STEAM High School
Data Analytics Concentration
Summary Overview

Concentration Overview

This concentration is designed to prepare students for careers and further education and training in the data analytics and data science field, such as data scientist, data analyst, data engineer, or database manager. Students will understand the importance of data analytics in various contexts, explore career options, and learn how data analytics applies to other industries and career fields. Through project-based units, students will learn about database management and machine learning technologies, and will use data science tools and analytical techniques to answer real-world questions. Students will understand and apply the data analytics workflow of data collection, data cleaning and validation, analysis, visualization and the use of dashboards and reports for presenting data to a variety of stakeholders. Students will learn core statistical concepts and apply them to analyze both quantitative and qualitative data. Students will also utilize various computer applications such as Excel, programming languages like Python, R, SQL, C, C++, Scala, and Java and various visualization and dashboard platforms such as Tableau and Power BI. Students will also develop critical thinking and leadership skills as they collaborate effectively with a team to identify, analyze, and present data. Students will develop clear and accurate communication skills, and an awareness of issues around diversity, data ethics, and social responsibility. Students will also be able to obtain certifications such as Microsoft Office Specialist: Excel Associate, and Microsoft Certified: Power BI Data Analyst Associate, and AWS (Amazon Web Services) Certifications, as well as having opportunities to obtain certification in Python, R, SQL, Scala, Java, C, C++, Power BI, and Tableau.

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 concentration include, but are not limited to:
    - Microsoft Office Specialist: Excel Associate
    - Microsoft Certified: Power BI Data Analyst Associate.
    - Programming Languages: Python, R, SQL, Scala, Java, C, C++
    - Dashboard Platforms: Power BI, Tableau
    - AWS (Amazon Web Services) Certifications: AWS Certified Cloud Practitioner, AWS Certified Solutions Architect Associate, AWS Certified Data Analytics Specialty
    - Other relevant certifications as they become available through industry collaborations, teacher certifications and student interest.
- **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 concentrations and programs.

Integrated High School Academics

TBD

Concurrent College Enrollment

TBD

Calendar for Data Analytics Concentration

Level	Quarter	Driving Question/ Project	Units of Study

1
9th Grade
	1	**What is the role of data in society?**
		
		Project #1: TBD
			• Introduction to Data Analytics
			• Careers in Data Analytics
			• Basic Communication and Employability Skills
			• Data Analytics, Data Science and Uses of Data
			• Data Analytics Fundamentals: Data Analytics Workflow
			  ○ Posing Questions
			  ○ Collecting Data
			  ○ Cleaning and Validating Data
			• Work-Based Learning: Career Coaching, Job Shadowing

	2	**How can data be organized to share effectively and efficiently?**
		
		Project #2: TBD
			• Data Analytics Fundamentals: Data Analytics Workflow
			  ○ Modeling and Analyzing Data
			  ○ Visualizing and Sharing Data
			• Work-Based Learning: Career Coaching, Job Shadowing

	3	**Why might multiple conclusions be drawn from a single dataset?**
		
		Project #3: TBD
			• Data Analytics Fundamentals: Data Analytics Techniques
			  ○ Types of Analysis
			  ○ Introduction to Statistics for Data Analytics
			• Work-Based Learning: Career Coaching, Job Shadowing

	4	**What is the importance of accuracy in data analytics?**
		
		Project #4: TBD
			• Data Analytics Fundamentals: Data Analytics Tools - Excel Basics
			  ○ Data Input and Formatting
			  ○ Using Formulas
			  ○ Creating and Interpreting Charts
			  ○ Microsoft Office Specialist: Excel Associate Certification
			• Work-Based Learning: Career Coaching, Job Shadowing

2 10th Grade	1	**How can data be misleading?** **Project #1: TBD**	• Career and Post-Secondary Education Research • Employability and Communication: Data Ethics and Privacy • Data Analytics Fundamentals: Machine Learning and Data Collection • Work-Based Learning: Career Coaching, Job Shadowing
	2	**Why might data need to be analyzed using different approaches?** **Project #2: TBD**	• Data Analytics Fundamentals: Data Analytics Workflow and Exploratory Data Analysis (EDA) • Work-Based Learning: Career Coaching, Job Shadowing
	3	**How might statistical tests lead to multiple conclusions from a single dataset?** **Project #3: TBD**	• Data Analytics Fundamentals: Statistics for Data Analytics – Levels of Measurement • Work-Based Learning: Career Coaching, Job Shadowing

	4	**In what ways do technology tools support the work of data analysis?**
		
		Project #4: TBD
			• Data Analytics Fundamentals: Data Analytics Tools
			  ○ Excel
			  ○ Introduction to Programming Languages – Python, R, SQL
			  ○ Certifications: Microsoft Office Specialist: Excel Associate, Microsoft Certified: Power BI Data Analyst Associate, Python, R, SQL
			• Work-Based Learning: Career Coaching, Job Shadowing

Level	Quarter	Project/ Driving Question	Units of Study
3 11th Grade	1	How can I effectively and ethically use and communicate data implications? Project #1: TBD	• Career Research, Employer and College Visits and Applications • Employability and Communication: Data Ethics and Regulations • Data Analytics Fundamentals: Design Skills • Work-Based Learning: Career Coaching, Job Shadowing
	2		• Data Analytics Fundamentals: Visualization and Interpretation • Work-Based Learning: Career Coaching, Job Shadowing
	3	How do I determine which technology tools to use? Project #2: TBD	• Data Analytics Fundamentals: Statistical Methods for Analyzing Data • Work-Based Learning: Career Coaching, Job Shadowing

	4		• Data Analytics Fundamentals: Data Analytics Tools
			  ○ Programming Languages: Python, R, SQL, Scala, Java, C, C++
			  ○ Visualization Dashboard Platforms: Power BI, Tableau
			  ○ Certifications: Microsoft Office Specialist: Excel Associate, Microsoft Certified: Power BI Data Analyst Associate, AWS Certified Cloud Practitioner, Python, R, SQL, Scala, Java, C, C++
			• Work-Based Learning: Career Coaching, Job Shadowing

4 12th Grade	1	How does real world application of data analysis and communication differ from theory? Project #1: TBD	• Career and Education Planning: Applications • Employability and Communication: Data Ethics and Regulations • Data Analytics Fundamentals: Presentation and Reporting Skills • Work-Based Learning: Career Coaching, Job Shadowing
	2		• Data Analytics Fundamentals: Data Analytics Workflow • Work-Based Learning: Internship
	3	How does real world application of data analysis and communication differ from theory? Project #2: TBD	• Data Analytics Fundamentals: Statistical Methods for Analyzing Data • Work-Based Learning: Career Coaching, Job Shadowing

	4		• Data Analytics Fundamentals: Data Analytics Tools
			  ○ Programming Languages: Python, R, SQL, Scala, Java, C, C++
			  ○ Visualization Dashboard Platforms: Power BI, Tableau
			  ○ Certifications: Microsoft Office Specialist: Excel Associate, Microsoft Certified: Power BI Data Analyst Associate, AWS Certified Cloud Practitioner, AWS Certified Solutions Architect Associate, AWS Certified Data Analytics Specialty, Python, R, SQL, Scala, Java, C, C++, Tableau
			• Work-Based Learning: Internship

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STEAM High School
Data Analytics Concentration
Course Syllabus
Level 1

Concentration Overview

This concentration is designed to prepare students for careers and further education and training in the data analytics and data science field, such as data scientist, data analyst, data engineer, or database manager. Students will understand the importance of data analytics in various contexts, explore career options, and learn how data analytics applies to other industries and career fields. Through project-based units, students will learn about database management and machine learning technologies, and will use data science tools and analytical techniques to answer real-world questions. Students will understand and apply the data analytics workflow of data collection, data cleaning and validation, analysis, visualization and the use of dashboards and reports for presenting data to a variety of stakeholders. Students will learn core statistical concepts and apply them to analyze both quantitative and qualitative data. Students will also utilize various computer applications such as Excel, programming languages like Python, R, SQL, C, C++, Scala, and Java and various visualization and dashboard platforms such as Tableau and Power BI. Students will also develop critical thinking and leadership skills as they collaborate effectively with a team to identify, analyze, and present data. Students will develop clear and accurate communication skills, and an awareness of issues around diversity, data ethics, and social responsibility. Students will also be able to obtain certifications such as Microsoft Office Specialist: Excel Associate, and Microsoft Certified: Power BI Data Analyst Associate, and AWS (Amazon Web Services) Certifications, as well as having opportunities to obtain certification in Python, R, SQL, Scala, Java, C, C++, Power BI, and Tableau.

Course Description

In this foundational course, students will learn the fundamentals of data science, its currency in the job market, and its applicability to everyday life through hands-on projects with real-world datasets. Students will learn about the reasons why data is collected and the questions data analytics is used to answer. Students will be introduced to various ways of collecting data and the effect that data collection has on the interpretation of the patterns they discover. Students will learn methods to ensure that their data is accurate and reliable and will use various analytics and display tools to understand the data they have collected. Students will be introduced to fundamental mathematical and statistical models to analyze and predict future results. There will be an emphasis on creating and interpreting visualizations and summarizing the data for different audiences to inform decisions. Students will be introduced to the concepts of basic programming, machine learning and artificial intelligence. Throughout the course, students will develop career ready practices and employability skills by both collaborating with and leading teams to create and implement the data analytics workflow. Student will also begin working toward certifications as Microsoft Office Specialist: Excel Associate and Microsoft Certified: Power BI Data Analyst Associate.

All students will engage in project-based learning at a minimum of a project each quarter. Intrinsic to project-based learning is examining a driving question or identifying a problem by articulating what is already known, and what students need to know to answer the question. Students are guided to develop and execute a plan culminating in a presentation demonstrating their response to the initial question or problem. This process concludes with self-reflection regarding their learning. In this foundational level, projects will focus on self-assessment of skills, problem-solving and creating a plan for their continued growth. Projects focusing on gathering, manipulating, and analyzing real world data to meet an authentic need will be key.

Work-Based Learning

All of the instruction for this course will be project-based where students will be developing, planning, executing, and presenting authentic data analysis projects based on community needs. Students will be connected with working data analysis and data science professionals 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.

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 concentration include, but are not limited to:
    - Microsoft Office Specialist: Excel Associate

    - Microsoft Certified: Power BI Data Analyst Associate.
    - Programming Languages: Python, R, SQL, Scala, Java, C, C++
    - Dashboard Platforms: Power BI, Tableau
    - AWS (Amazon Web Services) Certifications: AWS Certified Cloud Practitioner, AWS Certified Solutions Architect Associate, AWS Certified Data Analytics Specialty
    - Other relevant certifications as they become available through industry collaborations, teacher certifications and student interest.
- **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 concentrations and programs.

Pre-Requisites

N/A

Course Objectives

Upon completion of this course students will know and be able to:

1. Define data science and its importance in today's data-driven world.
2. Identify real-world problems a data scientist might need to solve, and the methods they use.
3. Describe the various paths that can lead to a career in data science.
4. Explain and demonstrate the communication skills that a data analytics professional needs to be successful.
5. Explain the data analytics workflow of data collection, cleaning, transformation, analysis, visualization, and sharing.
6. Use Excel to gather, manipulate, analyze, and visualize data.
7. Explain the differences between quantitative and qualitative data.
8. Define and apply basic statistical methods of mean, median and mode to analyze data.
9. Present data that has been collected and analyzed to answer a question or solve a problem.
10. Work toward certification as a Microsoft Office Specialist: Excel Associate.

Integrated High School Academics

N/A

Concurrent College Enrollment

TBD

Equipment and Supplies

- **School will provide:** All tools, technology, equipment, and supplies to complete projects
- **Student will provide:** N/A

Textbook

TBD

Grading

10% Research and planning for current projects
10% Journal
80% Projects, Presentations, Participation and Performance

Additional Course Policies

- Meet all deadlines and be on time. Meeting deadlines and being on time are a major part of being a professional.
- Produce their best work, including being prepared for presentations.
- Participate in class including contributing to discussions and critiquing their own and others' work, as well as diligently working on their own projects.
- Seek help when needed.
- Be attentive, ask questions if they do not understand something, and offer their opinions.
- Use provided software platforms for preparing and sharing all work.
- Give credit and use proper citations for all research and project ideas.

Course Calendar

Quarter	Driving Question/ Project	Units of Study

1	**What is the role of data in society?**
	
	Project #1: TBD
		• Introduction to Data Analytics
		• Careers in Data Analytics
		• Basic Communication and Employability Skills
		• Data Analytics, Data Science and Uses of Data
		• Data Analytics Fundamentals: Data Analytics Workflow
		  ○ Posing Questions
		  ○ Collecting Data
		  ○ Cleaning and Validating Data
		• Work-Based Learning: Career Coaching, Job Shadowing

2	**How can data be organized to share effectively and efficiently?**
	
	Project #2: TBD
		• Data Analytics Fundamentals: Data Analytics Workflow
		  ○ Modeling and Analyzing Data
		  ○ Visualizing and Sharing Data
		• Work-Based Learning: Career Coaching, Job Shadowing

3	**Why might multiple conclusions be drawn from a single dataset?**
	
	Project #3: TBD
		• Data Analytics Fundamentals: Data Analytics Techniques
		  ○ Types of Analysis
		  ○ Introduction to Statistics for Data Analytics
		• Work-Based Learning: Career Coaching, Job Shadowing

4	**What is the importance of accuracy in data analytics?**
	
	Project #4: TBD
		• Data Analytics Fundamentals: Data Analytics Tools-Excel Basics
		  ○ Data Input and Formatting
		  ○ Using Formulas
		  ○ Creating and Interpreting Charts
		  ○ Microsoft Office Specialist: Excel Associate Certification
		• Work-Based Learning: Career Coaching, Job Shadowing

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STEAM High School
Data Analytics Concentration
Scope and Sequence
Level 1

First Quarter Driving Question: What is the role of data in society? Project #1: TBD					
Unit	**Key Questions**	**Key Learning Targets** **(Students will know and be able to:)**	**Assessment Evidence of Learning**	**CCTC Standards**	**NYS Standards**
Introduction to Data Analytics	• What is the role of data analytics in the community and society? • How has data analytics grown in recent years? • What are the different roles that can be involved in a data analytics project?	• Identify and describe the role of data analytics in the community and society. • Describe how data analytics has changed and grown in recent years. • Describe the possible roles that could be involved in a data analytics project and how they interact with one another.	**Written** • Research Project • Project • Self-Assessment • Professional Portfolio **Performance** • Class Presentation • Teacher Observation Checklist	**Career Ready Practices** CRP 1,2,4,6,7,10,11,12 **Cluster Standards** IT 5,6 ST 4,5 **Pathway Standards** IT-PRG 3 ST-ET 2 ST-SM 3,4	**ELA** 9-10R 1,2,4,7,8,9 9-10W 1,2,5,6,7 9-10SL 1,2,3,4,5,6 9-10L 1,2,3,4,5,6 **Literacy** 9-10RST 1,2,4,5,7,8,9 9-10WHST 1,2,5,6,7 **CSDF** 9-12.IC.1,2 9-12.NSD.5 9-12.DL.1,2,4,5,6,7 **Math** **Science**
Careers in Data Analytics	• What are different careers available in data analytics and what types of skills do they require? • What are the financial and professional benefits of pursuing a data analytics career? • What is the typical career path for data analytics professionals?	• Identify different careers available in data analytics and the types of skills they require. • Summarize the current and future outlook for jobs. • Describe the financial and professional benefits of pursuing a data analytics career. • Describe the typical career path for data analytics professionals. • Identify different ways to pursue a career in the data analytics field. • Describe an area of interest in data analytics and investigate its entry-level and advancement requirements and its growth potential.	**Written** • Research Project • Project • Self-Assessment • Professional Portfolio **Performance** • Class Presentation • Teacher Observation Checklist	**Career Ready Practices** CRP 1,2,4,7,10,11 **Cluster Standards** IT 5,6 ST 4,5,6 **Pathway Standards** IT-PRG 3 ST-ET 2 ST-SM 3,4	**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 1,2,4,5,7,8,9 9-10WHST 1,2,5,6,7 **CSDF** 9-12.IC.7 9-12.DL.1,2,4,5,6,7 **Math** **Science**
Basic Communication and Employability Skills	• What is the importance of good communication? • What does it mean to be a professional? • What is the role of an employee in the data analytics field?	• Describe the communication process, the importance of listening and speaking skills and their relationship to job performance. • Describe the importance of good reading and writing skills and their relationship to job performance.	**Written** • Research Project • Project • Self-Assessment • Professional Portfolio **Performance** • Class Presentation	**Career Ready Practices** CRP 1,2,4,5,7,8,11,12 **Cluster Standards** IT 1,2,3 ST 4,5,6	**ELA** 9-10R 1,2,4,7,8,9 9-10W 1,2,5,6,7 9-10SL 1,2,3,4,5,6 9-10L 1,2,3,4,5,6 **Literacy** 9-10RST 1,2,4,5,7,8,9 9-10WHST 1,2,5,6,7

