

BENWAY SCHOOL

Fundamentals of Computing

Grades 9 - 12

Credits: 5



Benway School**Unit 1****Content Area:** Object Oriented and Event Driven Programming**Unit Title:** Classes, Objects, Methods and Parameters**Grade Level:** 9-12

Unit Overview: Students will develop programming skills in Scratch, Alice 2 and 3, HTML, CSS and JavaScript while building a web portfolio of their projects in order to bolster mathematical and problem solving skills. Students will demonstrate mastery of key concepts including stepwise refinement, control statements, method-writing, concurrency, variables, parameters, scope, inheritance and event handlers in an engineering design environment.

Recommended Pacing: 7-9 weeks

Student Learning Objectives	NJSLs
Select and use programming languages effectively and productively. <i>Specifically in regard to the identified design constraints, use the right IDE and framework. Students will create animation/games/programs that mirror collegiate skill and rigor.</i>	8.1.12.A.2 8.1.12.A.3 8.1.12.A.4 8.1.12.A.5 8.2.12.E1 8.2.12.E.3 8.2.12.E.4
Create a starter web portfolio using basic HTML. Apply existing knowledge to generate new ideas, products, or processes to create original works as a means of personal or group expression. Present portfolios in class for peer review.	8.1.12.B.2 8.2.12.D1 8.2.12.E.3 8.2.12.E.4
Advocate and practice safe, legal, and responsible use of information and technology. Use the Fair Use Act to create an educational video incorporating music for young children utilizing a 3-D programming language and Audacity.	8.1.12.D.1 8.1.12.C.1 8.2.12.D3
Update portfolio with new 3-D animation projects with to modify the HTML to include image tags and paragraph tags of the previous projects. Link the HTML homepage to the 3-D animation page using a tags.	8.1.12.A.3 8.2.12.C.4 8.2.12.C.5
Initiate and participate effectively in a range of collaborative discussions (one-on- one, in groups, and teacher-led) with peers on <i>grades 11–12 topics, texts, and issues</i> , building on others’ ideas and expressing their own clearly and persuasively. Discuss styling the web portfolio using CSS in group settings and present wireframes for peer review.	8.1.12.A.2 8.2.12.D.1 SL.11-12.1
Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, qualitatively, orally) evaluating the credibility and accuracy of each source. Use bootstrap CDN to format portfolio to include 3-column gallery of animation projects completed.	8.1.12.A.2 SL.11-12.2

Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.	8.1.12.A.3 SL.11-12.5
Technology, 21st Century Learning and College & Career Readiness New Jersey Student Learning Standards <i>(Additional standards should be applied, as needed, to enrich instruction and foster student achievement.)</i>	Progress Indicator
Produce and edit a multi-page web document for a commercial or professional audience and present it to peers and/or professionals in that related area for review.	8.1.12.A.2
Collaborate using ASSISTments, Edmodo learning community, social networks or Alice virtual worlds to discuss a resolution to a problem or issue.	8.1.12.A.3
Construct a spreadsheet workbook with multiple worksheets, rename tabs to reflect the data on the worksheet, and use mathematical or logical functions, charts and data from all worksheets to convey the results.	8.1.12.A.4
Apply previous content knowledge by creating and piloting a digital learning game or tutorial.	8.1.12.B.2
Demonstrate appropriate application of copyright, fair use and/or Creative Commons to an original work.	8.1.12.D.1
Analyze how economic conditions and societal changes influence employment trends and future education.	8.2.12.B.1
Analyze the correlation between personal and financial behavior and employability.	9.2.12.C.9
Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with peers on <i>grades 11–12 topics, texts, and issues</i> , building on others’ ideas and expressing their own clearly and persuasively. A. Come to discussions prepared, having created storyboards of original ideas; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. B. Collaborate with peers to promote civil, democratic discussions and decision-making, set clear goals and assessments (e.g. student developed rubrics), and select the best storyboard presented. C. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. D. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task. SL.11-12.2. Integrate multiple sources of	8.1.12.A.3 SL.11-12.1

information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.	
Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, qualitatively, orally) evaluating the credibility and accuracy of each source.	SL.11-12.2
Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.	SL.11-12.5
Career Ready Practices	Indicator
Act as a responsible and contributing citizen and employee.	CRP1
Apply appropriate academic and technical skills.	CRP2
Attend to personal health and financial well-being.	CRP3
Communicate clearly and effectively and with reason.	CRP4
Consider the environmental, social and economic impacts of decisions.	CRP5
Demonstrate creativity and innovation.	CRP6
Employ valid and reliable research strategies.	CRP7
Utilize critical thinking to make sense of problems and persevere in solving them.	CRP8
Model integrity, ethical leadership and effective management.	CRP9
Plan education and career paths aligned to personal goals.	CRP10
Use technology to enhance productivity.	CRP11
Work productively in teams while using cultural global competence.	CRP12
Key Vocabulary Words	
binary, algorithm, argument, comment, control structure, design, wireframing, instruction, nesting, pseudocode, syntax, storyboard, markup language, parameter, developer tools, method, object, purpose/audience, application components, research, acceptable use of technology, formal versus informal composition, professionalism, Fair Use Act, web portfolio	
Evidence of Learning	
Suggested Assessments:	
<ul style="list-style-type: none"> ● Benchmark Assessments ● Alice Presentations ● Web Project Presentations ● Class discussions and debates ● Make connections to the outside world and own life ● Observations/Rubric ● Participation ● Classwork ● Projects ● Homework 	

