



Mathematics
Grades 10 - 12
Mobile Applications

Dr. Mark Toback, Superintendent
Committee: Thomas Grasso

*This curriculum may be modified through varying techniques, strategies,
and materials as per an individual student's Individualized Educational
Plan (IEP)*

Wayne School District Curriculum Format

Content Area/ Grade Level/ Course:	Computer Science 9-12 Mobile Applications
Unit Plan Title:	Unit 1: Getting Started with App Development
Time Frame	4 weeks
Anchor Standards/Domain* *i.e: ELA: reading, writing i.e.: Math: Number and Operations in Base 10	
Data and Analysis	DA
Algorithms and Programming	AP
Engineering Design	ED
Computer Systems	CS
21st Century Life Skills: Career Preparation	9.2.12.C
Career & Technical Education: Information Technology	9.3.IT-PRG
Unit Overview	
<p>Unit 1: Getting Started with App Development</p> <ul style="list-style-type: none"> A. Data Basics B. Operators C. Control Flow D. Documentation E. Debugging F. Mobile Development Environment G. Building, Running and Testing Apps H. Interface Builder I. Guided Project: Light - students will build a functioning flashlight mobile application 	
Standard Number(s) * i.e: Math: 3.NBT.1 i.e.: RL 8.1	
<p>8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.</p> <p>8.1.12.AP.1: Design algorithms to solve computational problems using a combination of original and existing algorithms.</p> <p>8.1.12.AP.2: Create generalized computational solutions using collections instead of repeatedly using simple variables.</p> <p>8.1.12.AP.3: Select and combine control structures for a specific application based upon performance and readability, and identify trade-offs to justify the choice.</p> <p>8.1.12.AP.4: Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue.</p> <p>8.1.12.AP.5: Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects</p>	

8.1.12.AP.6: Create artifacts by using procedures within a program, combinations of data and procedures, or independent but interrelated programs.

8.1.12.AP.7: Collaboratively design and develop programs and artifacts for broad audiences by incorporating feedback from users.

8.1.12.AP.8: Evaluate and refine computational artifacts to make them more usable and Accessible

8.1.12.AP.9: Collaboratively document and present design decisions in the development of complex programs.

8.2.12.ED.2: Create scaled engineering drawings for a new product or system and make modification to increase optimization based on feedback.

9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.

9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).

9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).

9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).

9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a)

9.4.12.CT.4: Participate in online strategy and planning sessions for course-based, school-based, or other project and determine the strategies that contribute to effective outcomes.

9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).

WHST.11-12.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

WHST.11-12.5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

WHST.11-12.6. Use technology, including the Internet, to produce, share, and update writing products in response to ongoing feedback, including new arguments or information.

NJSLSA.SL1. - Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.

SL.11-12.4 - