignments ● Post high school plan	**Career Ready Practices** CRP 1,2,3,4,5,7,8,10 **Cluster Standards** ST 1,2,3,6 **Pathway Standards** ST-SM 1,2,4 ST-ET 1,2,3,5,6	**ELA** 11-12R 1,2,4,7,8,9 11-12W 2,4,5,6 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6 **Literacy** 11-12RST 1,2,4,6,7,8,9 11-12WHST 2,4,5,6,7 **Math** **Science**
Week 11	● What is the Geospatial Certification Program and why is it beneficial?	Understand the certification process. Explain the prerequisites.	Signature of acceptance to acknowledge certification requirements	**Career Ready Practices** CRP 2,10,11	**ELA** 11-12R 1,2,4,7,8,9 11-12W 2,4,5,6

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Geospatial Certification Review	● What is the Geospatial Project Management Model? ● What is the process for becoming certified? ● What is URISA and the code of ethics for GIS professionals?	Discuss the benefits of STARS certification. Understand the assessment and points system for evaluation. Identify and describe the files and reports required for submission. Understand the procedure and schedule for filing an application. ● Examine the GIS professional code of ethics.	● Quiz on certification procedures	 **Cluster Standards** ST 4 **Pathway Standards** ST-SM 3	11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6 **Literacy** 11-12RST 1,2,4,6,7,8,9 11-12WHST 2,4,5,6,7 **Math** **Science**
Weeks 12-15 **Project Management Overview and Planning**	● What are the different components of a complete project plan ● How do the project plan components relate to each other? ● Why is each one critical to the overall project?	● Understand what a good project plan looks like (objective, problem statement. ● Apply common project management terminology. ● Identify a problem and explain the process to answer or address it. ● Outline the functional requirements of a project plan. ● Examine the importance of project planning. ● Define the objective. ● Define the problem statement. ● Design a feasible study project. ● Identify stakeholders and their function.	● Project planning vocabulary quiz ● Project planning worksheets: pre-problem brainstorming, problem identification, stakeholder, project objective, project title, project feasibility, functional requirements ● Completed project plan including: title; problem statement; project objective; stakeholder review; area of interest; projected feasibility; functional requirements; summary and schedule	**Career Ready Practices** CRP 1,2,4,7,9 **Cluster Standards** ST 1,6 **Pathway Standards** ST-SM 2 ST-ET 1,2	**ELA** 11-12R 1,2,4,7,8,9 11-12W 2,4,5,6 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6 **Literacy** 11-12RST 1,2,4,6,7,8,9 11-12WHST 2,4,5,6,7 **Math** **Science** NGSS-1
Weeks 16-17 **Project Implementation**	● How is a project started? ● What are the steps in implementing a successful project? ● How do we acquire data and resources for a project? ● What is metadata and how do we document it? ● Which data processing and spatial analyses tools will be used for the project? ● How should the data be presented in a layout?	● Describe steps for successful project completion. ● Acquire and coordinate project resources. ● Identify, research, find and acquire data and shapefile. ● Format, manipulate, and/or reproject datasets. ● Validate and catalog metadata. ● Collect data manually, as necessary. ● Process and analyze data. ● Create map layouts, visualizations and other deliverables that inform the project purpose and results.	● Project implementation – metadata exercise ● Layout assessment worksheet ● Metadata catalog ● Map layouts ● Project deliverables and/or visualizations ● Self-assessment checklist ● Schedule assessment	**Career Ready Practices** CRP 1,5,6,7,8,11 **Cluster Standards** ST 2,6 **Pathway Standards** ST-SM 1,2 ST-ET 2,4,5	**ELA** 11-12R 1,2,4,7,8,9 11-12W 2,4,5,6 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6 **Literacy** 11-12RST 1,2,4,6,7,8,9 11-12WHST 2,4,5,6,7 **Math** **Science** NGSS-2,3,4,5

