

**Syracuse City School District
Career and Technical Education Program
Course Syllabus
GIS100: Geospatial Intelligence 100**



Geospatial Technology 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. The program is designed to prepare 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 earn integrated science, ELA and college credits.

Course Description

In this course students will define Geographic Information Systems (GIS), identify career opportunities in GIS, and learn key tools used by GIS specialists. Students will participate in hands-on activities and lessons that use 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.

Course Objectives

1. Students will define GIS and explain its application in a variety of career fields.
2. Students will learn how to identify datasets, understand map projections and apply basic cartography principles.
3. Students will understand the basic concepts of remote sensing, Global Positioning Systems and satellite imaging.
4. Students will be able to use ESRI ArcMap software to manipulate geographic data, create maps and digital datasets.
5. Students will be able to use ESRI ArcMap software to perform basic analyses of geographic data.

Integrated Academics

N/A

Student Equipment and Supplies

- **School will provide:** All necessary lab and classroom equipment
- **Student will provide:** A notebook for taking and saving notes; pen/pencils.

Textbook

Technical articles and/or worksheets may be provided by teacher for some assignments. Textbooks available for reference/class assignments.

Grading

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

- 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. Quizzes will be given throughout the semester.
- The lowest quiz score (one score only) will be dropped when calculating the final course grade.

Points

One day a month, as specified in advance by teacher, students are encouraged to 'Dress for Success'. Students will be awarded 1 bonus point for every time they arrive to school on that day, dressed in workplace professional clothing (more explanation in class).

Additional Course Policies

Students are required to follow all classroom professionalism and safety procedures. Please review class policies.

Course Calendar

Quarter	Units of Study
1	• Getting Started in our Classroom • What is GIS? • Introduction to ArcGIS • How does Geography fit in to GIS? • What is a topographic map? • What is photogrammetry? • What is the Global Positioning System and how does it work? • Basics of Remote Sensing
2	• Introduction to ESRI ArcGIS and ArcMap • Cartography with Map Layouts • Symbology and Classification
3	• Geoprocessing Basics • Data Frames and Coordinate Systems • Information Fundamentals
4	• Selection and Queries • Basics of Satellite Imaging • Putting it All Together • Final Project Assignment (Local Crime Mapping Analysis in conjunction with the CSI course)

Syracuse City School District
Career and Technical Education Program
Scope and Sequence
GIS 100: Geospatial Technology 100



Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CTE Standards	CCLS Literacy, ELA Math, Science
Weeks 1-4 Getting Started in our Classroom & Discovering GIS	- Who are we as individuals and a group and what are our interests? - What is GIS and how can we use it? - What kinds of career opportunities exist in the Geospatial field?	- Get to Know each other & Team-Building Activities - Develop classroom rules and establish relationships - Identify the G.I.S. in Geographic Information Systems - Identify three types of Geospatial Technologies - Create a definition for GIS - Learn career opportunities in the geospatial field - Identify how GIS can be used to solve real-world problems	Independent Assignments: - Data Sources Quiz - Class Participation - GIS Worksheet Assignments	Career Ready Practices CRP2,4,5	Literacy RST.9-10.3,4,7
				Cluster Standards ST2,ST5	ELA RSI.9-10.4,6 W.9-10.2,4 SL.9-10.1,2,4,5
				Pathway Standards ST-ET2 ST-SM	Math HSN.Q.A.1 HSG.CO.A.1 HSG.MGA.1
					Science STD2,6 HS-ESS2-2
Weeks 5-10 Basic Principles of GIS, Mapping and GPS	- How does Geography fit in to 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?	- Latitude/Longitude Review - Understand how to read topographic maps and 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 - Learn how to use handheld Garmin GPS receivers - Learn how to geocache - Identify two types of data used in GIS - Identify three different types of Vector Data and	Exercises: - Topics Quiz - Class work - Successful field trip to geocache - Completed anaglyph assignment - Geocache survey	Career Ready Practices CRP2,4,5,7,8,11	Literacy RST.9-10.3,4,7
				Cluster Standards ST2,4,6 IT2	ELA RSI.9-10.1,4 SL.9-10.1,2,4,5
				Pathway Standards ST-SM2,4	Math HSG.MGA.1,3
					Science STD1,2,6,7 HS-ESS2-2 HS-ESS2-3 HS-PS4-5