First Quarter Driving Question: What is the role of data in society? Project #1: TBD					
Unit	**Key Questions**	**Key Learning Targets** **(Students will know and be able to:)**	**Assessment Evidence of Learning**	**CCTC Standards**	**NYS Standards**
	• What is the importance of critical thinking to solving problems? • Why are good social skills necessary in the data analytics field? • What is the importance of teamwork? • What are some important social issues of concern in the workplace?	• Communicate effectively verbally and in writing. • Explain the need for professional standards and employability skills, including the role of an employee in the data analytics field. • Explain the importance of critical thinking and how to solve problems. • Explain the importance of social skills and identify ways good social skills are applied in the data analytics field. • Describe how to work in a team environment and how to be an effective leader. • Explain how to resolve conflicts with co-workers and supervisors. • Explain how to give and receive constructive criticism. • Identify and describe various social issues of concern in the workplace. • Demonstrate knowledge of basic computer systems.	• Teacher Observation Checklist	**Pathway Standards** IT-PRG 2,3 ST-ET 2 ST-SM 3,4	**CSDF** 9-12.IC.7 9-12.CY.1 9-12.DL.1,2,4,5,6,7 **Math** **Science**
Data Analytics, Data Science, and Uses of Data	• What is data? • What types of businesses and organizations collect data and why? • How is data used in different kinds of businesses and organizations? • Why is it critical to use data when making important decisions?	• Recognize the applicability of data science to many real-world problems. • Describe the different kinds businesses and organizations that collect and use data. • Explain the different kinds of problems businesses and organizations might need to solve. • Explain data-driven decision-making.	**Written** • Research Project • Project • Self-Assessment • Professional Portfolio **Performance** • Class Presentation • Teacher Observation Checklist	**Career Ready Practices** CRP 1,2,4,5,7,8,11,12 **Cluster Standards** IT 5,6 ST 2,4 **Pathway Standards** IT-PRG 3 ST-ET 1,2 ST-SM 1,2,3,4	**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 1,2,4,5,7,8,9 9-10WHST 1,2,5,6,7 **CSDF** 9-12.IC.7 9-12.NSD.5 9-12.CY.1 9-12.DL.1,2,4,5,6,7 **Math** **Science**
Data Analytics Fundamentals **Data Analytics Workflow**	• What is the data analytics workflow?	• Explain the data analytics workflow. • Pose effective questions about real-world scenarios to guide data collection and data analysis.	**Written** • Research Project • Project • Self-Assessment	**Career Ready Practices** CRP 1,2,4,5,6,7,11,12	**ELA** 9-10R 1,2,4,7,8,9 9-10W 1,2,5,6,7 9-10SL 1,2,3,4,5,6 9-10L 1,2,3,4,5,6

First Quarter Driving Question: What is the role of data in society? Project #1: TBD					
Unit	**Key Questions**	**Key Learning Targets** **(Students will know and be able to:)**	**Assessment Evidence of Learning**	**CCTC Standards**	**NYS Standards**
• **Posing Questions** • **Collecting Data** • **Cleaning and Validating Data**	• Why does a data analysis project need to start with questions? • What kinds of questions can be answered with data? • What is big data? • What kinds of data can be collected? • How is data collected and organized? • Why does data need to be cleaned and validated? • How is data cleaned and validated?	• Explain how the question can affect what and how data is collected. • Explain what big data is and how it is used. • Explain and give examples of different data types and data formats, including structured and unstructured data, and quantitative and qualitative data. • Make decisions about which data to collect for analysis. • Describe the methods used to collect data, including quantitative and qualitative methods, and web scraping. • Explain how to identify different types of bias in data to help ensure data credibility. • Explain why spreadsheets are an important tool for data analysts. • Describe how to use a spreadsheet to access, extract, filter, and sort the data. • Explain the best practices for organizing data and keeping it secure. • Explain processes for formatting and adjusting data. • Aggregate data using a spreadsheet. • Explain the necessity of cleaning data to ensure accuracy and relevance. • Describe the methods used to clean data and populate missing values. • Explain the value of validating data to make sure that the type and format are correct. • Describe the methods used to validate data.	• Professional Portfolio **Performance** • Class Presentation • Teacher Observation Checklist	**Cluster Standards** IT 1,2,3,7,11,12 ST 1,2,6 **Pathway Standards** IT-PRG 1,2,3,4,5 ST-ET 1,2,3,5,6 ST-SM 1,2,3,4	**Literacy** 9-10RST 1,2,4,5,7,8,9 9-10WHST 1,2,5,6,7 **CSDF** 9-12.CT.1,2,3 9-12.NSD.1,2,4,5 9-12.CY.1 9-12.DL.1,2,4,5,6,7 **Math** **Science**
Work-Based Learning: **Career Coaching, Job Shadowing**	• What can be learned from data analytics professionals?	• Participate in Career Coaching process. • Participate in Job Shadowing process with local data analytics professionals.	**Written** • Career Coaching Self-Assessment • Job Shadow Reflection • Professional Portfolio **Performance** • Presentations • Teacher/Mentor Observation Checklist	**Career Ready Practices** CRP 1,2,4,5,6,7,8,10,11,12 **Cluster Standards** IT 1,2,3,5,6 ST 1,2,5,6 **Pathway Standards** IT-PRG 1,2,3 ST-ET 1,2,3,5,6 ST-SM 1,2,3,4	**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 1,2,4,5,7,8,9 9-10WHST 1,2,5,6,7 **CSDF** 9-12.IC.7 9-12.CT.1,2,3 9-12.NSD.1,4,5 9-12.CY.1

First Quarter Driving Question: What is the role of data in society? Project #1: TBD					
Unit	**Key Questions**	**Key Learning Targets** **(Students will know and be able to:)**	**Assessment** **Evidence of Learning**	**CCTC Standards**	**NYS Standards**
					9-12.DL.1,2,4,5,6,7 **Math** **Science**

Second Quarter Driving Question: How can data be organized to share effectively and efficiently? Project #2: TBD					
Unit	**Key Questions**	**Key Learning Targets** **(Students will know and be able to:)**	**Assessment Evidence of Learning**	**CCTC Standards**	**NYS Standards**
Data Analytics Fundamentals **Data Analytics Workflow** • **Modeling and Analyzing Data** • **Visualizing and Sharing Data**	• What are different purposes for analyzing data? • What are different techniques for analyzing data? • What is the importance of data visualization? • Why do different kinds of data need to be visualized differently? • How does data analysis and visualization help to answer questions? • How can data be shared most effectively?	• Describe descriptive analytics and the different approaches and tools used to accomplish it. • Describe diagnostic analytics and the different approaches and tools used to accomplish it. • Describe predictive analytics and the different approaches and tools used to accomplish it. • Describe prescriptive analysis and the different approaches and tools used to accomplish it. • Explain the importance of data visualization. • Define data visualization, including why different displays are needed for different types of data. • Explain how data can be used to illustrate trends, comparisons, and distributions. • Explain how to visualize data using various types of displays. • Design visual representations of data. • Explain the importance of presenting and sharing data. • Describe the principles and practices involved with effective presentations. • Describe the potential limitations associated with the data in a presentation. • Create a data presentation that addresses a question.	**Written** • Research Project • Project • Self-Assessment • Professional Portfolio **Performance** • Class Presentation • Teacher Observation Checklist	**Career Ready Practices** CRP 1,2,4,6,7,8,11,12 **Cluster Standards** IT 1,2,3,7,11,12 ST 1,2,6 **Pathway Standards** IT-PRG 1,2,3,4,5 ST-ET 1,2,3,5,6 ST-SM 1,2,3,4	**ELA** 9-10R 1,2,4,7,8,9 9-10W 1,2,5,6,7 9-10SL 1,2,3,4,5,6 9-10L 1,2,3,4,5,6 **Literacy** 9-10RST 1,2,4,5,7,8,9 9-10WHST 1,2,5,6,7 **CSDF** 9-12.CT.1,2,3 9-12.NSD.1,2,4,5 9-12.CY.1 9-12.DL.1,2,4,5,6,7 **Math** **Science**
Work-Based Learning: **Career Coaching, Job Shadowing**	• What can be learned from data analytics professionals?	• Participate in Career Coaching process. • Participate in Job Shadowing process with local data analytics professionals.	**Written** • Career Coaching Self-Assessment • Job Shadow Reflection • Professional Portfolio **Performance** • Presentations • Teacher/Mentor Observation Checklist	**Career Ready Practices** CRP 1,2,4,5,6,7,8,10,11,12 **Cluster Standards** IT 1,2,3,5,6 ST 1,2,5,6 **Pathway Standards** IT-PRG 1,2,3 ST-ET 1,2,3,5,6 ST-SM 1,2,3,4	**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 1,2,4,5,7,8,9 9-10WHST 1,2,5,6,7 **CSDF** 9-12.IC.7 9-12.CT.1,2,3 9-12.NSD.1,4,5 9-12.CY.1 9-12.DL.1,2,4,5,6,7 **Math** **Science**

Third Quarter Driving Question: Why might multiple conclusions be drawn from a single dataset? Project #3: TBD					
Unit	**Key Questions**	**Key Learning Targets** **(Students will know and be able to:)**	**Assessment Evidence of Learning**	**CCTC Standards**	**NYS Standards**
Data Analytics Fundamentals **Data Analytics Techniques** • **Types of Analysis** • **Introduction to Statistics for Data Analytics**	• What statistical tools can be used for analyzing data? • What is regression analysis? • What is factor analysis? • What is cohort analysis? • What is cluster analysis? • What is time-series analysis? • What is sentiment analysis? • What are measures of central tendency and what do they mean?	• Describe different statistical tools that can be used to analyze data. • Explain regression analysis and how it is used. • Use regression analysis to model the relationship between a set of variables. • Explain factor analysis and how it is used: • Use factor analysis to condenses the number of variables in a dataset. • Explain cohort analysis and how it is used. • Use cohort analysis to see trends and patterns that relate to particular groups. • Explain cluster analysis and how it is used. • Use cluster analysis to identify segments within a dataset. • Explain the uses of time-series analysis. • Use time-series analysis to measure a variable at different points in time and identify trends and cycles. • Explain sentiment analysis and how it is used. • Use sentiment analysis to measure a variable at different points in time and identify trends and cycles. • Differentiate between pie and bar charts. • Read and interpret pie and bar charts. • Generate pie and bar charts. • Explain different measures of central tendency including mean, median and mode. • Compute the mean, median and mode.	**Written** • Research Project • Project • Self-Assessment • Professional Portfolio **Performance** • Class Presentation • Teacher Observation Checklist	**Career Ready Practices** CRP 1,2,4,6,7,8,11,12 **Cluster Standards** IT 1,2,3,7,11,12 ST 1,2,6 **Pathway Standards** IT-PRG 1,2,3,4,5 ST-ET 1,2,3,5,6 ST-SM 1,2,3,4	**ELA** 9-10R 1,2,4,7,8,9 9-10W 1,2,5,6,7 9-10SL 1,2,3,4,5,6 9-10L 1,2,3,4,5,6 **Literacy** 9-10RST 1,2,4,5,7,8,9 9-10WHST 1,2,5,6,7 **CSDF** 9-12.CT.1,2,3,4,5 9-12.NSD.1,2,4,5 9-12.CY.1 9-12.DL.1,2,4,5,6,7 **Math** **Science**
Work-Based Learning: **Career Coaching, Job Shadowing**	• What can be learned from data analytics professionals?	• Participate in Career Coaching process. • Participate in Job Shadowing process with local data analytics professionals.	**Written** • Career Coaching Self-Assessment • Job Shadow Reflection • Professional Portfolio **Performance** • Presentations • Teacher/Mentor Observation Checklist	**Career Ready Practices** CRP 1,2,4,5,6,7,8,10,11,12 **Cluster Standards** IT 1,2,3,5,6 ST 1,2,5,6 **Pathway Standards** IT-PRG 1,2,3 ST-ET 1,2,3,5,6 ST-SM 1,2,3,4	**ELA** 9-10R 1,2,4,7,8,9 9-10W 1,2,5,6,7 9-10SL 1,2,3,4,5,6 9-10L 1,2,3,4,5,6 **Literacy** 9-10RST 1,2,4,5,7,8,9 9-10WHST 1,2,5,6,7 **CSDF** 9-12.IC.7 9-12.CT.1,2,3 9-12.NSD.1,4,5 9-12.CY.1 9-12.DL.1,2,4,5,6,7 **Math**

Third Quarter Driving Question: Why might multiple conclusions be drawn from a single dataset? Project #3: TBD					
Unit	**Key Questions**	**Key Learning Targets** **(Students will know and be able to:)**	**Assessment Evidence of Learning**	**CCTC Standards**	**NYS Standards**
					Science