- Tests/quizzes
- Essays/compositions
- Reports
- Discussions
- Peer evaluations
- Daily oral language

Learning Activities:

- Differentiated Instructional Groups and Activities
- Small group/ large group discussion: storyboard development
- Investigation of key events, concepts & principles
- Create a 2-D animation using Scratch
- Create a portfolio of computer program built in class
- Create a 3-D animation in Alice utilizing music through Fair Use Act
- Create a Music Theory computer program that teaches musical scales and includes sound
- Create an interactive video game using Scratch
- Create a 3-D animation that teaches young children the alphabet through story

Work individually and collaboratively to explore key concepts:

- Engage in formal public speaking forums
- Complete cross-curricular projects that are based in Alice Application mastery and skill
- Study formal computing and writing practices, as they relate to future career goals and opportunities
- Mastery of basic programming skills, as they relate to academic and career-centered success and productivity
- Develop various presentation styles and formats that are appropriate to a(n) academic and business setting.

Instructional Materials:

- Text: Learning to Program with Alice by Dann, Cooper and Pausch
- W3schools.com
- Google Classroom
- G-Suite
- codecadmy.com
- Edmodo.com
- ASSISTments.org
- Sublime Text Editor
- Audacity
- Ubuntu Linux
- Chrome Web Developer Tools
- Windows File System / Internet Explorer
- Smartboard
- Internet
- Supplemental text: JavaScript & JQuery Jon Duckett

Teacher Resources:

- Intro to JQuery
<https://www.codecademy.com/learn/learn-jquery>
- Dr. Susan Rodgers (Duke University) Adventures in Alice Website with Alice Curriculum
<https://www2.cs.duke.edu/csed/alice/aliceInSchools/>
- Codecademy Web Programming
<https://www.codecademy.com/>
- Oracle Academy Alice 3 Tutorials
<https://academy.oracle.com/en/training-self-study.html>
- W3schools JavaScript
<https://www.w3schools.com/jS/default.asp>

Modifications & Accommodations:

**Please note that the following modifications and accommodations vary from unit to unit, and may be implemented for any student who would benefit*

<p align="center"><u>Gifted and Talented</u> <i>(content, process, product, and learning environment)</i></p> <p>Extension Activities:</p> <ul style="list-style-type: none"> ● Conduct research and provide presentation of various technological topics ● Design surveys to generate and analyze data to be used in discussion. Debate topics of interest/cultural importance. ● Authentic listening and reading sources that provide data and support for speaking and writing prompts ● Exploration of art and/or artists to understand society and history ● Implement RAFT (role, audience, format, topic) activities as they pertain to the types/modes of communication ● Anchor activities ● Use of higher-level questioning techniques ● Provide assessments at a higher-level of thinking 	<p align="center"><u>English Language Learners</u></p> <p>Modifications:</p> <ul style="list-style-type: none"> ● Modified assignments ● Native language translation (peer, online assistive technology, translation device, bilingual dictionary) ● Extended time for assignment completion as needed ● Highlight key vocabulary ● Use graphic organizers
<p align="center"><u>Students with Disabilities</u> <i>(appropriate accommodations, instructional adaptation, and/or modifications as determined by the IEP team)</i></p> <p>Modifications for Classroom:</p> <ul style="list-style-type: none"> ● Pair visual prompts with verbal presentations ● Ask students to restate information, directions, and assignments, ● Repetition and practice 	<p align="center"><u>Students at Risk of School Failure</u></p> <p>Modifications for Classroom:</p> <ul style="list-style-type: none"> ● Pair visual prompts with verbal presentations ● Ask students to restate information, directions, and assignments ● Repetition and practice ● Model skills/techniques to be mastered ● Extended time to complete class work ● Provide a copy of class notes

- Model skills/techniques to be mastered
- Extended time to complete class work
- Provide copy of class notes
- Preferential seating to be mutually determined by the student and teacher
- Student may request to use a computer to complete assignments
- Establish expectations for correct spelling on assignments
- Extra textbooks for home
- Student may request books on tape/CD/digital media, as available and appropriate
- Assign a peer helper in the class setting
- Provide oral reminders and check student work during independent work time
- Assist student with long and short term planning of assignments
- Encourage student to proofread assignments and tests
- Provide regular parent/school communication
- Teachers will check/sign student agenda daily
- Student requires use of other assistive technology device

Modifications for Homework and Assignments:

- Extended time to complete assignments
- Student requires more complex assignments to be broken up and explained in smaller units, with work to be submitted in phases.
- Provide the student with clearly stated (written) expectations and grading criteria for assignments.
- Implement RAFT (role, audience, format, topic) activities as they pertain to the types/modes of communication

Modifications for Assessments:

- Extended time on classroom tests and quizzes
- Student may take/complete tests in an alternate setting as needed
- Restate, reread, and clarify directions/questions
- Distribute study guide for classroom tests

- Preferential seating to be mutually determined by the student and teacher
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Modifications for Assessments:

- Extended time on classroom tests and quizzes
- Student may take/complete tests in an alternate setting as needed
- Restate, reread, and clarify directions/questions
- Distribute study guide for classroom tests
- Establish procedures for accommodations/modifications for assessments

<ul style="list-style-type: none"> Establish procedures for accommodations/modifications for assessments 	
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Benway School	
Unit 2	
Content Area: Building Dynamic Web Applications	
Unit Title: JavaScript and jQuery	
Grade Level: 9-12	
Unit Overview: In this unit, students will write programs to solve the problem of static	
Recommended Pacing: 7-10 weeks	
Student Learning Objectives	NJSLs
Write computer programs with multiple levels of sophistication. If HTML and CSS accomplish static web pages, how does JavaScript allow for dynamic web applications? <i>Specifically in regard to jQuery, students will create professional applications that mirror collegiate skill and rigor.</i>	8.1.12.A.2 8.1.12.A.3 8.1.12.A.4 8.1.12.A.5
Apply existing knowledge to generate new ideas, products, or processes. Create original works as a means of personal or group expression.	8.1.12.B.2
Advocate and practice safe, legal, and responsible use of information and technology.	8.1.12.D.1
Demonstrate the ability to draw direct connections between computational skills and the attainment of those goals. Directly apply computing skills to college and career readiness. Analyze the economical, job climate as it pertains to technology and use this understanding to apply knowledge and skills.	9.1.12.A.3 9.1.12.B.1 9.1.12.B.4 9.2.12.C.1 9.2.12.C.3 9.2.12.C.4 9.2.12.C.9
Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with peers on <i>grades 11–12 topics, texts, and issues</i> , building on others’ ideas and expressing their own clearly and persuasively.	8.1.12.A.3
Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, qualitatively, orally) evaluating the credibility and accuracy of each source.	8.1.12.A.2
Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.	8.1.12.A.2
Technology, 21st Century Learning and College & Career Readiness New Jersey Student Learning Standards <i>(Additional standards should be applied, as needed, to enrich instruction and foster student achievement.)</i>	Progress Indicator

Produce and edit a multi-page digital document for a commercial or professional audience and present it to peers and/or professionals in that related area for review.	8.1.12.A.2
Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue.	8.1.12.A.3
Construct a web project with multiple pages to reflect the data of multiple sources, and use mathematical or logical functions, charts and data from all pages to convey the results.	8.1.12.A.4
Apply previous content knowledge by creating and piloting a digital learning game or tutorial.	8.1.12.B.2
Demonstrate appropriate application of copyright, Fair Use Act and/or Creative Commons to an original work.	8.1.12.D.1
Analyze the correlation between personal and financial behavior and employability.	9.2.12.C.9
<p>Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with peers on <i>grades 11–12 topics, texts, and issues</i>, building on others’ ideas and expressing their own clearly and persuasively.</p> <ul style="list-style-type: none"> E. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. F. Collaborate with peers to promote civil, democratic discussions and decision-making, set clear goals and assessments (e.g. student developed rubrics), and establish individual roles as needed. G. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. H. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task. SL.11-12.2. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. 	SL.11-12.1
Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, qualitatively, orally) evaluating the credibility and accuracy of each source.	8.1.12.A.1 8.1.12.A.2

Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.	8.1.12.A.1 8.1.12.A.2
Career Ready Practices	Indicator
Act as a responsible and contributing citizen and employee.	CRP1
Apply appropriate academic and technical skills.	CRP2
Attend to personal health and financial well-being.	CRP3
Communicate clearly and effectively and with reason.	CRP4
Consider the environmental, social and economic impacts of decisions.	CRP5
Demonstrate creativity and innovation.	CRP6
Employ valid and reliable research strategies.	CRP7
Utilize critical thinking to make sense of problems and persevere in solving them.	CRP8
Model integrity, ethical leadership and effective management.	CRP9
Plan education and career paths aligned to personal goals.	CRP10
Use technology to enhance productivity.	CRP11
Work productively in teams while using cultural global competence.	CRP12
Key Vocabulary Words	
javaScript, JQuery, function, method, object, parent, child, class, inheritance, decision, if statement, data type, boolean, properties, parameters, variable, array, extension, AJAX, JSON, DOM, global variable, string, number data type, undefined, return value, null, truncation, scope, comparison operator, logical operators, switch statements, concatenation, falsy values, for loop, validation, event handlers, selectors	
Evidence of Learning	
<p>Suggested Assessments:</p> <ul style="list-style-type: none"> ● Web Programming Presentations ● Class discussions and debates ● Observations/Rubric ● Participation ● Classwork ● Projects ● Homework ● Tests/quizzes ● Essays/compositions ● Reports ● Discussions ● Notebook assignments ● Peer evaluations ● Daily oral language 	
<p>Learning Activities:</p> <ul style="list-style-type: none"> ● Differentiated Instructional Groups and Activities ● Upgrade portfolio with recent projects 	

- Small group/ large group discussion
- Create a towers of hanoi 3-D puzzle using Alice 2 and recursion
- Create a maze video game using Alice 3 and recursive methods
- Create a Shopping List app using HTML, CSS and javaScript methods
- Create a music player app using HTML, CSS and javaScript methods
- Given a completed storyboard, create an animated film short including title screen, action sequence with dialog, end screen and accompanying music
- Write a computer program to compute the circumference of a circle to animate a bee flying about the perimeter of a pond
- Write a computer program to animate a pharaoh ascending the side of a pyramid by utilizing pythagorean's theorem.