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CTE Standards	CCLS Literacy, ELA Math, Science
		their uses • Identify three types of Raster Data and their uses			
Weeks 11-16 Introduction to ESRI ArcGIS and ArcMap 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 ArcMap 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 ESRI • Describe the difference between ArcGIS Basic, Standard and Advanced • Describe the difference between ArcMap, ArcCatalog, and ArcToolbox • Operate the ArcMap interface • Identify, select and locate ArcMap's menus and toolbars • Illustrate how to add data to ArcMap (including BaseMaps) • Explain different geospatial file formats such as: Shapefiles, Geodatabases, Coverages and Raster • Locate specific data sets using ArcCatalog • 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	Exercises: • Introduction to ArcMap • 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 CRP2,8,11	Literacy RST.9-10.3,7
				Cluster Standards ST2,4 IT2	ELA RSI.9-10.1,3,4,6,7 W.9-10.4 SL.9-10.1,2
				Pathway Standards ST-ET2,3	Math HSN.QA.2,3HSG.MGA.1 Science STD2,6 HS-ESS1-5 HS-ESS2-2
Cartography with Map Layouts					

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CTE Standards	CCLS Literacy, ELA Math, Science
(continued)		• Demonstrate the use of a map template to create uniform looking maps • Be able to 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			
Weeks 17-19 Symbology and Classification	• What is symbology? • How can we use ArcMap to predict deforestation?	• Explain symbology and how it is used • Describe the various methods for symbolizing data • Choose an appropriate method of symbology for any given circumstance • Explain what layer files are and how they can be useful	Exercises: • Single Symbol Classification • Quantities – Graduated colors and symbols • Categories – Unique Values Independent Assignments: • Symbology Quiz	Career Ready Practices CRP2,11	ELA RSI.9-10.1,3,4,6,7 W.9-10.4 SL.9-10.1,2
				Cluster Standards ST2,4,6	Literacy RI.9-10.3 RH.9-10.7 RST.9-10.3
				Pathway Standards ST-ET6	Math HSN.QA.2 HSG.MGA.1
					Science STD1,2,6 HS-ESS2-2 HS-ESS3-6
Week 20-25 Geoprocessing Basics	• What are geoprocessing tools and how are they used? • How can we use geoprocessing tools to answer a real-world question (ArcMap Lesson Gallery example)?	• 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	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 CRP2,4,8,11	Literacy RST.9-10.3,7
				Cluster Standards ST2,6 IT2	ELA RSI.9-10.1,3,4,6,7 W.9-10.4 SL.9-10.1,2,4,5,6
				Pathway Standards ST-ET2,3,4 ST-SM2	Math HSG.GPE.B.7 HSN.QA.1,2,3 HSG.MGA.1

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CTE Standards	CCLS Literacy, ELA Math, Science
		complete a given task			Science STD2,7
Weeks 26-28 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 - Understand the difference between “on-the-fly” projection and defining projection	Exercises: - Exploring Coordinate Systems - Measuring Tools - Projection Corrections Independent Assignments: - Data frames and Coordinate Systems - Quiz	Career Ready Practices CRP2,8,11	Literacy RST.9-10.3,7 ELA RSI.9-10.1,3,4,6,7 W.9-10.4 SL.9-10.1,2
				Cluster Standards ST2,3 IT2	Math HSN.QA.1
				Pathway Standards ST-ET1,2 ST-SM1,4	Science STD2,6
Week 29-32 Information Fundamentals	- How is data organized in ArcGIS? - How do we manipulate attribute tables? - How do we apply GIS to a real-world, crime mapping analysis?	- 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	Exercises: - Attribute Tables - Data Manipulation Independent Assignments: - Information Fundamentals - Quiz Project: - Crime mapping analysis project in collaboration with Forensic Science class. - Project outputs include group discussion, student-led inquiry, hypothesis	Career Ready Practices CRP2,8,11	Literacy RST.9-10.3,7
				Cluster Standards ST2,4,6 IT2	ELA RSI.9-10.1,3,4,6,7 W.9-10.4,5 SL.9-10.1,2,4,5,6
				Pathway Standards ST-SM2,4	Math HSG.MGA.1 HSN.QA.3 Science STD2,6

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CTE Standards	CCLS Literacy, ELA Math, Science
		Evaluate the appropriate use of the summarize and statistic functions within the attribute table	development, research, evaluation of findings, technology/oral presentations to authentic audience, reflection.		
Week 33-34 Selection and Queries Selection and Queries (continued)	What is Structured Query Language (SQL)?	- Select by attributes - Select by location	Exercises: - Select by Attributes - Select by location Independent Assignments: - Selections and Queries - Quiz	Career Ready Practices CRP2,8,11	Literacy RST.9-10.3,4,7
				Cluster Standards ST2,4,6	ELA RSI.9-10.1,3,4,6,7 W.9-10.4Literacy SL.9-10.1,2
				Pathway Standards ST-ET2	Math HSG.MGA.1 HSN.QA.1,2,3
					Science STD2,6
Week 35-40 Final Project Assignment	- 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 - Create a final out (map, poster display, presentation, etc.) which assimilates the findings	Final Project - Project plan assessment - Project plan implementation - Final output creation - Collaborative and peer review	Career Ready Practices CRP2,4,7,8,11	Literacy
				Cluster Standards ST6,ST2	ELA RSI.9-10.1,3,4,6,7 W.9-10.4,5 SL.9-10.1,2,4,5,6
				Pathway Standards ST-ET1,2,3,5 ST-SM4	Math
					Science STD1,2,6,7 HS-ETS1-2

**Syracuse City School District
Career and Technical Education Program
Course Syllabus
GIS200: Geospatial Intelligence 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. The program is designed to prepare 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 earn integrated science, ELA and college credits.