Fourth Quarter Driving Question: What is the importance of accuracy in data analytics? Project #4: TBD					
Unit	**Key Questions**	**Key Learning Targets** **(Students will know and be able to:)**	**Assessment Evidence of Learning**	**CCTC Standards**	**NYS Standards**
Data Analytics Fundamentals **Data Analytics Tools: Excel Basics** • **Data Input and Formatting** • **Using Formulas** • **Creating and Interpreting Charts** • **Microsoft Office Specialist: Excel Associate Certification**	• How is Excel used in data analytics? • How can data be organized, analyzed, and visualized using Excel?	• Describe how Excel used in data analytics. • Explain how data can be organized, analyzed, and visualized using Excel. • Create worksheets and workbooks. • Navigate in worksheets and workbooks. • Format worksheets and workbooks. • Customize options and views for worksheets and workbooks. • Configure worksheets and workbooks for distribution. • Insert data in cells and ranges. • Format cells and ranges. • Summarize and organize data. • Create and manage tables. • Manage table styles and options. • Filter and sort a table. • Summarize data by using functions, such as SUM, MIN, MAX, COUNT, and AVERAGE. • Create charts. • Format graphic elements. • Begin certification process for Microsoft Office Specialist: Excel Associate.	**Written** • Research Project • Project • Self-Assessment • Professional Portfolio **Performance** • Class Presentation • Teacher Observation Checklist	**Career Ready Practices** CRP 1,2,4,6,7,8,11,12 **Cluster Standards** IT 1,2,3,7,11,12 ST 1,2,6 **Pathway Standards** IT-PRG 1,2,3,4,5 ST-ET 1,2,3,5,6 ST-SM 1,2,3,4	**ELA** 9-10R 1,2,4,7,8,9 9-10W 1,2,5,6,7 9-10SL 1,2,3,4,5,6 9-10L 1,2,3,4,5,6 **Literacy** 9-10RST 1,2,4,5,7,8,9 9-10WHST 1,2,5,6,7 **CSDF** 9-12.CT.1,2,3,4,5 9-12.NSD.1,2,4,5 9-12.CY.1 9-12.DL.1,2,4,5,6,7 **Math** **Science**
Work-Based Learning: **Career Coaching, Job Shadowing**	• What can be learned from data analytics professionals?	• Participate in Career Coaching process. • Participate in Job Shadowing process with local data analytics professionals.	**Written** • Career Coaching Self-Assessment • Job Shadow Reflection • Professional Portfolio **Performance** • Presentations • Teacher/Mentor Observation Checklist	**Career Ready Practices** CRP 1,2,4,5,6,7,8,10,11,12 **Cluster Standards** IT 1,2,3,5,6 ST 1,2,5,6 **Pathway Standards** IT-PRG 1,2,3 ST-ET 1,2,3,5,6 ST-SM 1,2,3,4	**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 1,2,4,5,7,8,9 9-10WHST 1,2,5,6,7 **CSDF** 9-12.IC.7 9-12.CT.1,2,3 9-12.NSD.1,4,5 9-12.CY.1 9-12.DL.1,2,4,5,6,7 **Math** **Science**

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STEAM High School
Data Analytics Concentration
Course Syllabus
Level 2

Concentration Overview

This concentration is designed to prepare students for careers and further education and training in the data analytics and data science field, such as data scientist, data analyst, data engineer, or database manager. Students will understand the importance of data analytics in various contexts, explore career options, and learn how data analytics applies to other industries and career fields. Through project-based units, students will learn about database management and machine learning technologies, and will use data science tools and analytical techniques to answer real-world questions. Students will understand and apply the data analytics workflow of data collection, data cleaning and validation, analysis, visualization and the use of dashboards and reports for presenting data to a variety of stakeholders. Students will learn core statistical concepts and apply them to analyze both quantitative and qualitative data. Students will also utilize various computer applications such as Excel, programming languages like Python, R, SQL, C, C++, Scala, and Java and various visualization and dashboard platforms such as Tableau and Power BI. Students will also develop critical thinking and leadership skills as they collaborate effectively with a team to identify, analyze, and present data. Students will develop clear and accurate communication skills, and an awareness of issues around diversity, data ethics, and social responsibility. Students will also be able to obtain certifications such as Microsoft Office Specialist: Excel Associate, and Microsoft Certified: Power BI Data Analyst Associate, and AWS (Amazon Web Services) Certifications, as well as having opportunities to obtain certification in Python, R, SQL, Scala, Java, C, C++, Power BI, and Tableau.

Course Description

In this course, students will build on their knowledge of data science through hands-on projects with real-world datasets. Students will work on managing time and workflow as they pose questions, collect, clean, and analyze data. Students will be introduced to various ways of collecting data, including surveys. They will investigate the ways that machine learning is used to collect large quantities of data and the effect that this can have on the data analytics workflow. Students will apply methods to ensure that their data is accurate and reliable and will use various displays and data analytics tools to understand the data they have collected. Students will continue to advance in their use of mathematical and statistical models to analyze data and predict future results. Students will learn the basic programming languages most commonly used in data analytics, such as Python, R, and SQL. Throughout the course, students will demonstrate career ready practices and employability skills by both collaborating with and leading teams to create and implement the data analytics workflow. Student will also continue working toward certifications as Microsoft Office Specialist: Excel Associate and begin working toward certification as Microsoft Certified: Power BI Data Analyst Associate. Students will also have the opportunity to become certified in the programming languages of Python, R, and SQL.

All students will engage in project-based learning at a minimum of a project each quarter. Intrinsic to project-based learning is examining a driving question or identifying a problem by articulating what is already known, and what students need to know to answer the question. Students are guided to develop and execute a plan culminating in a presentation demonstrating their response to the initial question or problem. This process concludes with self-reflection regarding their learning. In this course, projects will focus on solving problems within the data collection and cleaning processes and using statistical methods for analysis. Projects focusing on gathering, manipulating, and analyzing real world data to meet an authentic need will be key.

Work-Based Learning

All of the instruction for this course will be project-based where students will be developing, planning, executing, and presenting authentic data analysis projects based on community needs. Students will be connected with working data analysis and data science professionals 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.

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 concentration include, but are not limited to:
    - Microsoft Office Specialist: Excel Associate

    - Microsoft Certified: Power BI Data Analyst Associate.
    - Programming Languages: Python, R, SQL, Scala, Java, C, C++
    - Dashboard Platforms: Power BI, Tableau
    - AWS (Amazon Web Services) Certifications: AWS Certified Cloud Practitioner, AWS Certified Solutions Architect Associate, AWS Certified Data Analytics Specialty
    - Other relevant certifications as they become available through industry collaborations, teacher certifications and student interest.
- **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 concentrations and programs.

Pre-Requisites

Data Analytics Level 1

Course Objectives

Upon completion of this course students will know and be able to:

1. Define data science and its importance in today's data-driven world.
2. Identify real-world problems a data scientist might need to solve, and the methods they use.
3. Describe the post-secondary opportunities related to careers in data science.
4. Explain and demonstrate the communication skills that a data analytics professional needs to be successful.
5. Explain the data analytics workflow of data collection, cleaning, transformation, analysis, visualization, and sharing.
6. Use Excel to gather, manipulate, analyze, and visualize data.
7. Use programming languages such as Python, R, and SQL to collect, manage and analyze data.
8. Present data that has been collected and analyzed to answer a question or solve a problem.
9. Work toward certification as a Microsoft Office Specialist: Excel Associate and Microsoft Certified: Power BI Data Analyst Associate.

Integrated High School Academics

N/A

Concurrent College Enrollment

TBD

Equipment and Supplies

- **School will provide:** All tools, technology, equipment, and supplies to complete projects
- **Student will provide:** N/A

Textbook

TBD

Grading

10% Research and planning for current projects
10% Journal
80% Projects, Presentations, Participation and Performance

Additional Course Policies

- Meet all deadlines and be on time. Meeting deadlines and being on time are a major part of being a professional.
- Produce their best work, including being prepared for presentations.
- Participate in class including contributing to discussions and critiquing their own and others' work, as well as diligently working on their own projects.
- Seek help when needed.
- Be attentive, ask questions if they do not understand something, and offer their opinions.
- Use provided software platforms for preparing and sharing all work.
- Give credit and use proper citations for all research and project ideas.

Course Calendar

Quarter	Driving Question/ Project	Units of Study
1	**How can data be misleading?** **Project #1: TBD**	• Career and Post-Secondary Education Research • Employability and Communication: Data Ethics and Privacy • Data Analytics Fundamentals: Machine Learning and Data Collection • Work-Based Learning: Career Coaching, Job Shadowing
2	**Why might data need to be analyzed using different approaches?** **Project #2: TBD**	• Data Analytics Fundamentals: Data Analytics Workflow and Exploratory Data Analysis (EDA) • Work-Based Learning: Career Coaching, Job Shadowing
3	**How might statistical tests lead to multiple conclusions from a single dataset?** **Project #3: TBD**	• Data Analytics Fundamentals: Statistics for Data Analytics-Levels of Measurement • Work-Based Learning: Career Coaching, Job Shadowing

4	**In what ways do technology tools support the work of data analysis?**
	
	Project #4: TBD
		• Data Analytics Fundamentals: Data Analytics Tools
		  ○ Excel
		  ○ Introduction to Programming Languages – Python, R, SQL
		  ○ Certifications: Microsoft Office Specialist: Excel Associate, Microsoft Certified: Power BI Data Analyst Associate, Python, R, SQL
		• Work-Based Learning: Career Coaching, Job Shadowing

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STEAM High School
Data Analytics Concentration
Scope and Sequence
Level 2

First Quarter
Driving Question: How can data be misleading?
Project #1: TBD

Unit	Key Questions	Key Learning Targets (Students will know and be able to:)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Career and Post-Secondary Education Research	• What are different careers available in data analytics and what types of education and training do they require?	• Identify different careers available in data analytics and the types of education and training they require. • Identify different institutions that offer post-secondary education and training in data analytics careers. • Research an area of interest in data analytics and investigate the education and training required to pursue it.	**Written** • Research Project • Project • Self-Assessment • Professional Portfolio **Performance** • Class Presentation • Teacher Observation Checklist	**Career Ready Practices** CRP 1,2,4,6,7,8,10,11 **Cluster Standards** IT 5,6 ST 4,5,6 **Pathway Standards** IT-PRG 1,2,3 ST-ET 2 ST-SM 3,4	**ELA** 9-10R 1,2,4,7,8,9 9-10W 1,2,5,6,7 9-10SL 1,2,3,4,5,6 9-10L 1,2,3,4,5,6 **Literacy** 9-10RST 1,2,4,5,7,8,9 9-10WHST 1,2,5,6,7 **CSDF** 9-12.IC.7 9-12.DL.1,2,4,5,6,7 **Math** **Science**
Employability and Communication **Data Ethics and Privacy**	• What ethical issues around data have surfaced in the information age? • What does it mean to be a professional? • What is the role of an employee in the data analytics field? • What is the importance of critical thinking to solving problems?	• Describe ethical and privacy considerations in the field of data science. • Explain the impact of computers on access to information and information exchange worldwide. • Define open data and explain the importance of data ethics and data privacy. • Describe and demonstrate industry accepted ethical practices and behaviors. • Explain professional standards and employability skills, including the role of an employee in the data analytics field. • Explain the importance of critical thinking and how to solve problems.	**Written** • Research Project • Project • Self-Assessment • Professional Portfolio **Performance** • Class Presentation • Teacher Observation Checklist	**Career Ready Practices** CRP 1,2,4,5,6,7,8,9,11,12 **Cluster Standards** IT 1,2,3,4,5,6 ST 3,4,5,6 **Pathway Standards** IT-PRG 1,2,3 ST-ET 2,4 ST-SM 3,4	**ELA** 9-10R 1,2,4,7,8,9 9-10W 1,2,5,6,7 9-10SL 1,2,3,4,5,6 9-10L 1,2,3,4,5,6 **Literacy** 9-10RST 1,2,4,5,7,8,9 9-10WHST 1,2,5,6,7 **CSDF** 9-12.IC.3,4,5,7 9-12.CY.12,3 9-12.DL.1,2,4,5,6,7 **Math** **Science**
Data Analytics Fundamentals: **Machine Learning and Data Collection**	• What is the impact of machine learning algorithms? • What is the role of machine learning in data collection?	• Explain the role of machine learning in data collection. • Describe the use of filtering methods in machine learning. • Compare content-based filtering and collaborative filtering and their impact on data collection.	**Written** • Research Project • Project • Self-Assessment • Professional Portfolio **Performance** • Class Presentation	**Career Ready Practices** CRP 1,2,4,5,7,8,9,11,12 **Cluster Standards** IT 1,2,3,4,7,8,11,12 ST 1,2,4,6	**ELA** 9-10R 1,2,4,7,8,9 9-10W 1,2,5,6,7 9-10SL 1,2,3,4,5,6 9-10L 1,2,3,4,5,6 **Literacy** 9-10RST 1,2,4,5,7,8,9 9-10WHST 1,2,5,6,7

First Quarter Driving Question: How can data be misleading? Project #1: TBD					
Unit	**Key Questions**	**Key Learning Targets** **(Students will know and be able to:)**	**Assessment Evidence of Learning**	**CCTC Standards**	**NYS Standards**
	• How are filtering methods used in machine learning? • How is Natural Language Processing (NLP) used in machine learning? • What is web scraping?	• Describe how Natural Language Processing (NLP) is used in machine learning. • Define web scraping and how it relates to machine learning and data collection. • Research the impact of machine learning algorithms in their lives by learning about two current ethical issues.	• Teacher Observation Checklist	**Pathway Standards** IT-PRG 2,3,4,5 ST-ET 1,2,3,4,5,6 ST-SM 1,2,3,4	**CSDF** 9-12.IC.1,3,4 9-12.CY.1,2,3 9-12.DL.1,2,4,5,6,7 **Math** **Science**
Work-Based Learning: **Career Coaching, Job Shadowing**	• What can be learned from data analytics professionals?	• Participate in Career Coaching process. • Participate in Job Shadowing process with local data analytics professionals.	**Written** • Career Coaching Self-Assessment • Job Shadow Reflection • Professional Portfolio **Performance** • Presentations • Teacher/Mentor Observation Checklist	**Career Ready Practices** CRP 1,2,4,5,6,7,8,10,11,12	**ELA** 9-10R 1,2,4,7,8,9 9-10W 1,2,5,6,7 9-10SL 1,2,3,4,5,6 9-10L 1,2,3,4,5,6
				Cluster Standards IT 1,2,3,5,6 ST 1,2,5,6	**Literacy** 9-10RST 1,2,4,5,7,8,9 9-10WHST 1,2,5,6,7
				Pathway Standards IT-PRG 1,2,3 ST-ET 1,2,3,4,5,6 ST-SM 1,2,3,4	**CSDF** 9-12.IC.7 9-12.CT.1,2,3 9-12.NSD.1,4,5 9-12.CY.1 9-12.DL.1,2,4,5,6,7 **Math** **Science**

Second Quarter Driving Question: Why might data need to be analyzed using different approaches? Project #2: TBD					
Unit	**Key Questions**	**Key Learning Targets** **(Students will know and be able to:)**	**Assessment Evidence of Learning**	**CCTC Standards**	**NYS Standards**
Data Analytics Fundamentals: **Data Analytics Workflow and Exploratory Data Analysis (EDA)**	• What is the data analytics workflow? • What is exploratory data analysis? • Why is exploratory data analysis important? • What are the underlying principles of exploratory data analysis? • What are some techniques that are used for exploratory data analysis?	• Explain and demonstrate the data analytics workflow. • Explain the value of exploratory data analysis within the data analytics workflow. • Demonstrate the process of exploratory data analysis. • Identify the most appropriate statistical tools to use for a particular dataset. • Explain and demonstrate the five-number summary. • Explain and demonstrate univariate analysis. • Explain and demonstrate multivariate analysis. • Explain and demonstrate classification or clustering analysis. • Explain and demonstrate predictive analysis.	**Written** • Research Project • Project • Self-Assessment • Professional Portfolio **Performance** • Class Presentation • Teacher Observation Checklist	**Career Ready Practices** CRP 1,2,4,56,7,8,9,11,12 **Cluster Standards** IT 1,2,3,7,11,12 ST 1,2,6 **Pathway Standards** IT-PRG 1,2,3,4,5 ST-ET 1,2,3,4,5,6 ST-SM 1,2,3,4	**ELA** 9-10R 1,2,4,7,8,9 9-10W 1,2,5,6,7 9-10SL 1,2,3,4,5,6 9-10L 1,2,3,4,5,6 **Literacy** 9-10RST 1,2,4,5,7,8,9 9-10WHST 1,2,5,6,7 **CSDF** 9-12.IC.7 9-12.CT.1,2,3,4,6 9-12.NSD.1,2,4,5 9-12.CY.1,2 9-12.DL.1,2,4,5,6,7 **Math** **Science**
Work-Based Learning: Career Coaching, Job Shadowing	• What can be learned from data analytics professionals?	• Participate in Career Coaching process. • Participate in Job Shadowing process with local data analytics professionals.	**Written** • Career Coaching Self-Assessment • Job Shadow Reflection • Professional Portfolio **Performance** • Presentations • Teacher/Mentor Observation Checklist	**Career Ready Practices** CRP 1,2,4,5,6,7,8,10,11,12 **Cluster Standards** IT 1,2,3,5,6 ST 1,2,5,6 **Pathway Standards** IT-PRG 1,2,3 ST-ET 1,2,3,4,5,6 ST-SM 1,2,3,4	**ELA** 9-10R 1,2,4,7,8,9 9-10W 1,2,5,6,7 9-10SL 1,2,3,4,5,6 9-10L 1,2,3,4,5,6 **Literacy** 9-10RST 1,2,4,5,7,8,9 9-10WHST 1,2,5,6,7 **CSDF** 9-12.IC.7 9-12.CT.1,2,3 9-12.NSD.1,4,5 9-12.CY.1,2 9-12.DL.1,2,4,5,6,7 **Math** **Science**