Work individually and collaboratively to explore key concepts:

- Engage in formal public speaking forums paired with web projects and computer animations
- Complete cross-curricular projects that are based in Alice 2, Alice 3, Scratch, HTML, CSS and javaScript
- Study formal computing and writing practices, as they relate to future career goals and opportunities
- Mastery of basic method and procedure writing across multiple computer languages, including parameters, arguments and return values.
- Develop various presentation styles and formats that are appropriate to a(n) academic and business setting.

Instructional Materials:

- Learning to Program with Alice College Text Book by Wanda Dann, Steve Cooper and Randy Pausch
- Google Classroom
- G-Suite
- Edmodo
- youtube
- ASSISTments
- Laptops/ Desktop computers
- video tutorials
- Smartboard
- Internet
- JavaScript and JQuery by Jon Duckett

Teacher Resources:

- Intro to JQuery Lessons
<https://www.codecademy.com/learn/learn-jquery>
- Dr. Susan Rodgers (Duke University) Adventures in Alice Curriculum Website
<https://www2.cs.duke.edu/csed/alice/aliceInSchools/>
- Codecademy Web Programming Lessons
<https://www.codecademy.com/>
- Oracle Academy Alice 3 Tutorials
<https://academy.oracle.com/en/training-self-study.html>

<ul style="list-style-type: none"> ● W3schools JavaScript Documentation https://www.w3schools.com/jS/default.asp 	
Modifications & Accommodations: <i>*Please note that the following modifications and accommodations vary from unit to unit, and may be implemented for any student who would benefit</i>	
<p style="text-align: center;"><u>Gifted and Talented</u> <i>(content, process, product, and learning environment)</i></p> <p>Extension Activities:</p> <ul style="list-style-type: none"> ● Conduct research and provide presentation of various technological topics ● Design surveys to generate and analyze data to be used in discussion. Debate topics of interest/cultural importance. ● Authentic listening and reading sources that provide data and support for speaking and writing prompts ● Exploration of art and/or artists to understand society and history ● Implement RAFT (role, audience, format, topic) activities as they pertain to the types/modes of communication ● Anchor activities ● Use of higher-level questioning techniques ● Provide assessments at a higher-level of thinking 	<p style="text-align: center;"><u>English Language Learners</u></p> <p>Modifications:</p> <ul style="list-style-type: none"> ● Modified assignments ● Native language translation (peer, online assistive technology, translation device, bilingual dictionary) ● Extended time for assignment completion as needed ● Highlight key vocabulary ● Use graphic organizers
<p style="text-align: center;"><u>Students with Disabilities</u> <i>(appropriate accommodations, instructional adaptation, and/or modifications as determined by the IEP or 504 team)</i></p> <p>Modifications for Classroom:</p> <ul style="list-style-type: none"> ● Pair visual prompts with verbal presentations ● Ask students to restate information, directions, and assignments, ● Repetition and practice ● Model skills/techniques to be mastered ● Extended time to complete class work ● Provide copy of class notes ● Preferential seating to be mutually determined by the student and teacher ● Student may request to use a computer to complete assignments ● Establish expectations for correct spelling on assignments 	<p style="text-align: center;"><u>Students at Risk of School Failure</u></p> <p>Modifications for Classroom:</p> <ul style="list-style-type: none"> ● Pair visual prompts with verbal presentations ● Ask students to restate information, directions, and assignments ● Repetition and practice ● Model skills/techniques to be mastered ● Extended time to complete class work ● Provide a copy of class notes ● Preferential seating to be mutually determined by the student and teacher ● Student may request to use a computer to complete assignments ● Establish expectations for correct spelling on assignments ● Online textbook for home use ● Student may request books on tape/CD/digital media, as available and appropriate

- Online textbook for home use
- Student may request books on tape/CD/digital media, as available and appropriate
- Assign a peer helper in the class setting
- Provide oral reminders and check student work during independent work time
- Assist student with long and short term planning of assignments
- Encourage student to proofread assignments and tests
- Provide regular parent/school communication
- Teachers will check/sign student agenda daily
- Student requires use of other assistive technology device

Modifications for Homework and Assignments:

- Extended time to complete assignments
- Student requires more complex assignments to be broken up and explained in smaller units, with work to be submitted in phases.
- Provide the student with clearly stated (written) expectations and grading criteria for assignments.
- Implement RAFT (role, audience, format, topic) activities as they pertain to the types/modes of communication

Modifications for Assessments:

- Extended time on classroom tests and quizzes
- Student may take/complete tests in an alternate setting as needed
- Restate, reread, and clarify directions/questions
- Distribute study guide for classroom tests
- Establish procedures for accommodations/modifications for assessments

- Assign a peer helper in the class setting
- Provide oral reminders and check student work during independent work time
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Benway School

Unit 3

Content Area: Operating Systems

Unit Title: Raspberry Pi and Pen Drive Linux: learning the fundamentals of computer operating systems

Grade Level: 9-12

Unit Overview: Throughout this unit, students will identify key parts of an operating system. They will also identify and use the parts of a small computer, raspberry pi. Students will develop skills directly correlated with college and career success, by implementing and manipulating various aspects of computing fundamentals. This content knowledge will be mastered through differentiated activities, multiple means of assessment, and enhancement of prior knowledge. Students will be encouraged to make real-world connections and explore how mastery of computer applications can help to shape one's future.

Recommended Pacing: 7-10 weeks

Student Learning Objectives	NJSLs
Select and use applications effectively and productively. <i>Use the sublime text editor, use terminal to navigate about a computer's OS.</i>	8.1.12.A.2 8.1.12.A.3 8.1.12.A.4 8.1.12.A.5
Apply existing knowledge to generate new files, create read/write permissions. Create original works as a means of personal or group expression.	8.1.12.B.2
Advocate and practice safe, legal, and responsible use of information and technology by using the Fair Use act.	8.1.12.D.1
Initiate and participate effectively in a range of collaborative discussions (one-on- one, in groups, and teacher-led) with peers on <i>grades 11–12 topics, texts, and issues</i> , building on others' ideas and expressing their own clearly and persuasively.	8.1.12.A.3
Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, qualitatively, orally) evaluating the credibility and accuracy of each source.	8.1.12.A.1
Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.	8.1.12.A.1 8.1.12.A.3
Produce a clear and coherent research paper, utilizing technology, as well as the correct planning, and revision steps in its development. Focus on the purpose and audience when formatting and writing. Use MLA format.	W.11-12.4 W.11-12.5 W.11-12.6
Technology, 21st Century Learning and College & Career Readiness	Progress Indicator

New Jersey Student Learning Standards <i>(Additional standards should be applied, as needed, to enrich instruction and foster student achievement.)</i>	
Produce and edit a multi-page digital document for a commercial or professional audience and present it to peers and/or professionals in that related area for review.	8.1.12.A.2
Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue.	8.1.12.A.3
Apply previous content knowledge by creating and piloting a digital learning game or tutorial.	8.1.12.B.2
Demonstrate appropriate application of copyright, fair use and/or Creative Commons to an original prototype.	8.1.12.D.1
Review career goals and determine steps necessary for attainment.	9.2.12.C.1
Identify transferable career skills and design alternate career plans.	9.2.12.C.3
Analyze how economic conditions and societal changes influence employment trends and future education.	9.2.12.C.4
Analyze the correlation between personal and financial behavior and employability.	9.2.12.C.9
<p>Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with peers on <i>grades 11–12 topics, texts, and issues</i>, building on others’ ideas and expressing their own clearly and persuasively.</p> <ul style="list-style-type: none"> I. Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. J. Collaborate with peers to promote civil, democratic discussions and decision-making, set clear goals and assessments (e.g. student developed rubrics), and establish individual roles as needed. K. Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives. L. Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task. SL.11-12.2. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data. 	SL.11-12.1

Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.	SL.11-12.5
Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1–3 above.)	W.11-12.4
Develop and strengthen writing as needed by planning, revising, editing, rewriting, trying a new approach, or consulting a style manual (such as MLA or APA Style), focusing on addressing what is most significant for a specific purpose and audience.	W.11-12.5
Use technology, including the Internet, to produce, share, and update individual or shared writing products in response to ongoing feedback, including new arguments or information.	W.11-12.6
Career Ready Practices	
Indicator	
Act as a responsible and contributing citizen and employee.	CRP1
Apply appropriate academic and technical skills.	CRP2
Attend to personal health and financial well-being.	CRP3
Communicate clearly and effectively and with reason.	CRP4
Consider the environmental, social and economic impacts of decisions.	CRP5
Demonstrate creativity and innovation.	CRP6
Employ valid and reliable research strategies.	CRP7
Utilize critical thinking to make sense of problems and persevere in solving them.	CRP8
Model integrity, ethical leadership and effective management.	CRP9
Plan education and career paths aligned to personal goals.	CRP10
Use technology to enhance productivity.	CRP11
Work productively in teams while using cultural global competence.	CRP12
Key Vocabulary Words	
linux, distribution, root, resources, terminal, rm, mkdir, ls, cd, pwd, bash, shell, script, compile, binary, rpm, apt-get, repository, user, superuser, sudo, man, GUI	
Evidence of Learning	
<p>Suggested Assessments:</p> <ul style="list-style-type: none"> ● Presentations ● Class discussions and debates ● Make connections to the outside world and own life ● Coding Challenges ● Observations/Rubric ● Participation ● Classwork ● Projects ● Homework ● Tests / quizzes ● Essays /compositions ● Reports 	