Course Description

This course builds on students' understanding of the use of GIS technology, Global Positioning Systems, cartography and geospatial data visualization. It also increases students' ability to employ GIS tools and conduct more complex analyses using spatial statistics and data interpretation skills. The goals of this course are to help you to think spatially, analytically, and critically; and improve your problem solving skills.

Course Objectives

1. Describe the fundamental concepts and applications of geographic information science and technology and their use in collecting, analyzing, and displaying geospatial data.
2. Describe and explain the principles of mapping and spatial data modeling.
3. Describe different sources of spatial data and demonstrate how to acquire spatial data, including the fundamental concepts and use of Global Positioning Systems (GPS).
4. Describe the varying methods of spatial analysis and modeling.
5. Discuss the fundamental principles of remote sensing and image analysis.
6. Identify remote sensing platforms and their respective functions.
7. Discuss and demonstrate fundamental cartographic concepts and principles.

Course Objectives cont'd.

8. Discuss and debate the future of geospatial technologies, ethical questions related to the field, and societal implications.
9. Identify resources, plans and processes necessary to answer key questions and provide solutions and/or answers.

Integrated Academics

- Integrated ELA credit - upon completion of the GIS 100, 200 and 300
- Integrated Science credit - upon completion of GIS 100, 200 and 300

Student 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 –Technical articles and/or worksheets may be provided by teacher for some assignments. Textbooks available for reference/class assignments.

Grading

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

- 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.
- Quizzes will be given throughout the semester. The lowest quiz score (one score only) will be dropped when calculating the final course grade.

Bonus points

- One day a month, as specified in advance by teacher, students are encouraged to 'Dress for Success'. Students will be awarded 1 bonus point for every time they arrive to school on that day, dressed in workplace professional clothing (more explanation in class). Students will also be supplied with a polo shirt with our program logo, also to be worn on specific occasions noted throughout the year.

Additional Course Policies

- Students are required to follow all classroom professionalism and safety procedures.
- Please review specific classroom policies.

Course Calendar

Quarter	Units of Study
1	• Getting Started in our Classroom • Introduction to Intermediate GIS • Labels and Annotation • Digitizing • Geocoding
2	• Density Mapping and Analysis • Joining, Relating and Relationship Classes • Geoprocessing with ModelBuilder • Geoprocessing Tools
3	• Geodatabases II • Working with Rasters • Georeferencing • Spatial Adjustment
4	• Digitizing II • Georeferencing II • Classification • Review • Final Project Assignment (To be completed in conjunction with affiliate course – i.e., Forensic Science, Global Studies, Economics, Living Environment, etc.) • Wrap-Up

**Syracuse City School District
Career and Technical Education Program
Course Syllabus
GIS200: Geospatial Intelligence 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. The program is designed to prepare 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 earn integrated science, ELA and college credits.

Course Description

This course builds on students' understanding of the use of GIS technology, Global Positioning Systems, cartography and geospatial data visualization. It also increases students' ability to employ GIS tools and conduct more complex analyses using spatial statistics and data interpretation skills. The goals of this course are to help you to think spatially, analytically, and critically; and improve your problem solving skills.

Course Objectives

1. Describe the fundamental concepts and applications of geographic information science and technology and their use in collecting, analyzing, and displaying geospatial data.
2. Describe and explain the principles of mapping and spatial data modeling.
3. Describe different sources of spatial data and demonstrate how to acquire spatial data, including the fundamental concepts and use of Global Positioning Systems (GPS).
4. Describe the varying methods of spatial analysis and modeling.
5. Discuss the fundamental principles of remote sensing and image analysis.
6. Identify remote sensing platforms and their respective functions.
7. Discuss and demonstrate fundamental cartographic concepts and principles.

Course Objectives cont'd.

8. Discuss and debate the future of geospatial technologies, ethical questions related to the field, and societal implications.
9. Identify resources, plans and processes necessary to answer key questions and provide solutions and/or answers.

Integrated Academics

- Integrated ELA credit - upon completion of the GIS 100, 200 and 300
- Integrated Science credit - upon completion of GIS 100, 200 and 300

Student 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 –Technical articles and/or worksheets may be provided by teacher for some assignments. Textbooks available for reference/class assignments.

Grading

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

- 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.
- Quizzes will be given throughout the semester. The lowest quiz score (one score only) will be dropped when calculating the final course grade.