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	● How can symbology be utilized to represent data results? ● What deliverables are necessary to complete the project?				
Weeks 18-20 **Project Results and Reporting**	● How do we document spatial analysis steps, results and conclusions?	● Develop a written report that covers the entire project management process, including map layouts, figures and conclusions. ● Develop an oral presentation explaining results and map layouts. ● Format a proper presentation with all components, including title page, table of contents, planning process steps, implementation process, results and appendices.	● Completed project written report including all elements ● Completed oral presentation including all elements ● Submission and grading conducted by nationally-recognized STARS certification team	**Career Ready Practices** CRP 2,4,5,6,9,11 **Cluster Standards** ST 2,4,6 **Pathway Standards** ST-SM 1,4 ST-ET 5,6	**ELA** 11-12R 1,2,4,7,8,9 11-12W 2,4,5,6 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6 **Literacy** 11-12RST 1,2,4,6,7,8,9 11-12WHST 2,4,5,6,7 **Math** **Science** NGSS-6,7,8
Weeks 21-23 **Preparing for Certification Exam:** **Geospatial Data and ArcGIS Software Review**	● What are the basic data formats in geospatial technology and what do they represent? ● What are the primary geospatial software techniques and how are they applied? ● How do we use metadata and why is it important?	● Distinguish the differences between raster and vector data. ● Demonstrate use of ArcCatalog software. ● Demonstrate management of geospatial data. ● Explain metadata structures and formats. ● Manage a data inventory.	● ArcMap software student exercise ● ArcCatalog student exercise ● Quiz: spatial data vocabulary; software tools functions; metadata ● Performance task: navigating ArcMap and ArcCatalog software	**Career Ready Practices** CRP 2,4,8,11 **Cluster Standards** ST 2,4 **Pathway Standards** ST-SM 2 ST-ET 5	**ELA** 11-12R 1,2,4,7,8,9 11-12W 2,4,5,6 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6 **Literacy** 11-12RST 1,2,4,6,7,8,9 11-12WHST 2,4,5,6,7 **Math** **Science** NGSS-7,8
Weeks 24-25 **Preparing for Certification Exam:** **GIS Tools and Processes Review**	● When should we process and/or manipulate geospatial data and how do we do it? ● How is geocoding important to spatial data analysis?	● Use the processing tools Joins/Relates, Buffer, Clip, Dissolve and Intersect in ArcMap software to edit/create new datasets. ● Geocode to address information and edit/create geospatial data layers.	● Geocoding performance task exercise ● Heads-up digitizing exercise ● Performance task quiz: geoprocessing tools	**Career Ready Practices** CRP 2,4,8,11 **Cluster Standards** ST 2,4 **Pathway Standards** ST-SM 2 ST-ET 5	**ELA** 11-12R 1,2,4,7,8,9 11-12W 2,4,5,6 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6 **Literacy** 11-12RST 1,2,4,6,7,8,9 11-12WHST 2,4,5,6,7 **Math** **Science** NGSS-7,8

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Weeks 26-27 **Preparing for Certification Exam: Georeferencing, Map Projections and Reprojecting**	● What is the importance of having a spatial reference for data layers, and how do we create a reference for layers without an existing one? ● Why is a correct map projection important?	● Create a spatial reference for an image file in ArcMap software using control points. ● Understand the residual error and total error by using the root mean square method. ● Discuss the most commonly used map projections and the needs they address.	● Performance task quiz: georeference an aerial photograph in ArcMap ● Quiz: map projections and their uses	**Career Ready Practices** CRP 2,4,8,11 **Cluster Standards** ST 2,4 **Pathway Standards** ST-SM 2 ST-ET 5	**ELA** 11-12R 1,2,4,7,8,9 11-12W 2,4,5,6 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6 **Literacy** 11-12RST 1,2,4,6,7,8,9 11-12WHST 2,4,5,6,7 **Math** **Science** NGSS-7,8
Weeks 28-30 **Preparing for Certification Exam: Symbology and Classification Review**	● How can changing symbology emphasize different results of an analysis? ● How can different symbology influence an audience's interpretation of the data? ● What are the responsibilities of a good cartographer?	● Summarize professional article ● Recognize how the use of symbology influences interpretation. ● Articulate which symbology methods to apply. ● Understand ethical mapping.	● Summary of how presentation influences interpretation ● Quiz: symbology map types and uses	**Career Ready Practices** CRP 2,4,8,11 **Cluster Standards** ST 2,4 **Pathway Standards** ST-SM 2 ST-ET 5	**ELA** 11-12R 1,2,4,7,8,9 11-12W 2,4,5,6 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6 **Literacy** 11-12RST 1,2,4,6,7,8,9 11-12WHST 2,4,5,6,7 **Math** **Science** NGSS-7,8
Weeks 31 - 40 **Industry Certification Exam** **CTE Portfolio Development and Wrap Up** **Social Media Footprint and Networking**	● What does it take to be successful in college and the workplace? ● How do I write a professional resume and why is it important? ● What is a cover letter and when do I use it? ● What is a professional portfolio? ● How do I complete a college-level project report? ● How do I practice for college and/or job interviews? ● What is networking and where do I start?	Students will demonstrate: ● Communication skills. ● Interpersonal skills. ● Oral presentation skills. ● Professional writing skills. ● Research skills. ● The ability to analyze and, if necessary, 'clean' their social media footprint.	● Final certification exam ● Professional cover letter ● Project report with complete table of contents ● Analysis of social media footprint and plan to 'clean' it, if necessary ● Student achievements and awards list ● Employability profile ● References ● LinkedIn account ● CTE portfolio	**Career Ready Practices** CRP 1,2,4,5,6,7,8,9,10,11,12 **Cluster Standards** ST 1,2,3,6 **Pathway Standards** ST-SM 1,2,4 ST-ET 1,2,3,5,6	**ELA** 11-12R 1,2,4,7,8,9 11-12W 2,4,5,6 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6 **Literacy** 11-12RST 1,2,4,6,7,8,9 11-12WHST 2,4,5,6,7 **Math** **Science** NGSS-3,4,7,8

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	● Why is my social media presence important, how do employers/colleges access it, and how can I make sure it represents me in a positive light?				