- Discussions
- Peer evaluations
- Daily oral language

Learning Activities:

- Differentiated instructional groups and activities
- Develop web portfolio with projects from class
- Setting and getting permissions in a operating system
- Combining commands with piping
- Scripting exercises using Vi Edit
- Process Management / Resource Management
- Small group / large group discussion
- Investigation of key events, concepts & principles
- Anchor Activities
- Integration of Contemporary Informational Texts

Work individually and collaboratively to explore key concepts:

- Utilize Terminal in Linux or Mac OS (Unix)
 - Define the terms of an Operating System
 - Identify the parts of a raspberry pi
 - use terminal commands to navigate an operating system
 - Find and replace files
 - Change files
 - Use Sublime Text Editor to write scripts
 - Change the appearance of the GUI
 - Copy and remove files through terminal
 - Insert and delete files
- Resources / Networking / Computing Concepts
- Study formal computing and writing practices, as they relate to future career goals and opportunities
- Mastery of basic operating system skills, as they relate to academic and career-centered success and productivity

Answer essential questions:

- In a world of constant technological change, what operating skills should we learn?
- What are the positive and negative consequences of technology?
- How can I transfer technological skills to other areas of life/academics?

Instructional Materials:

- G-Suite
- Laptops/ Desktop computers
- Smartboard
- Video Lessons
- Internet
- Supplemental text

Teacher Resources:

- Teaching the Fundamentals of Computer Operating Systems:
<https://www.tldp.org/guides.html>
- Introduction to the command line
https://tutorial.djangogirls.org/en/intro_to_command_line/
- Raspberry Pi Curriculum
<https://curriculum.raspberrypi.org/>

Modifications & Accommodations:
**Please note that the following modifications and accommodations vary from unit to unit, and may be implemented for any student who would benefit*

<p style="text-align: center;"><u>Gifted and Talented</u> <i>(content, process, product, and learning environment)</i></p> <p>Extension Activities:</p> <ul style="list-style-type: none"> ● Create a video game illustrating content mastery ● Conduct research and provide presentation of various technological topics ● Design surveys to generate and analyze data to be used in discussion. Debate topics of interest/cultural importance. ● Authentic listening and reading sources that provide data and support for speaking and writing prompts ● Exploration of art and/or artists to understand society and history ● Implement RAFT (role, audience, format, topic) activities as they pertain to the types/modes of communication ● Anchor activities ● Use of higher-level questioning techniques ● Provide assessments at a higher-level of thinking 	<p style="text-align: center;"><u>English Language Learners</u></p> <p>Modifications:</p> <ul style="list-style-type: none"> ● Modified assignments ● Native language translation (peer, online assistive technology, translation device, bilingual dictionary) ● Extended time for assignment completion as needed ● Highlight key vocabulary ● Use graphic organizers
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<p style="text-align: center;"><u>Students with Disabilities</u> <i>(appropriate accommodations, instructional adaptation, and/or modifications as determined by the IEP team)</i></p> <p>Modifications for Classroom:</p> <ul style="list-style-type: none"> ● Pair visual prompts with verbal presentations ● Ask students to restate information, directions, and assignments, ● Repetition and practice ● Model skills/techniques to be mastered ● Extended time to complete class work ● Provide copy of class notes 	<p style="text-align: center;"><u>Students at Risk of School Failure</u></p> <p>Modifications for Classroom:</p> <ul style="list-style-type: none"> ● Pair visual prompts with verbal presentations ● Ask students to restate information, directions, and assignments ● Repetition and practice ● Model skills/techniques to be mastered ● Extended time to complete class work ● Provide a copy of class notes ● Preferential seating to be mutually determined by the student and teacher
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- Preferential seating to be mutually determined by the student and teacher
- Student may request to use a computer to complete assignments
- Establish expectations for correct spelling on assignments
- Online textbook for home use
- Student may request books on tape/CD/digital media, as available and appropriate
- Assign a peer helper in the class setting
- Provide oral reminders and check student work during independent work time
- Assist student with long and short term planning of assignments
- Encourage student to proofread assignments and tests
- Provide regular parent/school communication
- Teachers will check/sign student agenda daily
- Student requires use of other assistive technology device

Modifications for Homework and Assignments:

- Extended time to complete assignments
- Student requires more complex assignments to be broken up and explained in smaller units, with work to be submitted in phases.
- Provide the student with clearly stated (written) expectations and grading criteria for assignments.
- Implement RAFT (role, audience, format, topic) activities as they pertain to the types/modes of communication

Modifications for Assessments:

- Extended time on classroom tests and quizzes
- Student may take/complete tests in an alternate setting as needed
- Restate, reread, and clarify directions/questions
- Distribute study guide for classroom tests
- Establish procedures for accommodations/modifications for assessments

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Benway School

Unit 4

Content Area: Full Stack Web Development

Unit Title: Software Engineer: Database / Server Management

Grade Level: 9-12

Unit Overview: Throughout this unit, students will come to understand and use basic back end concepts, navigation techniques and the skills needed to construct a web application with the ability to create, read, update, edit, and destroy online data from multiple users. Students will develop skills required to construct a web application from scratch to live deployment. Content knowledge will be mastered through differentiated activities, multiple means of assessment, and enhancement of prior knowledge. Students will be encouraged to make real-world connections and explore how mastery of building computer applications can help to shape one’s future as a software engineer.