Bonus points

- One day a month, as specified in advance by teacher, students are encouraged to 'Dress for Success'. Students will be awarded 1 bonus point for every time they arrive to school on that day, dressed in workplace professional clothing (more explanation in class). Students will also be supplied with a polo shirt with our program logo, also to be worn on specific occasions noted throughout the year.

Additional Course Policies

- Students are required to follow all classroom professionalism and safety procedures.
- Please review specific classroom policies.

Course Calendar

Quarter	Units of Study
1	• Getting Started in our Classroom • Introduction to Intermediate GIS • Labels and Annotation • Digitizing • Geocoding
2	• Density Mapping and Analysis • Joining, Relating and Relationship Classes • Geoprocessing with ModelBuilder • Geoprocessing Tools
3	• Geodatabases II • Working with Rasters • Georeferencing • Spatial Adjustment
4	• Digitizing II • Georeferencing II • Classification • Review • Final Project Assignment (To be completed in conjunction with affiliate course – i.e., Forensic Science, Global Studies, Economics, Living Environment, etc.) • Wrap-Up

Syracuse City School District
Career and Technical Education Program
Scope and Sequence
GIS200: Geospatial Technology 200



Time Frame Unit of Study	Key Questions	Key Learning Targets	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, Science
Weeks 1-2 Getting Started in our Classroom Introduction to Intermediate GIS	- What activities and cooperative strategies build a solid team? - How will we run our classroom? - Review - What is GIS? - What can we use it for? - What kinds of careers are available in the Geospatial Technology field?	- Develop classroom rules and re-establish relationships - Review the GIS in Geographic Information Systems - Identify three types of Geospatial Technologies - Create a definition for GIS - Learn career opportunities in the geospatial field - Identify how GIS can be used to solve real-world problems	- Assignments: - Participation Grades - Team building activity grade - Classwork/Review - Quiz	Career Ready Practices CRP2	Literacy RST.11-12. 3, 4, 7
				Cluster Standards ST2,6 IT2	Math HSN.Q.A.1 HSG.CO.A.1
				Pathway Standards ST-ET2,3	Science STD 2,6
Weeks 3-5 Labels and Annotation	- How are features labeled? - When is labeling appropriate? - How can we save a labeling schema? - How can labels change the highlighted features of the map?	- Learn how to add Dynamic Labels to your map using a data layers attribute information - Learn how to make custom labels using expressions that can combine multiple fields - Learn how to change the appearance of a label using symbol selector - Learn how to convert Dynamic Labels to an Annotation - Understand what	Exercises: - Labels and Annotations - Independent Assignment: Labels and Annotations - Guided Lab Exercise: Data Download File - Guided Lab Exercise: Dynamic Hyperlinking File - Guided Lab Exercise: Field-Based Hyperlinking File - Guided Lab Exercise:	Career Ready Practices CRP2,4,8,11	Literacy RST.11-12.3,4,7
				Cluster Standards ST2,6 IT2	ELA RI.11-12.1,3,4,6, 7 W.11-12.4 SL.11-12.1,2

Time Frame Unit of Study	Key Questions	Key Learning Targets	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, Science
		circumstances would require you to establish an Annotation Feature Class vs Annotations within the Map Document • Learn how to add graphic text labels to the map using the drawing toolbar	Geodatabase Hyperlinking File • Participation Lab Exercise • Classwork/ Participation • Quiz	Pathway Standards ST-ET2,3	Math HSG.MGA.1,3
					Science STD 1,2,6 HS-ESS2-8
Weeks 6-10 Digitizing & Geocoding	• What is digitizing and why do we need to digitize? • How do we digitize a feature? • What are Land Use and Land Cover classifications and what are they used for? • What is geocoding? • Why is it important? • What do we use it for?	• Understand advanced digitizing concepts • Create new vector data layers and edit them • Digitize and manipulate points, lines, and polygons • Understand how to add aerial imagery • Understand the difference between Land Use and Land Cover and how to use the Land-Based Classification Standards through advanced digitizing • Understand geocoding and its application • List the steps involved in converting a descriptive location to geographic coordinates	• Guided Lab Exercise: Points File • Participation Assignment: Points • Guided Lab Exercise: Lines File • Participation Assignment: Lines • Guided Lab Exercise: Polygons File • Participation Assignment: Polygons • Independent Assignment • Quiz • Guided Lab Exercise: Data Download File • Guided Exercise: Introduction to Geocoding File • Participation Assignment: Introduction to Geocoding • Guided Exercise: Geocoding Using XY Coordinates File • Participation Assignment:	Career Ready Practices CRP2,5,8,11	Literacy RST.11-12.3,7
					ELA RI.11-12.1,3,4,6,7 W.11-12.4 SL.11-12.1,2
				Cluster Standards ST2,6 IT 2	Math HSN.QA 2,3 HSG.MGA.1
				Pathway Standards ST-ET2,3	Science STD 2,6