Third Quarter Driving Question: How might statistical tests lead to multiple conclusions from a single dataset? Project #3: TBD					
Unit	**Key Questions**	**Key Learning Targets** **(Students will know and be able to:)**	**Assessment Evidence of Learning**	**CCTC Standards**	**NYS Standards**
Data Analytics Fundamentals: **Statistics for Data Analytics- Levels of Measurement**	• What are four levels of measurement in data and statistics? • What descriptive statistics are used in data analysis? • What statistical tests used in data analysis? • When is it appropriate to use parametric and nonparametric statistical tests?	• Describe and give examples of the four levels of measurement in data and statistics: nominal scale, ordinal scale, interval scale, and ratio scale. • Define and give examples of descriptive statistics used at each level of measurement, including frequency distributions, measures of central tendency (mode, median and mean), range, standard deviation, and variance. • Define and give examples of statistical tests used at each level of measurement, including Chi-Square, t-test, analysis of variance, and linear regression. • Describe and give examples of parametric and nonparametric statistical tests and when to use them in data analysis.	**Written** • Research Project • Project • Self-Assessment • Professional Portfolio **Performance** • Class Presentation • Teacher Observation Checklist	**Career Ready Practices** CRP 1,2,4,6,77,8,9,11,12 **Cluster Standards** IT 1,2,3,7,11,12 ST 1,2,6 **Pathway Standards** IT-PRG 1,2,3,4,5 ST-ET 1,2,3,4,5,6 ST-SM 1,2,3,4	**ELA** 9-10R 1,2,4,7,8,9 9-10W 1,2,5,6,7 9-10SL 1,2,3,4,5,6 9-10L 1,2,3,4,5,6 **Literacy** 9-10RST 1,2,4,5,7,8,9 9-10WHST 1,2,5,6,7 **CSDF** 9-12.IC.7 9-12.CT.1,2,3,4,5,6,7 9-12.NSD.1,2,4,5 9-12.CY.1,2 9-12.DL.1,2,4,5,6,7 **Math** **Science**
Work-Based Learning: **Career Coaching, Job Shadowing**	• What can be learned from data analytics professionals?	• Participate in Career Coaching process. • Participate in Job Shadowing process with local data analytics professionals.	**Written** • Career Coaching Self-Assessment • Job Shadow Reflection • Professional Portfolio **Performance** • Presentations • Teacher/Mentor Observation Checklist	**Career Ready Practices** CRP 1,2,4,5,6,7,8,10,11,12 **Cluster Standards** IT 1,2,3,5,6 ST 1,2,5,6 **Pathway Standards** IT-PRG 1,2,3 ST-ET 1,2,3,4,5,6 ST-SM 1,2,3,4	**ELA** 9-10R 1,2,4,7,8,9 9-10W 1,2,5,6,7 9-10SL 1,2,3,4,5,6 9-10L 1,2,3,4,5,6 **Literacy** 9-10RST 1,2,4,5,7,8,9 9-10WHST 1,2,5,6,7 **CSDF** 9-12.IC.7 9-12.CT.1,2,3 9-12.NSD.1,4,5 9-12.CY.1 9-12.DL.1,2,4,5,6,7 **Math** **Science**

Fourth Quarter Driving Question: In what ways do technology tools support the work of data analysis? Project #4: TBD					
Unit	**Key Questions**	**Key Learning Targets** **(Students will know and be able to:)**	**Assessment Evidence of Learning**	**CCTC Standards**	**NYS Standards**
Data Analytics Fundamentals: **Data Analytics Tools** • **Excel** • **Introduction to Programming Languages – Python, R, SQL** • **Certifications: Microsoft Office Specialist: Excel Associate, Python, R SQL**	• How is Excel used in data analytics? • How can data be organized, analyzed, and visualized using Excel? • What are programming languages and how are they used in data analytics? • What is Python and how is it used in data analytics? • What is R and how is it used in data analytics? • What is SQL and how is it used in data analytics?	• Create and format Excel worksheets and workbooks. • Summarize and organize data using Excel. • Create and manage tables in Excel. • Summarize data in Excel by using functions. • Perform logical operations in Excel by using the IF function, including SUMIF, AVERAGEIF, and COUNTIF. • Create, modify, and format charts in Excel. • Define and explain the Python programming language. • Describe the uses of Python. • Identify and explain the advantages Python provides in programming. • Create, modify, and add to a Python program to produce new output. • Define and explain the R programming language. • Describe the uses of R. • Identify and explain the advantages R provides in programming. • Create, modify, and add to a R program to produce new output. • Define and explain the SQL programming language. • Describe the uses of SQL. • Identify and explain the advantages SQL provides in programming. • Create, modify, and add to a SQL program to produce new output. • Continue certification process for Microsoft Office Specialist: Excel Associate. • Begin certification process for Microsoft Certified: Power BI Data Analyst Associate, Python, R, and SQL.	**Written** • Research Project • Project • Self-Assessment • Professional Portfolio **Performance** • Class Presentation • Teacher Observation Checklist	**Career Ready Practices** CRP 1,2,4,6,7,8,9,11,12 **Cluster Standards** IT 1,2,3,7,11,12 ST 1,2,6 **Pathway Standards** IT-PRG 1,2,3,4,5,6,7 ST-ET 1,2,3,4,5,6 ST-SM 1,2,3,4	**ELA** 9-10R 1,2,4,7,8,9 9-10W 1,2,5,6,7 9-10SL 1,2,3,4,5,6 9-10L 1,2,3,4,5,6 **Literacy** 9-10RST 1,2,4,5,7,8,9 9-10WHST 1,2,5,6,7 **CSDF** 9-12.IC.7 9-12.CT.1,2,3,4,5,67,8,9,10 9-12.NSD.1,2,4,5 9-12.CY.1,2 9-12.DL.1,2,4,5,6,7 **Math** **Science**
Work-Based Learning: Career		• Participate in Career Coaching process.	**Written**	**Career Ready Practices** CRP 1,2,4,5,6,7,8,10,11,12	**ELA** 9-10R 1,2,4,7,8,9 9-10W 1,2,5,6,7

Fourth Quarter Driving Question: In what ways do technology tools support the work of data analysis? Project #4: TBD					
Unit	**Key Questions**	**Key Learning Targets** **(Students will know and be able to:)**	**Assessment Evidence of Learning**	**CCTC Standards**	**NYS Standards**
Coaching, Job Shadowing	• What can be learned from data analytics professionals?	• Participate in Job Shadowing process with local data analytics professionals.	• Career Coaching Self-Assessment • Job Shadow Reflection • Professional Portfolio **Performance** • Presentations • Teacher/Mentor Observation Checklist		9-10SL 1,2,3,4,5,6 9-10L 1,2,3,4,5,6
				Cluster Standards IT 1,2,3,5,6 ST 1,2,5,6	**Literacy** 9-10RST 1,2,4,5,7,8,9 9-10WHST 1,2,5,6,7
				Pathway Standards IT-PRG 1,2,3 ST-ET 1,2,3,4,5,6 ST-SM 1,2,3,4	**CSDF** 9-12.IC.7 9-12.CT.1,2,3 9-12.NSD.1,4,5 9-12.CY.1 9-12.DL.1,2,4,5,6,7
					Math
					Science

3

STEAM High School
Data Analytics Concentration
Course Syllabus
Level 3

Concentration Overview

This concentration is designed to prepare students for careers and further education and training in the data analytics and data science field, such as data scientist, data analyst, data engineer, or database manager. Students will understand the importance of data analytics in various contexts, explore career options, and learn how data analytics applies to other industries and career fields. Through project-based units, students will learn about database management and machine learning technologies, and will use data science tools and analytical techniques to answer real-world questions. Students will understand and apply the data analytics workflow of data collection, data cleaning and validation, analysis, visualization and the use of dashboards and reports for presenting data to a variety of stakeholders. Students will learn core statistical concepts and apply them to analyze both quantitative and qualitative data. Students will also utilize various computer applications such as Excel, programming languages like Python, R, SQL, C, C++, Scala, and Java and various visualization and dashboard platforms such as Tableau and Power BI. Students will also develop critical thinking and leadership skills as they collaborate effectively with a team to identify, analyze, and present data. Students will develop clear and accurate communication skills, and an awareness of issues around diversity, data ethics, and social responsibility. Students will also be able to obtain certifications such as Microsoft Office Specialist: Excel Associate, and Microsoft Certified: Power BI Data Analyst Associate, and AWS (Amazon Web Services) Certifications, as well as having opportunities to obtain certification in Python, R, SQL, Scala, Java, C, C++, Power BI, and Tableau.

Course Description

In this course, students will continue to build on their knowledge of data science through hands-on projects with real-world datasets. Students will work on understanding the responsible and ethical use of data as they pose questions, collect, clean, and analyze data. Students will develop their design skills as they design both programs for manipulating data as well as visualizations of the data they have analyzed. They will continue to use methods to explore and access big data determine how the results can be applied to real-world questions. Students will continue to develop their skills in ensuring that their data is accurate and reliable. Students will advance in their use of statistical models to analyze data and predict future results. Students will build their knowledge of programming languages most commonly used in data analytics, such as Python, R, SQL, Scala, Java, C, and C++. Students will learn to use dashboard platforms for displaying and visualizing data for sharing, such as Power BI and Tableau. Throughout the course, students will demonstrate career ready practices and employability skills by both collaborating with and leading teams to create and implement the data analytics workflow. Student will also continue working toward certifications as Microsoft Office Specialist: Excel Associate, Microsoft Certified: Power BI Data Analyst Associate, and AWS Certified Cloud Practitioner. Students will also have the opportunity to become certified in the programming languages of Python, R, SQL, Scala, Java, C, and C++ and the dashboard platform Tableau.

All students will engage in project-based learning at a minimum of two projects a year. Intrinsic to project-based learning is examining a driving question or identifying a problem by articulating what is already known, and what students need to know to answer the question. Students are guided to develop and execute a plan culminating in a presentation demonstrating their response to the initial question or problem. This process concludes with self-reflection regarding their learning. In this course, projects will focus on problem-solving using the design skills needed for collecting, manipulating, analyzing, and sharing data. Projects focusing on analyzing and visualizing real world data to meet an authentic need will be key.

Work-Based Learning

All of the instruction for this course will be project-based where students will be developing, planning, executing, and presenting authentic data analysis projects based on community needs. Students will be connected with working data analysis and data science professionals 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.

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 concentration include, but are not limited to:
    - Microsoft Office Specialist: Excel Associate
    - Microsoft Certified: Power BI Data Analyst Associate.
    - Programming Languages: Python, R, SQL, Scala, Java, C, C++
    - Dashboard Platforms: Power BI, Tableau
    - AWS (Amazon Web Services) Certifications: AWS Certified Cloud Practitioner, AWS Certified Solutions Architect Associate, AWS Certified Data Analytics Specialty
    - Other relevant certifications as they become available through industry collaborations, teacher certifications and student interest.
- **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 concentrations and programs.

Pre-Requisites

Data Analytics Levels 1 and 2

Course Objectives

Upon completion of this course students will know and be able to:

1. Define data science and its importance in today's data-driven world.
2. Identify real-world problems a data scientist might need to solve, and the methods they use.
3. Research the post-secondary opportunities related to careers in data science of interest to them.
4. Explain and demonstrate the communication skills that a data analytics professional needs to be successful.
5. Explain the data analytics workflow of data collection, cleaning, transformation, analysis, visualization, and sharing.
6. Use various methods to gather, manipulate, analyze, and visualize data.
7. Use programming languages such as Python, R, SQL, Scala, Java, C, and C++ to collect, manage and analyze data.
8. Present data that has been collected and analyzed to answer a question or solve a problem using dashboard platforms such as Power BI and Tableau.
9. Work on certification as a Microsoft Office Specialist: Excel Associate and Microsoft Certified: Power BI Data Analyst Associate.
10. Work on certification as AWS Certified Cloud Practitioner.
11. Work on certifications in the programming languages of Python, R, SQL, Scala, Java, C, and C++ and the dashboard platform Tableau.

Integrated High School Academics

N/A

Concurrent College Enrollment

TBD

Equipment and Supplies

- **School will provide:** All tools, technology, equipment, and supplies to complete projects
- **Student will provide:** N/A

Textbook

TBD

Grading

10% Research and planning for current projects
10% Journal
80% Projects, Presentations, Participation and Performance

Additional Course Policies

- Meet all deadlines and be on time. Meeting deadlines and being on time are a major part of being a professional.
- Produce their best work, including being prepared for presentations.
- Participate in class including contributing to discussions and critiquing their own and others' work, as well as diligently working on their own projects.
- Seek help when needed.
- Be attentive, ask questions if they do not understand something, and offer their opinions.
- Use provided software platforms for preparing and sharing all work.
- Give credit and use proper citations for all research and project ideas.