Recommended Pacing: 7-10 weeks

Student Learning Objectives	NJSLS
Select and use programming applications and tools effectively and productively. Demonstrate an understanding of the problem-solving capacity of computers in our world. <i>Specifically demonstrate ability to: Write code in multiple languages using and frameworks including ruby on rails, html, CSS, javascript, bootstrap, SASS and jQuery</i>	8.1.12.A.1 8.1.12.A.2 8.1.12.A.3 8.1.12.A.4 8.1.12.A.5 8.2.12.E.1 8.2.12.E.3 8.2.12.E.4
Apply existing interdisciplinary knowledge to generate new ideas, products, or processes in terms of web application design. Create original applications including games, tutorials or movies as a means of personal or group expression by writing clean and efficient computer programs.	8.1.12.A.1 8.1.12.B.2 8.2.12.E.1 8.2.12.E.3 8.2.12.E.4
Advocate and practice safe, legal, and responsible use of information and technology. Use Fair Use Act to develop safe, educational programs and applications.	8.1.12.D.1 8.1.12.D.2 8.1.12.D.5 8.2.12.E.4
Develop an innovative solution to a real world problem or issue in collaboration with peers and experts, and present ideas for feedback through social media or in an online community.	8.1.12.A.3 8.1.12.C.1 8.2.12.E.3 8.2.12.E.4 SL.11-12.1
Use a programming language to solve problems or accomplish a task (e.g., robotic functions, website designs, applications, and games).	8.1.12.A.1 8.2.12.E.3 8.2.12.E.4

Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in computer programs to enhance understanding of findings, reasoning, and evidence and to add interest.	8.2.12.E.4 8.1.12.D.1
Technology, 21st Century Learning and College & Career Readiness New Jersey Student Learning Standards <i>(Additional standards should be applied, as needed, to enrich instruction and foster student achievement.)</i>	Progress Indicator
Produce and edit a multi-page digital document for a commercial or professional audience and present it to peers and/or professionals in that related area for review.	8.1.12.A.2
Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue.	8.1.12.A.3
Construct a web database using active record methods, rename tabs to reflect the data on the worksheet, and use mathematical or logical functions, charts and data from all worksheets to convey the results.	8.1.12.A.4
Create a report from a relational database consisting of at least two tables and describe the process, and explain the report results.	8.1.12.A.5
Apply previous content knowledge by creating and piloting a digital learning game or tutorial.	8.1.12.B.2
Demonstrate appropriate application of copyright, fair use and/or Creative Commons to an original work.	8.1.12.D.1
Prioritize social impact on decisions in the design process.	9.1.12.B.1
Analyze historical impact of a design introduced in society.	9.1.12.B.4
Review career goals and determine steps necessary for attainment.	9.2.12.C.1
Identify transferable career skills and design alternate career plans.	9.2.12.C.3
Analyze how economic conditions and societal changes influence employment trends and future education.	9.2.12.C.4
Analyze the correlation between personal and financial behavior and employability.	9.2.12.C.9
Initiate and participate effectively in a range of collaborative discussions (one-on- one, in groups, and teacher-led) with peers on <i>grades 11–12 topics, texts, and issues</i> , building on others’ ideas and expressing their own clearly and persuasively. A.Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas. B.Collaborate with peers to promote civil, democratic discussions and decision-making, set clear goals and assessments (e.g. student developed rubrics), and establish individual roles as needed.	SL.11-12.1

<p>C.Propel conversations by posing and responding to questions that probe reasoning and evidence; ensure a hearing for a full range of positions on a topic or issue; clarify, verify, or challenge ideas and conclusions; and promote divergent and creative perspectives.</p> <p>D.Respond thoughtfully to diverse perspectives; synthesize comments, claims, and evidence made on all sides of an issue; resolve contradictions when possible; and determine what additional information or research is required to deepen the investigation or complete the task. SL.11-12.2. Integrate multiple sources of information presented in diverse formats and media (e.g., visually, quantitatively, orally) in order to make informed decisions and solve problems, evaluating the credibility and accuracy of each source and noting any discrepancies among the data.</p>	
<p>Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, qualitatively, orally) evaluating the credibility and accuracy of each source.</p>	<p>8.1.12.A.1 8.1.12.A.2</p>
<p>Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.</p>	<p>8.1.12.A.1 8.1.12.A.2</p>
Career Ready Practices	Indicator
<p>Act as a responsible and contributing citizen and employee.</p>	<p>CRP1</p>
<p>Apply appropriate academic and technical skills.</p>	<p>CRP2</p>
<p>Attend to personal health and financial well-being.</p>	<p>CRP3</p>
<p>Communicate clearly and effectively and with reason.</p>	<p>CRP4</p>
<p>Consider the environmental, social and economic impacts of decisions.</p>	<p>CRP5</p>
<p>Demonstrate creativity and innovation.</p>	<p>CRP6</p>
<p>Employ valid and reliable research strategies.</p>	<p>CRP7</p>
<p>Utilize critical thinking to make sense of problems and persevere in solving them.</p>	<p>CRP8</p>
<p>Model integrity, ethical leadership and effective management.</p>	<p>CRP9</p>
<p>Plan education and career paths aligned to personal goals.</p>	<p>CRP10</p>
<p>Use technology to enhance productivity.</p>	<p>CRP11</p>
<p>Work productively in teams while using cultural global competence.</p>	<p>CRP12</p>
Key Vocabulary Words	
<p>rails, ruby, object oriented, method, counter, loop, scaffolding, blog, bin, config, db, gem, rake, migration, data type, model, class, inheritance, embedded ruby, controller, index, show, create, read, update, destroy, activerecord methods, MVC programming, server, backend, database persistence, interactive ruby console</p>	
Evidence of Learning	
<p>Suggested Assessments:</p> <ul style="list-style-type: none"> ● Presentations ● Class discussions and debates 	