Time Frame Unit of Study	Key Questions	Key Learning Targets	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, Science
			Geocoding Using XY Coordinates • Guided Exercise: iMAP ServerFile • Participation Assignment: iMAP Server • Independent Assignment • Quiz		
Weeks 11-12 Density Mapping and Analysis	- What is Density Mapping? - How can we use it to analyze geographic data?	- Understand when and how to create density maps - Be able to calculate a density value - Apply skills to create a dot density map and/or density surface map	- Guided Lab Exercise: Density Analysis File - Participation Assignment: Density Analysis - Independent Assignment Data Download - Independent Assignment - Quiz	Career Ready Practices CRP2,5,8,11	Literacy RI.11-12.3 RH.11-12.7 RST.11-12.3
				Cluster Standards ST2,6 IT2	Math HSN.QA2 HSG.MGA. 1
				Pathway Standards ST-ET2,6 ST-SM2,4	Science STD 2,6
Weeks 13-15 Joining, Relating, and Relationship classes	- What are the join, relate and relationship classes? - What are these tools used for? - How are they different? - When should they 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; match tool to scenario - Create and save a map with joins and relates	- Guided Lab Exercise: Joining, Relating and Relationship Classes File - Participation Assignment: Joining, Relating and Relationship Classes - Independent Assignment: Joins and Relates	Career Ready Practices CRP2,4,8,11	Literacy RST.11-12.3,7
				Cluster Standards ST2,6 IT2	ELA RI.11-12.1,3,4,6,7 W.11-12.4 SL.11-12.1,2
				Pathway Standards ST-ET2,6 ST-SM2,4	Math HSG.MGA .1 HSN.QA 3

Time Frame Unit of Study	Key Questions	Key Learning Targets	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, Science
		Create a relationship class	- Performance Quiz - Student Choice Mid-Term Project – runs concurrent		Science HS-ESS3-3. HS-ESS3-6. STD 2,6
Weeks 16-20 Geoprocessing with Model Builder Geoprocessing Tools	- What is the Model Builder? - What can it do? - When should we automate workflow? - What are geoprocessing tools? - How are the implemented? - What are the most common geoprocessing tools and what do they do?	- Understand concepts behind automating workflow - Identify steps to create, edit, and manage geoprocessing models - Create a geoprocessing model in Model Builder - Demonstrate the use of basic geoprocessing tools: Intersect, Union, Buffer, Multiple Ring Buffer, Clip, Merge, Append, and Union	- Guided Lab Exercise Data Download File - Guided Lab Exercise: Clip, Buffer, Merge File - Participation Assignment: Clip, Buffer, Merge - Guided Lab Exercise: Union, Select, Intersect, Erase File - Participation Assignment: Union, Select, Intersect, Erase - Performance Quiz - Complete Mid Term Student Choice Assignment	Career Ready Practices CRP2,4,5,8,11	Literacy RST.11-12.3,7
				Cluster Standards ST2,4,6 IT2	ELA RI.11-12.1,3,4,6,7 W.11-12.4 SL.11-12.1,2
				Pathway Standards ST-ET2,6 ST-SM2,4	Math HSG.GPE.B.7 HSN.QA.1,2,3 HSG.MGA.1
					Science HS-ETS1-1. STD 1,2,6,7
Weeks 21-23 Geodatabases II	- What is a geodatabase? - How do we use it? - How do we manipulate geodatabases? - How do they work in ArcCatalog?	- Review of Geodatabases and structure - Understand the tools used to establish a new personal geodatabase - Learn the settings for creating a spatial layer that can take advantage of the functions of a geodatabase	- Exercises: - Guided Lab Exercise: Geodatabases II File - Participation Assignment: Geodatabases II - Personal Geodatabase JPEG - Participation Assignment: Geodatabases II - Geodatabase Map - Quiz	Career Ready Practices CRP2,4,5,8,11	Literacy RST.11-12.3,7
				Cluster Standards ST2,4,6 IT2	ELA RI.11-12.1,3,4,6,7 W.11-12.4 SL.11-12.1,2
				Pathway Standards ST-ET2,3,6 ST-SM2,4	Math HSN.QA. 1
					Science STD 2,6