Course Calendar

Quarter	Driving Question/ Project	Units of Study
1	**How can I effectively and ethically use and communicate data implications?**	• Career Research, Employer and College Visits and Applications • Employability and Communication: Data Ethics and Regulations • Data Analytics Fundamentals: Design Skills • Work-Based Learning: Career Coaching, Job Shadowing
2	**Project #1: TBD**	• Data Analytics Fundamentals: Visualization and Interpretation • Work-Based Learning: Career Coaching, Job Shadowing
3	**How do I determine which technology tools to use?** **Project #2: TBD**	• Data Analytics Fundamentals: Statistical Methods for Analyzing Data • Work-Based Learning: Career Coaching, Job Shadowing

4		• Data Analytics Fundamentals: Data Analytics Tools
		  ○ Programming Languages: Python, R, SQL, Scala, Java, C, C++
		  ○ Visualization Dashboard Platforms: Power BI, Tableau
		  ○ Certifications: Microsoft Office Specialist: Excel Associate, Microsoft Certified: Power BI Data Analyst Associate, AWS Certified Cloud Practitioner, Python, R, SQL, Scala, Java, C, C++, Tableau
		• Work-Based Learning: Career Coaching, Job Shadowing

3

STEAM High School
Data Analytics Concentration
Scope and Sequence
Level 3

First Quarter
Driving Question: How can I effectively and ethically use and communicate data implications?
Project #1: TBD

Unit	Key Questions	Key Learning Targets (Students will know and be able to:)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Career Research, Employer and College Visits and Applications	• What are different careers available in data analytics and what types of education and training do they require?	• Research different institutions that offer post-secondary education and training in data analytics careers. • Research different opportunities that offer post-secondary employment. • Arrange to visit employers and/or colleges that offer post-secondary employment or education in data analytic. • Create applications for post-secondary employment and/or education opportunities.	**Written** • Research Project • Project • Self-Assessment • Professional Portfolio **Performance** • Class Presentation • Teacher Observation Checklist	**Career Ready Practices** CRP 1,2,4,6,7,8,10,11 **Cluster Standards** IT 5,6 ST 5,6 **Pathway Standards** IT-PRG 1,2,3 ST-ET 2,4 ST-SM 3,4	**ELA** 11-12R 1,2,4,7,8,9 11-12W 1,2,5,6,7 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6 **Literacy** 11-12RST 1,2,4,5,7,8,9 11-12WHST 1,2,5,6,7 **CSDF** 9-12.IC.7 9-12.DL.1,2,4,5,6,7 **Math** **Science**
Employability and Communication: **Data Ethics and Regulations**	• What ethical issues around data have surfaced in the information age? • Which laws and regulations might be applicable to a data analysis project in different disciplines? • How might the legal rights of an individual be impinged by the use of data? • How do data analysts know that data is ethically available and valid for its intended use? • How do data analysts identify and minimize bias in the data or in the model? • What are likely misinterpretations of the results of data analysis	• Describe ethical and privacy considerations in the field of data science. • Explain the impact of computers on access to information and information exchange worldwide. • Define open data and explain the importance of data ethics and data privacy. • Describe and demonstrate industry accepted ethical practices and behaviors. • Define HIPAA, FERPA, and other privacy laws and their effect on data collection and analysis. • Identify and evaluate potential harm to individuals or groups that may arise from data collection and analysis. • Determine whether data is ethically available and valid for its intended use. • Explain how privacy can be maintained through transmission, storage and merging of data. • Identify and minimize bias in data collection and data models.	**Written** • Research Project • Project • Self-Assessment • Professional Portfolio **Performance** • Class Presentation • Teacher Observation Checklist	**Career Ready Practices** CRP 1,2,4,5,7,8,9,10,11,12 **Cluster Standards** IT 1,2,3,4,5,6 ST 3,4,5,6 **Pathway Standards** IT-PRG 1,2,3 ST-ET 2,4 ST-SM 3,4	**ELA** 11-12R 1,2,4,7,8,9 11-12W 1,2,5,6,7 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6 **Literacy** 11-12RST 1,2,4,5,7,8,9 11-12WHST 1,2,5,6,7 **CSDF** 9-12.IC.3,4,5,7 9-12.CY.1,2,3 9-12.DL.1,2,4,5,6,7 **Math** **Science**

First Quarter Driving Question: How can I effectively and ethically use and communicate data implications? Project #1: TBD					
Unit	**Key Questions**	**Key Learning Targets** **(Students will know and be able to:)**	**Assessment Evidence of Learning**	**CCTC Standards**	**NYS Standards**
	and what can be done to prevent them?	• Identify likely misinterpretations of the results data analysis and provide examples of what can be done to prevent them.			
Data Analytics Fundamentals: **Design Skills**	• What design factors can affect the interpretation of a data visualization?	• Create a data visualization that presents data clearly and accurately. • Describe common chart types and when it appropriate to use each type. • Use common types of charts to show results of data analysis, including line graphs, bar charts, histograms, area charts, scatter plots, and box plots. • Describe the uses of color and contrast in clear and accurate data visualizations. • Describe and demonstrate design elements such as font, color, contrast, line thickness, data arrangement, and data labels to create a clear and accurate data visualization. • Explain how to make data visualizations accessible for colorblind and visually impaired individuals.	**Written** • Research Project • Project • Self-Assessment • Professional Portfolio **Performance** • Class Presentation • Teacher Observation Checklist	**Career Ready Practices** CRP 1,2,4,6,7,8,11,12 **Cluster Standards** IT 1,2,3,7,11,12 ST 1,2,6 **Pathway Standards** IT-PRG 1,2,3,4,5,6,7 ST-ET 1,2,3,4,5,6 ST-SM 1,2,3,4	**ELA** 11-12R 1,2,4,7,8,9 11-12W 1,2,5,6,7 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6 **Literacy** 11-12RST 1,2,4,5,7,8,9 11-12WHST 1,2,5,6,7 **CSDF** 9-12.IC.5,6,7 9-12.CT.1,2,3,4,8,10 9-12.NSD.1,2,4,5 9-12.CY.1,2 9-12.DL.1,2,4,5,6,7 **Math** **Science**
Work-Based Learning: **Career Coaching, Job Shadowing**	• What can be learned from data analytics professionals?	• Participate in Career Coaching process. • Participate in Job Shadowing process with local data analytics professionals.	**Written** • Career Coaching Self-Assessment • Job Shadow Reflection • Professional Portfolio **Performance** • Presentations • Teacher/Mentor Observation Checklist	**Career Ready Practices** CRP 1,2,4,5,6,7,8,10,11,12 **Cluster Standards** IT 1,2,3,5,6 ST 1,2,5,6 **Pathway Standards** IT-PRG 1,2,3 ST-ET 1,2,3,4,5,6 ST-SM 1,2,3,4	**ELA** 11-12R 1,2,4,7,8,9 11-12W 1,2,5,6,7 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6 **Literacy** 11-12RST 1,2,4,5,7,8,9 11-12WHST 1,2,5,6,7 **CSDF** 9-12.IC.7 9-12.CT.1,2,3 9-12.NSD.1,4,5 9-12.CY.1,2 9-12.DL.1,2,4,5,6,7 **Math** **Science**

Second Quarter Driving Question: How can I effectively and ethically use and communicate data implications? Project #1: TBD (continued)					
Unit	**Key Questions**	**Key Learning Targets** **(Students will know and be able to:)**	**Assessment Evidence of Learning**	**CCTC Standards**	**NYS Standards**
Data Analytics Fundamentals: **Visualization and Interpretation**	• How can data tell a story? • What is the importance of data visualization?	• Define data visualization, including why different displays are needed for different types of data. • Explain how to visualize data using various types of displays. • Describe descriptive analytics and the different approaches and tools. • Describe predictive analytics and the different approaches and tools. • Summarize, visualize, and interpret data on different types of variables. • Analyze data visualizations to determine the story they tell and how they may be misleading.	**Written** • Research Project • Project • Self-Assessment • Professional Portfolio **Performance** • Class Presentation • Teacher Observation Checklist	**Career Ready Practices** CRP 1,2,4,6,7,8,11,12 **Cluster Standards** IT 1,2,3,7,11,12 ST 1,2,6 **Pathway Standards** IT-PRG 1,2,3,4,5,6,7 ST-ET 1,2,3,4,5,6 ST-SM 1,2,3,4	**ELA** 11-12R 1,2,4,7,8,9 11-12W 1,2,5,6,7 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6 **Literacy** 11-12RST 1,2,4,5,7,8,9 11-12WHST 1,2,5,6,7 **CSDF** 9-12.IC.7 9-12.CT.1,2,3,4,10 9-12.NSD.1,2,4,5 9-12.CY.1,2 9-12.DL.1,2,4,5,6,7 **Math** **Science**
Work-Based Learning: **Career Coaching, Job Shadowing**	• What can be learned from data analytics professionals?	• Participate in Career Coaching process. • Participate in Job Shadowing process with local data analytics professionals.	**Written** • Career Coaching Self-Assessment • Job Shadow Reflection • Professional Portfolio **Performance** • Presentations • Teacher/Mentor Observation Checklist	**Career Ready Practices** CRP 1,2,4,5,6,7,8,10,11,12 **Cluster Standards** IT 1,2,3,5,6 ST 1,2,5,6 **Pathway Standards** IT-PRG 1,2,3 ST-ET 1,2,3,4,5,6 ST-SM 1,2,3,4	**ELA** 11-12R 1,2,4,7,8,9 11-12W 1,2,5,6,7 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6 **Literacy** 11-12RST 1,2,4,5,7,8,9 11-12WHST 1,2,5,6,7 **CSDF** 9-12.IC.7 9-12.CT.1,2,3 9-12.NSD.1,4,5 9-12.CY.1,2 9-12.DL.1,2,4,5,6,7 **Math** **Science**

Third Quarter Driving Question: How do I determine which technology tools to use? Project #2: TBD					
Unit	**Key Questions**	**Key Learning Targets** **(Students will know and be able to:)**	**Assessment Evidence of Learning**	**CCTC Standards**	**NYS Standards**
Data Analytics Fundamentals: **Statistical Methods for Analyzing Data**	• What are four levels of measurement in data and statistics? • What descriptive statistics are used in data analysis? • What statistical tests used in data analysis? • When is it appropriate to use parametric and nonparametric statistical tests?	• Describe and give examples of the four levels of measurement in data and statistics: nominal scale, ordinal scale, interval scale, and ratio scale. • Use different types of descriptive statistics for each level of measurement to analyze datasets, including frequency distributions, measures of central tendency (mode, median and mean), range, standard deviation, and variance. • Use different types of statistical tests for each level of measurement to analyze datasets, including Chi-Square, t-test, analysis of variance, and linear regression. • Describe and demonstrate the use parametric and nonparametric statistical tests in analyzing datasets.	**Written** • Research Project • Project • Self-Assessment • Professional Portfolio **Performance** • Class Presentation • Teacher Observation Checklist	**Career Ready Practices** CRP 1,2,4,6,7,8,11,12 **Cluster Standards** IT 1,2,3,7,11,12 ST 1,2,6 **Pathway Standards** IT-PRG 1,2,3,4,5,6,7 ST-ET 1,2,3,4,5,6 ST-SM 1,2,3,4	**ELA** 11-12R 1,2,4,7,8,9 11-12W 1,2,5,6,7 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6 **Literacy** 11-12RST 1,2,4,5,7,8,9 11-12WHST 1,2,5,6,7 **CSDF** 9-12.IC.7 9-12.CT.1,2,3,4,5,6,7,8,9,10 9-12.NSD.1,2,4,5 9-12.CY.1,2 9-12.DL.1,2,4,5,6,7 **Math** **Science**
Work-Based Learning: **Career Coaching, Job Shadowing**	• What can be learned from data analytics professionals?	• Participate in Career Coaching process. • Participate in Job Shadowing process with local data analytics professionals.	**Written** • Career Coaching Self-Assessment • Job Shadow Reflection • Professional Portfolio **Performance** • Presentations • Teacher/Mentor Observation Checklist	**Career Ready Practices** CRP 1,2,4,5,6,7,8,10,11,12 **Cluster Standards** IT 1,2,3,5,6 ST 1,2,5,6 **Pathway Standards** IT-PRG 1,2,3 ST-ET 1,2,3,4,5,6 ST-SM 1,2,3,4	**ELA** 11-12R 1,2,4,7,8,9 11-12W 1,2,5,6,7 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6 **Literacy** 11-12RST 1,2,4,5,7,8,9 11-12WHST 1,2,5,6,7 **CSDF** 9-12.IC.7 9-12.CT.1,2,3 9-12.NSD.1,4,5 9-12.CY.1,2 9-12.DL.1,2,4,5,6,7 **Math** **Science**

Fourth Quarter Driving Question: How do I determine which technology tools to use? Project #: TBD (continued)					
Unit	**Key Questions**	**Key Learning Targets** **(Students will know and be able to:)**	**Assessment** **Evidence of Learning**	**CCTC Standards**	**NYS Standards**
Data Analytics Fundamentals: **Data Analytics Tools** • **Programming Languages: Python, R, SQL, Scala, Java, C, C++** • **Visualization Dashboard Platforms: Power BI, Tableau** **Certifications:** • **Microsoft Office Specialist: Excel Associate** • **Microsoft Certified: Power BI Data Analyst Associate** • **AWS Certified Cloud Practitioner** • **Python, R, SQL, Scala, Java, C, C++, Tableau**	• What are programming languages and how are they used in data analytics? • What are Python, R, and SQL and how are they used in data analytics? • What are Scala and Java and how are they used in data analytics? • What are C and C++ and how are they used in data analytics? • What is a dashboard platform and how is it used in data analytics? • What are the similarities and differences between Power BI and Tableau?	• Create, modify, and add to Python, R, and SQL programs to produce new output. • Describe Scala and Java programming languages and their uses. • Explain the advantages Scala and Java provide in programming. • Create, modify, and add to Scala and Java programs to produce new output. • Describe C and C++ programming languages and their uses. • Explain the advantages C and C++ provide. • Create, modify, and add to C and C++ programs to produce new output. • Describe, compare, and contrast Power BI and Tableau dashboard platforms. • Explain the advantages and disadvantages that Power BI and Tableau provide in visualizing and sharing data. • Produce new output in Power BI and Tableau dashboard platforms. • Continue certification process for Microsoft Office Specialist: Excel Associate, Microsoft Certified: Power BI Data Analyst Associate, Python, R, and SQL. • Begin certification process for AWS Certified Cloud Practitioner. • Begin certification process for Scala, Java, C, C++, and Tableau.	**Written** • Research Project • Project • Self-Assessment • Professional Portfolio **Performance** • Class Presentation • Teacher Observation Checklist	**Career Ready Practices** CRP 1,2,4,6,7,8,11,12 **Cluster Standards** IT 1,2,3,7,11,12 ST 1,2,6 **Pathway Standards** IT-PRG 1,2,3,4,5,6,7,10 ST-ET 1,2,3,4,5,6 ST-SM 1,2,3,4	**ELA** 11-12R 1,2,4,7,8,9 11-12W 1,2,5,6,7 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6 **Literacy** 11-12RST 1,2,4,5,7,8,9 11-12WHST 1,2,5,6,7 **CSDF** 9-12.IC.7 9-12.CT.1,2,3,4,5,6,7,8,9,10 9-12.NSD.1,2,3,4,5 9-12.CY.1,2 9-12.DL.1,2,4,5,6,7 **Math** **Science**
Work-Based Learning: **Career Coaching, Job Shadowing**	• What can be learned from data analytics professionals?	• Participate in Career Coaching process. • Participate in Job Shadowing process with local data analytics professionals.	**Written** • Career Coaching Self-Assessment • Job Shadow Reflection • Professional Portfolio **Performance** • Presentations • Teacher/Mentor Observation Checklist	**Career Ready Practices** CRP 1,2,4,5,6,7,8,10,11,12 **Cluster Standards** IT 1,2,3,5,6 ST 1,2,5,6 **Pathway Standards** IT-PRG 1,2,3 ST-ET 1,2,3,4,5,6 ST-SM 1,2,3,4	**ELA** 11-12R 1,2,4,7,8,9 11-12W 1,2,5,6,7 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6 **Literacy** 11-12RST 1,2,4,5,7,8,9 11-12WHST 1,2,5,6,7 **CSDF** 9-12.IC.7 9-12.CT.1,2,3 9-12.NSD.1,4,5 9-12.CY.1,2 9-12.DL.1,2,4,5,6,7 **Math**

Fourth Quarter Driving Question: How do I determine which technology tools to use? Project #: TBD (continued)					
Unit	**Key Questions**	**Key Learning Targets** **(Students will know and be able to:)**	**Assessment** **Evidence of Learning**	**CCTC Standards**	**NYS Standards**
					Science

4

STEAM High School
Data Analytics Concentration
Course Syllabus
Level 4

Concentration Overview

This concentration is designed to prepare students for careers and further education and training in the data analytics and data science field, such as data scientist, data analyst, data engineer, or database manager. Students will understand the importance of data analytics in various contexts, explore career options, and learn how data analytics applies to other industries and career fields. Through project-based units, students will learn about database management and machine learning technologies, and will use data science tools and analytical techniques to answer real-world questions. Students will understand and apply the data analytics workflow of data collection, data cleaning and validation, analysis, visualization and the use of dashboards and reports for presenting data to a variety of stakeholders. Students will learn core statistical concepts and apply them to analyze both quantitative and qualitative data. Students will also utilize various computer applications such as Excel, programming languages like Python, R, SQL, C, C++, Scala, and Java and various visualization and dashboard platforms such as Tableau and Power BI. Students will also develop critical thinking and leadership skills as they collaborate effectively with a team to identify, analyze, and present data. Students will develop clear and accurate communication skills, and an awareness of issues around diversity, data ethics, and social responsibility. Students will also be able to obtain certifications such as Microsoft Office Specialist: Excel Associate, and Microsoft Certified: Power BI Data Analyst Associate, and AWS (Amazon Web Services) Certifications, as well as having opportunities to obtain certification in Python, R, SQL, Scala, Java, C, C++, Power BI, and Tableau.