- Make connections to the outside world and own life
- Coding Challenges
- Observations/Rubric
- Participation
- Classwork
- Projects
- Homework
- Tests/quizzes
- Essays/compositions
- Reports
- Discussions
- Peer evaluations
- Daily oral language

Learning Activities:

- Differentiated Instructional Groups and Activities
- Create a blog web application from scratch
- Create a twitter web application with followers and comments and a sign-in/sign up form
- Small group/large group discussion
- Investigation of key events, concepts & principles
- Anchor Activities
- Integration of Contemporary Informational Texts
- troubleshooting / debugging

Work individually and collaboratively to explore key concepts:

- Creating Full Stack Web Applications
- Develop educational software and products to teach young children interdisciplinary lessons
- Study formal computing and writing practices, as they relate to future career goals and opportunities
- Mastery of basic programming skills, from design to iteration
- Develop programs appropriate to a(n) academic and business setting.

Answer essential questions:

- In a world of constant technological change, what programming skills should we learn?
- What are the positive and negative consequences of using web technologies?
- How can I transfer technological skills to other areas of life/academics?

Instructional Materials:

- G-Suite
- Laptops/ Desktop computers
- Video Tutorials
- Smartboard
- Internet

Teacher Resources:

- Development of web programs with database persistence
<https://guides.rubyonrails.org/>
- Database coding
<https://www.freecodecamp.org/>
- Github Software Development Platform
<https://github.com/>
- Online Backend Tutorials
<https://stackoverflow.com/>

Modifications & Accommodations:

**Please note that the following modifications and accommodations vary from unit to unit, and may be implemented for any student who would benefit*

Gifted and Talented

(content, process, product, and learning environment)

Extension Activities:

- Create a video game that uses the key concept
- Conduct research and provide presentation of various technological topics
- Design surveys to generate and analyze data to be used in discussion.
Debate topics of interest/cultural importance.
- Authentic listening and reading sources that provide data and support for speaking and writing prompts
- Exploration of art and/or artists to understand society and history
- Implement RAFT (role, audience, format, topic) activities as they pertain to the types/modes of communication
- Anchor activities
- Use of higher-level questioning techniques
- Provide assessments at a higher-level of thinking

English Language Learners

Modifications:

- Modified assignments
- Native language translation (peer, online assistive technology, translation device, bilingual dictionary)
- Extended time for assignment completion as needed
- Highlight key vocabulary
- Use graphic organizers

Students with Disabilities

(appropriate accommodations, instructional adaptation, and/or modifications as determined by the IEP team)

Modifications for Classroom:

- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments,
- Repetition and practice

Students at Risk of School Failure

Modifications for Classroom:

- Pair visual prompts with verbal presentations
- Ask students to restate information, directions, and assignments
- Repetition and practice
- Model skills/techniques to be mastered
- Extended time to complete class work
- Provide a copy of class notes

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- Extended time to complete class work
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- Preferential seating to be mutually determined by the student and teacher
- Student may request to use a computer to complete assignments
- Establish expectations for correct spelling on assignments
- Online textbooks for home use
- Student may request books on tape/CD/digital media, as available and appropriate
- Assign a peer helper in the class setting
- Provide oral reminders and check student work during independent work time
- Assist student with long and short term planning of assignments
- Encourage student to proofread assignments and tests
- Provide regular parent/school communication
- Teachers will check/sign student agenda daily
- Student requires use of other assistive technology device

Modifications for Homework and Assignments:

- Extended time to complete assignments
- Student requires more complex assignments to be broken up and explained in smaller units, with work to be submitted in phases.
- Provide the student with clearly stated (written) expectations and grading criteria for assignments.
- Implement RAFT (role, audience, format, topic) activities as they pertain to the types/modes of communication

Modifications for Assessments:

- Extended time on classroom tests and quizzes
- Student may take/complete tests in an alternate setting as needed
- Restate, reread, and clarify directions/questions
- Distribute study guide for classroom tests

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|---|--|
| <ul style="list-style-type: none">● Establish procedures for accommodations/modifications for assessments | |
|---|--|