Time Frame Unit of Study	Key Questions	Key Learning Targets	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, Science
Weeks 24-27 Working with Rasters Georeferencing	- What is a raster image? - What does the resolution mean? - What is georeferencing? - What do we use it for? - How do we apply it to raster imagery?	- Review – raster imagery and types - Review raster resolution - Outline the steps of aligning a raster image to a map coordinate system - Understand process of georeferencing - Create a personal geodatabase - Create a georeferenced image	- Guided lab exercise – Raster Imagery - Classwork - Raster Quiz - Guided Lab Exercise: Geodatabases II File - Participation Assignment: Geodatabases II - Personal Geodatabase JPEG - Independent Assignment: Geodatabases II - Geodatabase Map - Georeferencing Quiz	Career Ready Practices CRP2,8,11	Literacy RST.11-12.3,4,7
				Cluster Standards ST1 IT2	ELA RI.11-12.1,3,4,6,7 W.11-12.4 SL.11-12.1,2
				Pathway Standards ST-ET2,3,6 ST-SM2,4	Math HSG.MGA.1 HSN.QA.1,2,3 Science HS-ESS1-4 STD2,6,7
Weeks 28-31 Spatial Adjustment	- What is a map projection? - What does transformation mean? - When do we perform spatial adjustments? - Why are they necessary? - What are potential sources of error?	- Review map projection - Review types of projections - Understand coordinate systems and transformations - Apply transformations and transformation methods - Create displacement links and use rubbersheeting techniques	- Guided Lab Exercise: Spatial Adjustments - Participation Assignment: Map Projections and Coordinate Systems - Independent Assignment: Transformation - Performance Quiz	Career Ready Practices CRP2,8,11	Literacy RST.11-12.3,4,7
				Cluster Standards ST4,6 IT2	ELA RI.11-12.1,3,4,6,7 W.11-12.4 SL.11-12.1,2
				Pathway Standards ST-ET2,3,6 ST-SM2,4	Math HSN.QA.2,3H SG.MGA.1 Science HS-ETS1-2 STD2,6
Weeks 32-36 Digitizing II	Now that we understand spatial adjustment and georeferencing, how can digitizing be used	- Review basic digitizing - Understand digitizing in relation to spatial adjustment and georeferencing concepts - Understand digitizing sources of error and	- Guided Lab Exercise: Digitizing II - Guided Lab Exercise: Digitizing II File - Participation Assignment #1 - Participation	Career Ready Practices CRP2,8,11	Literacy RST.11-12.3,4,7
					ELA RI.11-12.1,3,4,6,7

**Syracuse City School District
Career and Technical Programs
Course Syllabus
GIS300: Geospatial Technology 300**



Geospatial Technology 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. The program is designed to prepare 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 earn integrated science, ELA and college credits.

Course Description

This course will complete the Geospatial Technology sequence. Students will review Geospatial software skills and knowledge. Students will complete an approved project, including all project aspects, from project planning to implementation and presentation of results. Students will also prepare to take the STARS 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.

Course Objectives

- Describe and perform the fundamental concepts and applications of geographic information science and technology and their use in collecting, analyzing, and displaying geospatial data.
- Explain the principles of mapping and spatial data modeling.
- Perform the varying methods of spatial analysis and modeling.
- Identify and analyze remote sensing platforms and their respective functions.
- Discuss and debate the future of geospatial technologies, ethical questions related to the field, and societal implications.
- Identify resources, plans and processes necessary to answer key questions and provide solutions and/or answers.
- Understand the project planning process, from defining a problem statement through project implementation and results reporting.
- Pass the STARS Project and Certification Exam.
- Complete a community-based internship experience.

Integrated Academics

Integrated Science Credit – Upon successful completion of GIS 100 and GIS 200
Integrated ELA Credit – Upon completion of the GIS 100, GIS 200, and GIS 300

Student 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 –Technical articles and/or worksheets may be provided by teacher for some assignments. Textbooks available for reference/class assignments.

Grading

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

Additional Course 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.

Quizzes will be given throughout the semester. The lowest quiz score (one score only) will be dropped when calculating the final course grade.

Students are required to follow all classroom professionalism and safety procedures. Please review specific classroom policies.

Course Calendar

Quarter	Units of Study
1	• Getting Started in our Classroom • Technology Skills Review • Geospatial Technology for Problem-Solving and Decision-Making • Overview of the STARS Certification Program • Project Management Overview & Planning
2	• Project Implementation • Project Results and Reporting • Review for STARS Certification Exam
3	• Review for STARS Certification Exam: ○ Spatial Data Analysis & Tools; Spatial Reference; Symbolology; Geocoding & Digitizing; Ethical Mapping
4	• STARS Certification Exam • Project Review • Community-based Internships