Course Description

In this final course of the concentration, students will demonstrate thorough knowledge of the fundamentals of data science through hands-on projects with real-world datasets. Students demonstrate their understanding of the responsible and ethical use of data as they pose questions, collect, analyze, and visualize data. Students will develop their presentation and communication skills as they present their data analysis and solutions to stakeholder questions. They will use methods to explore and access big data and ensure that their data is accurate and reliable. Students will use of statistical models to analyze data and predict future results. Students will demonstrate their knowledge of programming languages most commonly used in data analytics, such as Python, R, SQL, Scala, Java, C, and C++. Students will use dashboard platforms for displaying and visualizing data for sharing, such as Power BI and Tableau. Throughout the course, students will demonstrate career ready practices and employability skills by both collaborating with and leading teams to create and implement the data analytics workflow. Student will also obtain certifications as Microsoft Office Specialist: Excel Associate, Microsoft Certified: Power BI Data Analyst Associate, AWS Certified Cloud Practitioner, AWS Certified Solutions Architect Associate, and AWS Certified Data Analytics Specialty. Students will also have the opportunity to obtain certifications in the programming languages of Python, R, SQL, Scala, Java, C, and C++ and the dashboard platforms of Power BI and Tableau.

All students will engage in project-based learning at a minimum of one project per year. Intrinsic to project-based learning is examining a driving question or identifying a problem by articulating what is already known, and what students need to know to answer the question. Students are guided to develop and execute a plan culminating in a presentation demonstrating their response to the initial question or problem. This process concludes with self-reflection regarding their learning. In this course, projects will focus on all aspects of the data analytics workflow. Projects focusing on presentation of real-world data to meet an authentic need will be key.

Work-Based Learning

All of the instruction for this course will be project-based where students will be developing, planning, executing, and presenting authentic data analysis projects based on community needs. Students will be connected with working data analysis and data science professionals 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.

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 concentration include, but are not limited to:

    - Microsoft Office Specialist: Excel Associate
    - Microsoft Certified: Power BI Data Analyst Associate.
    - Programming Languages: Python, R, SQL, Scala, Java, C, C++
    - Dashboard Platforms: Power BI, Tableau
    - AWS (Amazon Web Services) Certifications: AWS Certified Cloud Practitioner, AWS Certified Solutions Architect Associate, AWS Certified Data Analytics Specialty
    - Other relevant certifications as they become available through industry collaborations, teacher certifications and student interest.
- **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 concentrations and programs.

Pre-Requisites

Data Analytics Levels 1, 2, and 3

Course Objectives

Upon completion of this course students will know and be able to:

1. Define data science and its importance in today's data-driven world.
2. Identify real-world problems a data scientist might need to solve, and the methods they use.
3. Research and apply for post-secondary opportunities related to careers in data science of interest to them.
4. Explain and demonstrate the communication skills that a data analytics professional needs to be successful.
5. Explain the data analytics workflow of data collection, cleaning, transformation, analysis, visualization, and sharing.
6. Use various methods to gather, manipulate, analyze, visualize, and share data.
7. Use programming languages such as Python, R, SQL, Scala, Java, C, and C++ to collect, manage and analyze data.
8. Present data that has been collected and analyzed to answer a question or solve a problem using dashboard platforms such as Power BI and Tableau.
9. Obtain certification as a Microsoft Office Specialist: Excel Associate and Microsoft Certified: Power BI Data Analyst Associate.
10. Work on certifications as AWS Certified Cloud Practitioner, AWS Certified Solutions Architect Associate, and AWS Certified Data Analytics Specialty.
11. Work on certifications in the programming languages of Python, R, SQL, Scala, Java, C, and C++ and the dashboard platform Tableau.

Integrated High School Academics

1 CTE Integrated ELA Credit

Concurrent College Enrollment

TBD

Equipment and Supplies

- **School will provide:** All tools, technology, equipment, and supplies to complete projects
- **Student will provide:** N/A

Textbook

TBD

Grading

10% Research and planning for current projects
10% Journal
80% Projects, Presentations, Participation and Performance

Additional Course Policies

- Meet all deadlines and be on time. Meeting deadlines and being on time are a major part of being a professional.
- Produce their best work, including being prepared for presentations.

- Participate in class including contributing to discussions and critiquing their own and others' work, as well as diligently working on their own projects.
- Seek help when needed.
- Be attentive, ask questions if they do not understand something, and offer their opinions.
- Use provided software platforms for preparing and sharing all work.
- Give credit and use proper citations for all research and project ideas.

Course Calendar

Quarter	Driving Question/ Project	Units of Study
1	**How does real world application of data analysis and communication differ from theory?**	• Career and Education Planning: Applications • Employability and Communication: Data Ethics and Regulations • Data Analytics Fundamentals: Presentation and Reporting Skills • Work-Based Learning: Career Coaching, Job Shadowing
2	**Project #1: TBD**	• Data Analytics Fundamentals: Data Analytics Workflow • Work-Based Learning: Internship
3	**How does real world application of data analysis and communication differ from theory?** **Project #2: TBD**	• Data Analytics Fundamentals: Statistical Methods for Analyzing Data • Work-Based Learning: Career Coaching, Job Shadowing
4		• Data Analytics Fundamentals: Data Analytics Tools and Certifications o Programming Languages: Python, R, SQL, Scala, Java, C, C++ o Visualization Dashboard Platforms: Power BI, Tableau o Certifications: Microsoft Office Specialist: Excel Associate, Microsoft Certified: Power BI Data Analyst Associate, AWS Certified Cloud Practitioner, AWS Certified Solutions Architect Associate, AWS Certified Data Analytics Specialty, Python, R, SQL, Scala, Java, C, C++, Tableau • Work-Based Learning: Internship

4

STEAM High School
Data Analytics Concentration
Scope and Sequence
Level 4

First Quarter
Driving Question: How does real world application of data analysis and communication differ from theory?
Project #1: TBD

Unit	Key Questions	Key Learning Targets (Students will know and be able to:)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Career and Education Planning: **Applications**	• What are different careers available in data analytics and what types of education and training do they require?	• Research different institutions that offer post-secondary education and training in data analytics careers. • Research different opportunities that offer post-secondary employment. • Create and submit applications for post-secondary employment and/or education opportunities.	**Written** • Research Project • Project • Self-Assessment • Professional Portfolio **Performance** • Class Presentation • Teacher Observation Checklist	**Career Ready Practices** CRP 1,2,4,6,7,8,10,11 **Cluster Standards** IT 5,6 ST 4,5,6 **Pathway Standards** IT-PRG 1,2,3 ST-ET 2,4 ST-SM 3,4	**ELA** 11-12R 1,2,4,7,8,9 11-12W 1,2,5,6,7 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6 **Literacy** 11-12RST 1,2,4,5,7,8,9 11-12WHST 1,2,5,6,7 **CSDF** 9-12.IC.7 9-12.DL.1,2,4,5,6,7 **Math** **Science**
Employability and Communication: **Data Ethics and Regulations**	• Which laws and regulations might be applicable to a data analysis project in different disciplines? • How might the legal rights of an individual be impinged by the use of data? • How do data analysts know that data is ethically available and valid for its intended use? • How do data analysts identify and minimize bias in the data or in the model? • What are likely misinterpretations of the results data analysis and what can be done to prevent them?	• Describe ethical and privacy considerations in the field of data science. • Explain the impact of computers on access to information and information exchange worldwide. • Define open data and explain the importance of data ethics and privacy. • Describe and demonstrate industry accepted ethical practices and behaviors. • Define HIPAA, FERPA, and other privacy laws and their effect on data collection and analysis. • Identify and evaluate potential harm to individuals or groups that may arise from data collection and analysis. • Determine whether data is ethically available and valid for its intended use. • Explain how privacy can be maintained through transmission, storage and merging of data. • Identify and minimize bias in data collection and data models.	**Written** • Research Project • Project • Self-Assessment • Professional Portfolio **Performance** • Class Presentation • Teacher Observation Checklist	**Career Ready Practices** CRP 1,2,4,5,7,8,9,10,11,12 **Cluster Standards** IT 1,2,3,4,5,6 ST 3,4,5,6 **Pathway Standards** IT-PRG 1,2,3 ST-ET 2,4 ST-SM 3,4	**ELA** 11-12R 1,2,4,7,8,9 11-12W 1,2,5,6,7 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6 **Literacy** 11-12RST 1,2,4,5,7,8,9 11-12WHST 1,2,5,6,7 **CSDF** 9-12.IC.3,4,5,7 9-12.CY.1,2,3 9-12.DL.1,2,4,5,6,7 **Math** **Science**

First Quarter Driving Question: How does real world application of data analysis and communication differ from theory? Project #1: TBD					
Unit	**Key Questions**	**Key Learning Targets** **(Students will know and be able to:)**	**Assessment Evidence of Learning**	**CCTC Standards**	**NYS Standards**
		• Identify likely misinterpretations of the results of data analysis and provide examples of what can be done to prevent them.			
Data Analytics Fundamentals: **Presentation and Reporting Skills**	• Why and how do data analysts need to present their findings? • Why do data analysts need to present their findings differently to different audiences? • What factors can affect the presentation and reporting of data?	• Describe data-driven decision-making and how data analysts present findings. • Explain how giving context to data can help to tell a story which can lead to decision-making. • Describe the different types of data reporting outputs. • Explain why data should be summarized and presented differently for different audiences. • Explain the different uses of dashboards and reports, then determine which is better to use for a variety of audiences. • Decide what data is relevant to different audiences and how reports and dashboards can be tailored to meet a variety of needs. • Create reports and dashboards that present findings with visual evidence and recommendations based on the initial data questions. • Describe the principles and practices involved with effective presentations. • Present data and take questions and comments from an audience. • Evaluate presented data and conclusions to distinguish between weak and strong claims. • Identify potential limitations associated with the data in presentations. • Explain how incorrect data can lead to false conclusions and poor decision-making. • Use data responsibly to prevent data misrepresentation.	**Written** • Research Project • Project • Self-Assessment • Professional Portfolio **Performance** • Class Presentation • Teacher Observation Checklist	**Career Ready Practices** CRP 1,2,4,6,7,8,11,12 **Cluster Standards** IT 1,2,3,4,7,11,12 ST 1,2,3,6 **Pathway Standards** IT-PRG 1,2,3,4,5,6,7,10 ST-ET 1,2,3,4,5,6 ST-SM 1,2,3,4	**ELA** 11-12R 1,2,4,7,8,9 11-12W 1,2,5,6,7 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6 **Literacy** 11-12RST 1,2,4,5,7,8,9 11-12WHST 1,2,5,6,7 **CSDF** 9-12.IC.6,7 9-12.CT.1,2,3,4,5,6,7,8,9,10 9-12.NSD.1,2,3,4,5 9-12.CY.1,2 9-12.DL.1,2,4,5,6,7 **Math** **Science**
Work-Based Learning:	• What can be learned from data analytics professionals?	• Participate in Career Coaching process. • Participate in Job Shadowing process with local data analytics professionals.	**Written** • Career Coaching Self-Assessment	**Career Ready Practices** CRP 1,2,4,5,6,7,8,10,11,12	**ELA** 11-12R 1,2,4,7,8,9 11-12W 1,2,5,6,7 11-12SL 1,2,3,4,5,6

First Quarter Driving Question: How does real world application of data analysis and communication differ from theory? Project #1: TBD					
Unit	**Key Questions**	**Key Learning Targets** **(Students will know and be able to:)**	**Assessment Evidence of Learning**	**CCTC Standards**	**NYS Standards**
Career Coaching, Job Shadowing			• Job Shadow Reflection • Professional Portfolio **Performance** • Presentations • Teacher/Mentor Observation Checklist		11-12L 1,2,3,4,5,6
				Cluster Standards IT 1,2,3,5,6 ST 1,2,5,6	**Literacy** 11-12RST 1,2,4,5,7,8,9 11-12WHST 1,2,5,6,7
				Pathway Standards IT-PRG 1,2,3 ST-ET 1,2,3,4,5,6 ST-SM 1,2,3,4	**CSDF** 9-12.IC.7 9-12.CT.1,2,3 9-12.NSD.1,4,5 9-12.CY.1,2 9-12.DL.1,2,4,5,6,7
					Math
					Science

Second Quarter Driving Question: How does real world application of data analysis and communication differ from theory? Project #1: TBD (continued)					
Unit	**Key Questions**	**Key Learning Targets** **(Students will know and be able to:)**	**Assessment Evidence of Learning**	**CCTC Standards**	**NYS Standards**
Data Analytics Fundamentals: **Data Analytics Workflow**	• What is the data analytics workflow?	• Explain and demonstrate the complete data analytics workflow, including asking questions to make data-driven decisions, collecting, preparing, and cleaning data for exploration, analyzing data to answer questions, sharing data using visualizations, reports, and dashboards, and managing datasets and workspaces.	**Written** • Research Project • Project • Self-Assessment • Professional Portfolio **Performance** • Class Presentation • Teacher Observation Checklist	**Career Ready Practices** CRP 1,2,4,6,7,8,10,11,12	**ELA** 11-12R 1,2,4,7,8,9 11-12W 1,2,5,6,7 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6
				Cluster Standards IT 1,2,3,4,7,8,11,12 ST 1,2,3,6	**Literacy** 11-12RST 1,2,4,5,7,8,9 11-12WHST 1,2,5,6,7
				Pathway Standards IT-PRG 1,2,3,4,5,6,7,10 ST-ET 1,2,3,4,5,6 ST-SM 1,2,3,4	**CSDF** 9-12.IC.6,7 9-12.CT.1,2,3,4,5,6,7,8,9,10 9-12.NSD.1,2,3,4,5 9-12.CY.1,2 9-12.DL.1,2,4,5,6,7
					Math
					Science
Work-Based Learning: **Internship**	• How does an employee convey professionalism in the workplace? • Why are internships necessary? • How does an internship experience contribute to a professional portfolio? • What are areas of improvement and challenge during the internship experience?	• Apply job search techniques to seek out, evaluate and obtain internship opportunities. • Communicate with industry/potential employers through the internship experience. • Apply learned knowledge and skills to workplace situations. • Explain the importance of professionalism and ethics in the workplace. • Comply with workplace policies and regulations. • Communicate effectively both verbally and in writing. • Explain the importance of being prompt, being able to take directions and being motivated to accomplish assigned tasks. • Analyze and resolve problems that arise in completing assigned tasks.	**Written** • Self-Assessment • Reflection Summary: Internship Experience • Professional Portfolio • Employability Profile **Performance** • Internship Checklist • Employer/Mentor Observation Checklist	**Career Ready Practices** CRP 1,2,4,5,6,7,8,10,11,12	**ELA** 11-12R 1,2,4,7,8,9 11-12W 1,2,5,6,7 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6
				Cluster Standards IT 1,2,3,5,6,7,8,11,12 ST 1,2,3,5,6	**Literacy** 11-12RST 1,2,4,5,7,8,9 11-12WHST 1,2,5,6,7
				Pathway Standards IT-PRG 1,2,3,4,5,6,7,10 ST-ET 1,2,3,4,5,6 ST-SM 1,2,3,4	**CSDF** 9-12.IC.6,7 9-12.CT.1,2,3,4,5,6,7,8,9,10 9-12.NSD.1,2,34,5 9-12.CY.1,2 9-12.DL.1,2,4,5,6,7
					Math
					Science