Time Frame Unit of Study	Key Questions	Key Learning Targets	Assessment Evidence of Learning	Related Standards	CCLS Literacy, Math, Science
	further? • What are the downsides of digitizing?	limitations • Understand how to apply digitizing concepts to specific, real-world examples • Begin Final Quarter Project utilizing techniques from the entire year	Assignment: Assignment #2, • Performance Quiz • Student-choice project will be selected and will run concurrently until the end of the quarter		W.11-12.4 SL.11-12.1,2
				Cluster Standards ST4,6 IT2	Math HSN.QA.2,3H SG.MGA.1
				Pathway Standards ST-ET2,3,5 ST-SM2,4	Science STD2,6
Weeks 37-40 Georeferencing II Classification Review and Wrap-Up	• How can we use georeferencing 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? • What did we learn over the course of the year?	• Create a georeferenced image from a scanned paper map • Describe the classification methods available to sort data for visual representation in a map • Understand concepts behind standard classification methods • Identify scenario/usage of each classification method • Learn how to customize and manipulate symbology in a map • Understand when and how to use categories, quantiles and other symbology schemas • Year-end review of all major concepts • Review of final projects	• Guided Lab Exercise: Single Symbol Classification File • Participation Assignment: Hospital Symbology • Guided Lab Exercise: Quantities - Graduated Colors and Symbols File • Participation Assignment: Graduated Colors • Participation Assignment: Graduated Symbols • Guided Lab Exercise: Categories - Unique Values File • Participation Assignment: Unique Value Assignment • Final Project Presentations and Review • Final Exam (includes practical portion)	Career Ready Practices CRP2,4,8	ELA RI.11-12.1,3,4,6,7 W.11-12.1,2,4,5,7,8 SL.11-2.1,2,4,5,6
				Cluster Standards ST1	Literacy RST.11-12.3,4,7
				Pathway Standards ST-ET2,3,5 ST-SM2,4	Math HSN.QA.2,3H SG.MGA.1
					Science HS-ESS3-1 HS-ESS3-4 STD1,2,6,7

Time Frame Unit of study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	Related Standards	CCLS Literacy, ELA, Math, Science
Weeks 1-2 Geospatial Technology Skills Review	- What are the key vocabulary terms and concepts used in geospatial technology? - What skillsets do we use 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 where geospatial technology skills can be applied - 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 their relationships - Perform basic and some advanced geospatial analyses using ESRI ArcGIS software	- 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 Practice CRP1,2,4,7,11	Literacy RST.11-12.1 WHST.11-12.2,4
				Cluster Standards ST2,5, IT11	Math
				Pathway Standards ST-SM3 ST-ET2	Science STD1,2,7
Week 3 Overview of STARS Geospatial Certification and Project Management Capstone Implementation	- What is the STARS Geospatial Certification Program and why is it beneficial? - What is the process for becoming STARS certified? - What is the Geospatial Project Management Model? - What is URISA and the code of ethics for GIS professionals?	- Understand the STARS certification process and explain the prerequisites - Understand the procedure and schedule for filing an application - Discuss the benefits of STARS certification - Understand the assessment and points system for evaluation - Identify and describe the files and reports are required for submission	- Signature of acceptance to acknowledge certification requirements - Quiz on STARS certification procedures	Career Ready Practice CRP2,10,11	Literacy RST.11-12.2
				Cluster Standards ST4	ELA (11/12) RI.11-12.1, 4, SL.11-12.1
				Pathway Standards ST-SM3	Math
					Science STD 2,7

Time Frame Unit of study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	Related Standards	CCLS Literacy, ELA, Math, Science
		Examine the GIS professional code of ethics			
Weeks 4-9 Development of a Successful Project Plan	- What are the different components of a complete project plan? - How they are related to each other, and 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 feasibility study project - Identify stakeholders and examine their functions	- Project planning vocabulary quiz - Pre-Problem Brainstorming worksheet - Problem identification worksheet - Stakeholder worksheet - Project objective worksheet - Project title worksheet - Project feasibility worksheets - Functional requirements worksheet - Completed project plan including: title; problem statement; project objective; stakeholder review; area of interest; projected feasibility; functional requirements; summary and schedule	Career Ready Practice CRP1,2,4,7,9	Literacy WHST.11-12.4,5
				Cluster Standards ST1,6	ELA RI.11-12.1, 3, 4, 7 W.11-12.2,4-7 SL.11-12.1,2,4
				Pathway Standards ST-SM2 ST-ET1,2	Math HSN-Q.A.1
					Science STD 1,2 HS-ETSI-2
Weeks 10-15 Project Implementation	- How do we start a project? - What are the steps in implementing a successful project? - How do we acquire data and resources for a project	- Be able to acquire and coordinate project resources - Identify, research, locate and acquire data and shapefile - Format, manipulate, and/or reproject	- Project implementation – metadata exercise - Layout assessment worksheet - Metadata catalog - Map layouts - Project deliverables/ visualizations	Career Ready Practice CRP1,4,5,6,7,8,11	Literacy WHST.11-12.4,7
				Cluster Standards ST-2,6	ELA RI.11-12.1,4,7 W.11-12.4,5,8 SL.11-12. 2

Time Frame Unit of study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	Related Standards	CCLS Literacy, ELA, Math, Science
	- What is metadata and how do we document it? - Which data processing and spatial analysis tools will be used for the project? - How should the data be presented in a layout? - How can symbology be utilized to represent data results? - What deliverables are necessary to complete the project?	- 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	- Self-assessment checklist - Schedule assessment	Pathway Standards ST-SM1,2, ST-ET2,4,5	Math HSN-Q.A.1,2,3 Science STD 1,2,6,7 HS-ESS3-4 HS-ETSI-2
Weeks 16-21 Project Presentation of Results	How do we document spatial analysis steps, results and conclusions?	- Develop a written report covering the entire project management process, including map layouts, figures and conclusions - Develop an oral presentation explaining results and map layouts - Format a professional presentation, inclusive of all required components, i.e., 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 Practice CRP2,4,5,6,9,11	Literacy WHST.11-12.4,9
				Cluster Standards ST2,4,6	ELA W.11-12.2,4-9 SL.11-12.4-6
				Pathway Standards ST-SM1,4 ST-ET5,6	Math HSN-Q.A.1
					Science STD 1,2,6,7 HS-ETSI-4
Weeks 22-23 Preparing for STARS Exam Review:	What are the basic data formats in geospatial technology and what do they	- Distinguish the differences between raster and vector data - Apply knowledgeable in	- ArcMap software student exercise - ArcCatalog student exercise	Career Ready Practice CRP2,4,8,11	Literacy WHST.11-12.6
					ELA RI.11-12.4,7

Time Frame Unit of study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	Related Standards	CCLS Literacy, ELA, Math, Science
Understanding Geospatial Data and ArcGIS Software	- represent? - What are the primary geospatial software techniques and how are they applied? - How do we use metadata and why is it important?	- the use of ArcCatalog software - Manage geospatial data - Be familiar with meta-data structures and formats - Manage a data inventory	- Quiz: spatial data vocabulary; software tools functions; metadata - Performance Task: Navigating ArcMap and ArcCatalog software	Cluster Standards ST-2,4	SL.11-12.1-2
				Pathway Standards ST-SM2 ST-ET5	Math MP.2,4
					Science STD 2,6
Weeks 24-25 Preparing for STARS Exam Review: GIS Tools and Processes Review	- When should we process and/or manipulate geospatial data and what skills and knowledge will we need to complete the task? - How is geocoding important to spatial data analysis?	- Use the processing tools Joins/Relates, Buffer, Clip, Dissolve and Intersect in ArcMap software to create/edit new datasets - Geocode address information and create/edit geospatial data layers	- Complete a geocoding performance task exercise - Complete a heads-up digitizing exercise - Performance task quiz: Geoprocessing Tools	Career Ready Practice CRP2,4,8,11	Literacy WHST.11-12.6
				Pathway Standards ST-SM2 ST-ET5	ELA RI.11-12.4,7 SL.11-12.1-2
					Math HSN-Q.A.3
Weeks 26-27 Preparing for STARS Exam Review: 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 Practice CRP2,4,8,11	Literacy WHST.11-12.6
				Cluster Standards ST2,4	ELA RI.11-12.4,7 SL.11-12.1-2
				Pathway Standards ST-SM2 ST-ET5	Math HSN-Q.A.3
Weeks 28-30	How can changing symbology emphasize	Read and understand 'How to Lie with Maps'	Essay: How to Lie with Maps	Career Ready Practice	Science STD 2,6,7
					Literacy WHST.11-12.6

Time Frame Unit of study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	Related Standards	CCLS Literacy, ELA, Math, Science
Preparing for STARS Exam Review: Symbology and Classification	- 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?	- Select the appropriate symbology methods to apply - Understand ethical mapping	Quiz: Symbology map types and uses	CRP2,4,8,11	ELA RI.11-12.3,4,7 W.11-12.1,2,4,5 SL.11-12.1-2
				Cluster Standards ST2,4	Math HSN-Q.A.3
				Pathway Standards ST-SM-2 ST-ET-5	Science STD 2,6,7
Weeks 31-40 STARS Certification Exam Community Service/ Work Study/ Internship Project	- What does it take to be successful in college and the workplace? - How do I link academic knowledge to everyday practice? - How do I use my internship to develop awareness of my strengths, values and interests in order to prepare for success in a future direction?	Students will Demonstrate: - Communication skills - Interpersonal skills - Problem solving skills - Team work skills - Analytical skills - Strong work ethic - Organizational skills - Leadership skills - Initiative	- STARS Final Certification Exam - Community Project/Internship and Work Study Completion *Work study/internship may run concurrently with capstone project, depending on selected site and activities	Career Ready Practice CRP1,2,4,5,6,7,8,9,10,11,12	Literacy RST.11-12.5 WHST.11-12.4 RST.11-12.10
				Cluster Standards ST-1, ST-2, ST-3, ST-6	ELA RI.11-12.1,3,4,7 W.11-12.2,4,5 SL.11-12.1,4,5,6
				Pathway Standards ST-SM-1,2,4, ST-ET-1,2,3,5,6	Math HSN-Q.A.1 MP.2,4
					Science STD 1,2,6,7 HS-ETSI-4