Third Quarter Driving Question: How does real world application of data analysis and communication differ from theory? Project #2: TBD					
Unit	**Key Questions**	**Key Learning Targets** **(Students will know and be able to:)**	**Assessment Evidence of Learning**	**CCTC Standards**	**NYS Standards**
Data Analytics Fundamentals: **Statistical Methods for Analyzing Data**	• What are four levels of measurement in data and statistics? • What descriptive statistics are used in data analysis? • What statistical tests used in data analysis? • When is it appropriate to use parametric and nonparametric statistical tests?	• Describe and give examples of the four levels of measurement in data and statistics: nominal scale, ordinal scale, interval scale, and ratio scale. • Use different types of descriptive statistics for each level of measurement to analyze datasets, including frequency distributions, measures of central tendency (mode, median and mean), range, standard deviation, and variance. • Use different types of statistical tests for each level of measurement to analyze datasets, including Chi-Square, t-test, analysis of variance, and linear regression. • Use parametric and nonparametric statistical tests in analyzing datasets.	**Written** • Research Project • Project • Self-Assessment • Professional Portfolio **Performance** • Class Presentation • Teacher Observation Checklist	**Career Ready Practices** CRP 1,2,4,6,7,8,11,12 **Cluster Standards** IT 1,2,3,7,11,12 ST 1,2,6 **Pathway Standards** IT-PRG 1,2,3,4,5,6,7,10 ST-ET 1,2,3,4,5,6 ST-SM 1,2,3,4	**ELA** 11-12R 1,2,4,7,8,9 11-12W 1,2,5,6,7 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6 **Literacy** 11-12RST 1,2,4,5,7,8,9 11-12WHST 1,2,5,6,7 **CSDF** 9-12.IC.6,7 9-12.CT.1,2,3,4,5,6,7,8,9,10 9-12.NSD.1,2,3,4,5 9-12.CY.1,2 9-12.DL.1,2,4,5,6,7 **Math** **Science**
Work-Based Learning: **Career Coaching, Job Shadowing**	• What can be learned from data analytics professionals?	• Participate in Career Coaching process. • Participate in Job Shadowing process with local data analytics professionals.	**Written** • Career Coaching Self-Assessment • Job Shadow Reflection • Professional Portfolio **Performance** • Presentations • Teacher/Mentor Observation Checklist	**Career Ready Practices** CRP 1,2,4,5,6,7,8,10,11,12 **Cluster Standards** IT 1,2,3,5,6 ST 1,2,5,6 **Pathway Standards** IT-PRG 1,2,3 ST-ET 1,2,3,4,5,6 ST-SM 1,2,3,4	**ELA** 11-12R 1,2,4,7,8,9 11-12W 1,2,5,6,7 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6 **Literacy** 11-12RST 1,2,4,5,7,8,9 11-12WHST 1,2,5,6,7 **CSDF** 9-12.IC.7 9-12.CT.1,2,3 9-12.NSD.1,4,5 9-12.CY.1,2 9-12.DL.1,2,4,5,6,7 **Math** **Science**

Fourth Quarter Driving Question: How does real world application of data analysis and communication differ from theory? Project #2: TBD (continued)					
Unit	**Key Questions**	**Key Learning Targets** **(Students will know and be able to:)**	**Assessment Evidence of Learning**	**CCTC Standards**	**NYS Standards**
Data Analytics Fundamentals: **Data Analytics Tools** • **Programming Languages: Python R, SQL, Scala, Java, C, C++** • **Visualization Dashboard Platforms: Power BI, Tableau** **Certifications** • **Microsoft Office Specialist: Excel Associate** • **Microsoft Certified: Power BI Data Analyst Associate** • **AWS Certified Cloud Practitioner, AWS Certified Solutions Architect Associate, AWS Certified Data Analytics Specialty** • **Python, R, SQL, Scala, Java, C, C++, Tableau**	• What are programming languages and how are they used in data analytics? • What are Python, R, SQL, Scala, Java, C, C++ and how are they used in data analytics? • What is a dashboard platform and how is it used in data analytics? • What are Power BI and Tableau and how are they used in data analytics?	• Create, modify, and add to Python, R, and SQL programs to produce new output. • Create, modify, and add to Scala and Java programs to produce new output. • Create, modify, and add to C and C++ programs to produce new output. • Create, modify, and add to Power BI and Tableau dashboard platforms to produce new output. • Complete certification process for Microsoft Office Specialist: Excel Associate. • Complete certification process for Microsoft Certified: Power BI Data Analyst Associate. • Complete certification process for AWS Certified Cloud Practitioner • Work on certification process for AWS Certified Solutions Architect Associate, and AWS Certified Data Analytics Specialty. • Complete certification process for Python, R, SQL, Scala, Java, C, C++, Tableau.	**Written** • Research Project • Project • Self-Assessment • Professional Portfolio **Performance** • Class Presentation • Teacher Observation Checklist	**Career Ready Practices** CRP 1,2,4,6,7,8,10, 11,12 **Cluster Standards** IT 1,2,3,7,11,12 ST 1,2,6 **Pathway Standards** IT-PRG 1,2,3,4,5,6,7,10 ST-ET 1,2,3,4,5,6 ST-SM 1,2,3,4	**ELA** 11-12R 1,2,4,7,8,9 11-12W 1,2,5,6,7 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6 **Literacy** 11-12RST 1,2,4,5,7,8,9 11-12WHST 1,2,5,6,7 **CSDF** 9-12.IC.6,7 9-12.CT.1,2,3,4,5,6,7,8,9,10 9-12.NSD.1,2,3,4,5 9-12.CY.1,2 9-12.DL.1,2,4,5,6,7 **Math** **Science**
Work-Based Learning: **Internship**	• How does an employee convey professionalism in the workplace? • Why are internships necessary? • How does an internship experience contribute to a professional portfolio? • What are areas of improvement and challenge during the internship experience?	• Apply job search techniques to seek out, evaluate and obtain internship opportunities. • Communicate with industry/potential employers through the internship experience. • Apply learned knowledge and skills to workplace situations. • Explain the importance of professionalism and ethics in the workplace. • Comply with workplace policies and regulations. • Communicate effectively both verbally and in writing.	**Written** • Self-Assessment • Reflection Summary: Internship Experience • Professional Portfolio • Employability Profile **Performance** • Internship Checklist • Employer/Mentor Observation Checklist	**Career Ready Practices** CRP 1,2,4,5,6,7,8,10,11,12 **Cluster Standards** IT 1,2,3,5,6,7,8,11,12 ST 1,2,3,5,6 **Pathway Standards** IT-PRG 1,2,3,4,5,6,7,10 ST-ET 1,2,3,4,5,6 ST-SM 1,2,3,4	**ELA** 11-12R 1,2,4,7,8,9 11-12W 1,2,5,6,7 11-12SL 1,2,3,4,5,6 11-12L 1,2,3,4,5,6 **Literacy** 11-12RST 1,2,4,5,7,8,9 11-12WHST 1,2,5,6,7 **CSDF** 9-12.IC.6,7 9-12.CT.1,2,3,4,5,6,7,8,9,10 9-12.NSD.1,2,34,5 9-12.CY.1,2 9-12.DL.1,2,4,5,6,7 **Math**

Fourth Quarter Driving Question: How does real world application of data analysis and communication differ from theory? Project #2: TBD (continued)					
Unit	**Key Questions**	**Key Learning Targets** **(Students will know and be able to:)**	**Assessment Evidence of Learning**	**CCTC Standards**	**NYS Standards**
		• Explain the importance of being prompt, being able to take directions and being motivated to accomplish assigned tasks. • Analyze and resolve problems that arise in completing assigned tasks.			**Science**

CCTC: Common Career and Technical Core Standards for Data Analytics

Career Ready Practices

1	Act as a responsible and contributing citizen and employee.
2	Apply appropriate academic and technical skills.
3	Attend to personal health and financial well-being.
4	Communicate clearly and effectively and with reason.
5	Consider the environmental, social, and economic impacts of decisions.
6	Demonstrate creativity and innovation.
7	Employ valid and reliable research strategies.
8	Utilize critical thinking to make sense of problems and persevere in solving them.
9	Model integrity, ethical leadership, and effective management.
10	Plan education and career paths aligned to personal goals.
11	Use technology to enhance productivity.
12	Work productively in teams while using cultural global competence.

Full Text: Career Ready Practices

Career Cluster and Pathway Standards

Area	Number	Standard
Career Cluster: **Information Technology**	**IT 01**	Demonstrate effective professional communication skills and practices that enable positive customer relationships.
	IT 02	Use product or service design processes and guidelines to produce a quality information technology (IT) product or service.
	IT 03	Demonstrate the use of cross-functional teams in achieving IT project goals.
	IT 04	Demonstrate positive cyber citizenry by applying industry accepted ethical practices and behaviors.
	IT 05	Explain the implications of IT on business development.
	IT 06	Describe trends in emerging and evolving computer technologies and their influence on IT practices.
	IT 07	Perform standard computer backup and restore procedures to protect IT information.
	IT 08	Recognize and analyze potential IT security threats to develop and maintain security requirements.
	IT 09	Describe quality assurance practices and methods employed in producing and providing quality IT products and services.
	IT 10	Describe the use of computer forensics to prevent and solve information technology crimes and security breaches.
	IT 11	Demonstrate knowledge of the hardware components associated with information systems.
	IT 12	Compare key functions and applications of software and determine maintenance strategies for computer systems.
Career Pathway: **Programming & Software Development**	**IT-PRG 01**	Analyze customer software needs and requirements.
	IT-PRG 02	Demonstrate the use of industry standard strategies and project planning to meet customer specifications.
	IT-PRG 03	Analyze system and software requirements to ensure maximum operating efficiency.
	IT-PRG 04	Demonstrate the effective use of software development tools to develop software applications.
	IT-PRG 05	Apply an appropriate software development process to design a software application.
	IT-PRG 06	Program a computer application using the appropriate programming language.
	IT-PRG 07	Demonstrate software testing procedures to ensure quality products.
	IT-PRG 08	Perform quality assurance tasks as part of the software development cycle.
	IT-PRG 09	Perform software maintenance and customer support functions.
	IT-PRG 10	Design, create and maintain a database.
Career Cluster:	**ST 1**	Apply engineering skills in a project that requires project management, process control and quality assurance.
	ST 2	Use technology to acquire, manipulate, analyze, and report data.
	ST 3	Describe and follow safety, health and environmental standards related to science, technology, engineering, and mathematics (STEM) workplaces.

Area	Number	Standard
Science, Technology, Engineering & Mathematics	**ST 4**	Understand the nature and scope of the Science, Technology, Engineering & Mathematics Career Cluster, and the role of STEM in society and the economy.
	ST 5	Demonstrate an understanding of the breadth of career opportunities and means to those opportunities in each of the Science, Technology, Engineering & Mathematics Career Pathways.
	ST 6	Demonstrate technical skills needed in a chosen STEM field.
Career Pathway: **Engineering & Technology**	**ST-ET 1**	Use STEM concepts and processes to solve problems involving design and/or production.
	ST-ET 2	Display and communicate STEM information.
	ST-ET 3	Apply processes and concepts for the use of technological tools in STEM.
	ST-ET 4	Apply the knowledge learned in the study of STEM to provide solutions to human and societal problems in an ethical and legal manner.
	ST-ET 5	Apply the elements of the design process.
	ST-ET 6	Apply the knowledge learned in STEM to solve problems.
Career Pathway: **Science & Math**	**ST-SM 1**	Apply science and mathematics to provide results, answers, and algorithms for engineering and technological activities.
	ST-SM 2	Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.
	ST-SM 3	Analyze the impact that science and mathematics has on society.
	ST-SM 4	Apply critical thinking skills to review information, explain statistical analysis and to translate, interpret and summarize research and statistical data.

Full Text:

- Information Technology Cluster and Pathways
- Science, Technology, Engineering and Mathematics Cluster and Pathways

New York State Standards

NYS ELA Standards

9th-10th Grade Reading Standards (Literary and Informational Text)

Key Ideas and Details	
9-10R1	Cite strong and thorough textual evidence to support analysis of what the text says explicitly/implicitly and make logical inferences; develop questions for deeper understanding and for further exploration. (RI&RL)
9-10R2	Determine one or more themes or central ideas in a text and analyze its development, including how it emerges and is shaped and refined by specific details; objectively and accurately summarize a text. (RI&RL)
9-10R3	Analyze how and why individuals, events, and ideas develop and interact over the course of a text. In literary texts, analyze how complex and/or dynamic characters develop, interact with other characters, advance the plot, or develop a theme. (RL) In informational texts, analyze how the author unfolds an analysis or argument, including the sequence, the introduction and development of ideas, and the connections that exist. (RI)
Craft and Structure	
9-10R4	Determine the meaning of words and phrases as they are used in a text, including figurative and connotative meanings. Analyze the impact of specific word choices on meaning, tone, and mood. Examine technical or key terms and how language differs across genres. (RI&RL)
9-10R5	In literary texts, consider how varied aspects of structure create meaning and affect the reader. (RL) In informational texts, consider how author's intent influences particular sentences, paragraphs, or sections. (RI)
9-10R6	Analyze how authors employ point of view, perspective, and purpose to shape explicit and implicit messages (e.g., examine rhetorical strategies, literary elements, and devices). (RI&RL)
Integration of Knowledge and Ideas	
9-10R7	Analyze how a subject / content is presented in two or more formats by determining which details are emphasized, altered, or absent in each account. (e.g., analyze the representation of a subject / content or key scene in two different formats, examine the differences between a historical novel and a documentary). (RI&RL)
9-10R8	Delineate and evaluate an argument and specific claims in a text, assessing the validity or fallacy of key statements by examining whether the supporting evidence is relevant and sufficient. (RI&RL)
9-10R9	Choose and develop criteria in order to evaluate the quality of texts. Make connections to other texts, ideas, cultural perspectives, eras, and personal experiences. (RI&RL)

9th-10th Grade Writing Standards

Text Types and Purposes	
9-10W1	Write arguments to support claims that analyze substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
9-10W2	Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.
9-10W3	Write narratives to develop real or imagined experiences or events using effective technique, well-chosen details, and well-structured event sequences.
9-10W4	Create a poem, story, play, art work, or other response to a text, author, theme, or personal experience; demonstrate knowledge and understanding of a variety of techniques and genres. Explain divergences from the original when appropriate.
9-10W5	Draw evidence from literary or informational texts to support analysis, reflection, and research. Apply grade 9/10 Reading standards to both literary and informational text, where applicable.
Research to Build and Present Knowledge	
9-10W6	Conduct research to answer questions, including self-generated questions, or solve a problem; narrow or broaden the inquiry when appropriate. Synthesize multiple sources, demonstrating understanding of the subject under investigation.
9-10W7	Gather relevant information from multiple sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas; avoid plagiarism and follow a standard format for citation.

9th-10th Grade Speaking and Listening

Comprehension and Collaboration	
9-10SL1	Initiate and participate effectively in a range of collaborative discussions with diverse partners on complex topics, texts, and issues; express ideas clearly and persuasively, and build on those of others.

9-10SL2	Integrate multiple sources of information presented in diverse formats (e.g., including visual, quantitative, and oral), evaluating the credibility, accuracy, and relevance of each source.
9-10SL3	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric; identify any fallacious reasoning or exaggerated or distorted evidence.
Presentation of Knowledge and Ideas	
9-10SL4	Present claims, findings, and supporting evidence clearly, concisely, and logically; organization, development, substance, and style are appropriate to task, purpose, and audience.
9-10SL5	Make strategic use of digital media and/or visual displays in presentations to enhance understanding of findings, reasoning, and evidence, and to add elements of interest to engage the audience.
9-10SL6	Adapt speech to a variety of contexts and tasks, demonstrating command of formal English when indicated or appropriate.

9th-10th Grade Language Standards

Conventions of Academic English	
Anchor L1	Demonstrate command of the conventions of academic English grammar and usage when writing or speaking*.
Anchor L2	Demonstrate command of the conventions of academic English capitalization, punctuation, and spelling when writing*
Knowledge of Language	
9-10L3	Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.
Vocabulary Acquisition and Use	
9-10L4	Determine or clarify the meaning of unknown and multiple-meaning words and phrases, choosing flexibly from a range of strategies.
9-10L5	Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.
9-10L6	Acquire and accurately use general academic and content-specific words and phrases, sufficient for reading, writing, speaking, and listening; demonstrate independence in applying vocabulary knowledge when considering a word or phrase important to comprehension or expression.

Core Conventions Skills for Grades 9-12

- Use parallel structure.
- Use various types of phrases and clauses to add variety and interest to writing or presentations.
- Understand that usage is a matter of convention that can change over time.
- Resolve issues of complex or contested usage, consulting references as needed.

Core Punctuation and Spelling Skills for Grades 9-12

- Use punctuation (commas, parentheses, dashes, hyphens) to clarify and enhance writing.
- Use a semicolon to link two or more closely related independent clauses.
- Use a colon to introduce a list or quotation.

11th-12th Grade Reading Standards (Literary and Informational Text)

Key Ideas and Details	
11-12R1	Cite strong and thorough textual evidence to support analysis of what the text says explicitly/implicitly and make logical inferences, including determining where the text is ambiguous; develop questions for deeper understanding and for further exploration. (RI&RL)
11-12R2	Determine two or more themes or central ideas in a text and analyze their development, including how they emerge and are shaped and refined by specific details; objectively and accurately summarize a complex text. (RI&RL)
11-12R3	In literary texts, analyze the impact of author's choices. (RL) In informational texts, analyze a complex set of ideas or sequence of events and explain how specific individuals, ideas, or events interact and develop. (RI)
Craft and Structure	
11-12R4	Determine the meaning of words and phrases as they are used in a text, including figurative and connotative meanings. Analyze the impact of specific word choices on meaning, tone, and mood, including words with multiple meanings. Analyze how an author uses and refines the meaning of technical or key term(s) over the course of a text. (RI&RL)
11-12R5	In literary texts, analyze how varied aspects of structure create meaning and affect the reader. (RL) In informational texts, analyze the impact and evaluate the effect structure has on exposition or argument in terms of clarity, persuasive/rhetorical technique, and audience appeal. (RI)
11-12R6	Analyze how authors employ point of view, perspective, and purpose, to shape explicit and implicit messages (e.g., persuasiveness, aesthetic quality, satire, sarcasm, irony, or understatement). (RI&RL)
Integration of Knowledge and Ideas	
11-12R7	In literary texts, analyze multiple adaptations of a source text as presented in different formats (e.g., works of art, graphic novels, music, film, etc.), specifically evaluating how each version interprets the source. (RL) In informational texts, integrate and evaluate sources on the same topic or argument in order to address a question, or solve a problem. (RI)
11-12R8	Delineate and evaluate an argument in applicable texts, applying a lens (e.g. constitutional principles, logical fallacy, legal reasoning, belief systems, codes of ethics, philosophies, etc.) to assess the validity or fallacy of key arguments, determining whether the supporting evidence is relevant and sufficient. (RI&RL)
11-12R9	Choose and develop criteria in order to evaluate the quality of texts. Make connections to other texts, ideas, cultural perspectives, eras, and personal experiences. (RI&RL)

11th-12th Grade Writing Standards

Text Types and Purposes	
11-12W1	Write arguments to support claims that analyze substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
11-12W2	Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.
11-12W3	Write narratives to develop real or imagined experiences or events using effective techniques, well-chosen details, and well-structured event sequences.
11-12W4	Create a poem, story, play, art work, or other response to a text, author, theme, or personal experience; demonstrate knowledge and understanding of a variety of techniques and genres. Explain connections between the original and the created work.
11-12W5	Draw evidence from literary or informational texts to support analysis, reflection, and research. Apply grade 11/12 Reading standards to both literary and informational text, where applicable.
Research to Build and Present Knowledge	
11-12W6	Conduct research through self-generated question, or solve a problem; narrow or broaden the inquiry when appropriate. Synthesize multiple sources, demonstrating understanding and analysis of the subject under investigation.
11-12W7	Gather relevant information from multiple sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas; avoid plagiarism, overreliance on one source, and follow a standard format for citation.

11th-12th Grade Speaking and Listening

Comprehension and Collaboration	
11-12SL1	Initiate and participate effectively in a range of collaborative discussions with diverse partners on complex topics, texts, and issues; express ideas clearly and persuasively, and build on those of others.
11-12SL2	Integrate multiple sources of information presented in diverse formats (e.g., including visual, quantitative, and oral). Evaluate the credibility and accuracy of each source, and note any discrepancies among the data to make informed decisions and solve problems.

11-12SL3	Evaluate a speaker's point of view, reasoning, and use of evidence and rhetoric; assess the premises and connections among ideas, diction, and tone.
Presentation of Knowledge and Ideas	
11-12SL4	Present claims, findings, and supporting evidence, conveying a clear and distinct perspective; alternative or opposing perspectives are addressed; organization, development, substance, and style are appropriate to task, purpose, and audience.
11-12SL5	Make strategic use of digital media and/or visual displays in presentations to enhance understanding of findings, reasoning, and evidence, and to add elements of interest to engage the audience.
11-12SL6	Adapt speech to a variety of contexts and tasks, demonstrating a command of formal English when indicated or appropriate.

11th-12th Grade Language Standards

Conventions of Academic English	
Anchor L1	Demonstrate command of the conventions of academic English grammar and usage when writing or speaking*.
Anchor L2	Demonstrate command of the conventions of academic English capitalization, punctuation, and spelling when writing*
Knowledge of Language	
11-12L3	Apply knowledge of language to understand how language functions in different contexts, to make effective choices for meaning or style, and to comprehend more fully when reading or listening.
Vocabulary Acquisition and Use	
11-12L4	Determine or clarify the meaning of unknown and multiple-meaning words and phrases, choosing flexibly from a range of strategies.
11-12L5	Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.
11-12L6	Acquire and accurately use general academic and content-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in applying vocabulary knowledge when considering a word or phrase important to comprehension or expression.

Core Conventions Skills for Grades 9-12

- Use parallel structure.
- Use various types of phrases and clauses to add variety and interest to writing or presentations.
- Understand that usage is a matter of convention that can change over time.
- Resolve issues of complex or contested usage, consulting references as needed.

Core Punctuation and Spelling Skills for Grades 9-12

- Use punctuation (commas, parentheses, dashes, hyphens) to clarify and enhance writing.
- Use a semicolon to link two or more closely related independent clauses.
- Use a colon to introduce a list or quotation.

Full Text: New York State Next Generation English Language Arts Learning Standards (nysed.gov)

NYS Literacy Standards: NYS Next Generation 6-12 Literacy Standards in History/Social Studies, Science, and Technical Subjects

Reading Standards for Literacy in Science and Technical Subjects 9-10	
9-10RST 1	Cite specific evidence to support analysis of scientific and technical texts, charts, diagrams, etc. attending to the precise details of the source. Understand and follow a detailed set of directions.
9-10RST 2	Determine the key ideas or conclusions of a source; trace the source's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the source.
9-10RST 3	Analyze how and why scientific ideas and reasoning are developed and modified over the course of a text, source, argument, etc.
9-10RST 4	Determine the meaning of symbols, key terms, and other content-specific words and phrases as they are used in scientific or technical sources; describe how the inclusion of charts, graphs, diagrams, data influence conclusion(s).
9-10RST 5	Describe how the text structures information or ideas into categories or hierarchies, including how the major sections contribute to the whole and to an understanding of the topic.
9-10RST 6	Describe purpose and/or point of view when an author is presenting information, describing a procedure, discussing an experiment, etc.
9-10RST 7	Translate scientific or technical information expressed as written text into visual form (e.g., a table or chart), and translate information expressed visually or mathematically (e.g., in an equation) into words.
9-10RST 8	Assess the extent to which the reasoning and evidence in a source support the author's claim or a recommendation for solving a scientific or technical problem.
9-10RST 9	Compare and contrast findings presented in a source to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.

Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects 9-10	
9-10WHST 1	Write arguments focused on discipline-specific content.
9-10WHST 2	Write informative/explanatory text focused on discipline-specific content.
9-10WHST 3	Write narratives to understand an event or topic, appropriate to discipline-specific norms, conventions, and tasks.
9-10WHST 4	Write responses to texts and to events (past and present), ideas, and theories that include personal, cultural, and thematic connections.
9-10WHST 5	Conduct short as well as more sustained research projects to answer a question (including a self-generated question), analyze a topic, or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
9-10WHST 6	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question and the accuracy of each source by applying discipline-specific criteria; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation.
9-10WHST 7	Draw evidence from informational texts to support analysis, reflection, and research.

Reading Standards for Literacy in Science and Technical Subjects 11-12	
11-12RST 1	Cite specific evidence to support analysis of scientific and technical texts, charts, diagrams, etc. attending to the precise details of the source, and attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
11-12RST 2	Determine the key ideas or conclusions of a source; summarize complex concepts, processes, or information presented in a source by paraphrasing in precise and accurate terms.
11-12RST 3	Analyze how and why scientific ideas and reasoning are developed and modified over the course of a text, source, argument, etc.; analyze/evaluate the results and conclusions based on explanations in the text.
11-12RST 4	Determine the meaning of symbols, key terms, and other content-specific words and phrases as they are used in scientific or technical sources.
11-12RST 5	Analyze how the text structures information or ideas into categories or hierarchies, demonstrating understanding of the information or ideas.
11-12RST 6	Analyze the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, identifying important issues that remain unresolved. Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
11-12RST 7	Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
11-12RST 8	Evaluate the data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
11-12RST 9	Compare and contrast findings presented in a source to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.

Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects 11-12	
11-12WHST 1	Write arguments focused on discipline-specific content.
11-12WHST 2	Write explanatory and analytical text focused on discipline-specific content and which uses strategies for conveying information like those used in the respective discipline.
11-12WHST 3	Write narratives to understand an event or topic, appropriate to discipline-specific norms, conventions, and tasks.
11-12WHST 4	Write responses to texts and to events (past and present), ideas, and theories that include personal, cultural, and thematic connections.
11-12WHST 5	Conduct short as well as more sustained research projects to answer a question (including a self-generated question), analyze a topic, or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
11-12WHST 6	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience as well as by applying discipline-specific criteria used in the social sciences or sciences; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation.
11-12WHST 7	Draw evidence from informational texts to support analysis, reflection, and research.

Full Text: New York State Next Generation Learning Standards for Literacy in History/Social Studies, Science and Technical Subjects (nysed.gov)

New York State Next Generation Mathematics Learning Standards

Full Text: New York State Next Generation Mathematics Learning Standards

New York State High School Science Learning Standards

Full Text: New York State High School Science Learning Standards

NYS K-12 Computer Science and Digital Fluency Learning Standards

Subconcept	Standard	
Impacts of Computing		
Society	9-12.IC.1	Evaluate the impact of computing technologies on equity, access, and influence in a global society.
	9-12.IC.2	Debate laws and regulations that impact the development and use of computing technologies and digital information.
Ethics	9-12.IC.3	Debate issues of ethics related to real-world computing technologies.
	9-12.IC.4	Assess personal and societal trade-offs related to computing technologies and data privacy.
	9-12.IC.5	Describe ways that complex computer systems can be designed for inclusivity and to mitigate unintended consequences.
Accessibility	9-12.IC.6	Create accessible computational artifacts that meet standard compliance requirements or otherwise meet the needs of users with disabilities.
Career Paths	9-12.IC.7	Investigate the use of computer science in multiple fields.
Computational Thinking		
Modeling and Simulation	9-12.CT.1	Create a simple digital model that makes predictions of outcomes.
Data Analysis and Visualization	9-12.CT.2	Collect and evaluate data from multiple sources for use in a computational artifact.
	9-12.CT.3	Refine and visualize complex data sets to tell different stories with the same data set.
Abstraction and Decomposition	9-12.CT.4	Implement a program using a combination of student-defined and third-party functions to organize the computation.
	9-12.CT.5	Modify a function or procedure in a program to perform its computation in a different way over the same inputs, while preserving the result of the overall program.
Algorithms and Programming	9-12.CT.6	Demonstrate how at least two classic algorithms work, and analyze the trade-offs related to two or more algorithms for completing the same task.
	9-12.CT.7	Design or remix a program that utilizes a data structure to maintain changes to related pieces of data.
	9-12.CT.8	Develop a program that effectively uses control structures in order to create a computer program for practical intent, personal expression, or to address a societal issue.
	9-12.CT.9	Systematically test and refine programs using a range of test cases, based on anticipating common errors and user behavior.
	9-12.CT.10	Collaboratively design and develop a program or computational artifact for a specific audience and create documentation outlining implementation features to inform collaborators and users.
Network and System Design		
Hardware and Software	9-12.NSD.1	Design a solution to a problem that utilizes embedded systems to automatically gather input from the environment.
	9-12.NSD.2	Explain the levels of interaction existing between the application software, system software, and hardware of a computing system.
	9-12.NSD.3	Develop and communicate multistep troubleshooting strategies others can use to identify and fix problems with computing devices and their components.
Networks and the Internet	9-12.NSD.4	Describe the components and design characteristics that allow data and information to be moved, stored, and referenced over the internet.
	9-12.NSD.5	Describe how emerging technologies are impacting networks and how they are used.
Cybersecurity		
Risks	9-12.CY.1	Determine the types of personal and organizational information and digital resources that an individual may have access to that need to be protected.
Safeguards	9-12.CY.2	Describe physical, digital, and behavioral safeguards that can be employed to protect the confidentiality, integrity, and accessibility of information.
	9-12.CY.3	Explain specific trade-offs when selecting and implementing security recommendations.
	9-12.CY.4	Evaluate applications of cryptographic methods.
Response	9-12.CY.5	Recommend multiple actions to take prior and in response to various types of digital security breaches.
Digital Literacy		
Digital Use	9-12.DL.1	Type proficiently on a keyboard.
	9-12.DL.2	Communicate and work collaboratively with others using digital tools to support individual learning and contribute to the learning of others.
	9-12.DL.4	Independently select advanced digital tools and resources to create, revise, and publish complex digital artifacts or collection of artifacts.
	9-12.DL.5	Transfer knowledge of technology in order to use new and emerging technologies on multiple platforms.
Digital Citizenship	9-12.DL.6	Actively manage digital presence and footprint to reflect an understanding of the permanence and potential consequences of actions in online spaces.
	9-12.DL.7	Design and implement strategies that support safety and security of digital information, personal identity, property, and physical and mental health when operating in the digital world.

Full Text: New York State 9-12 Computer Science and Digital Fluency Standards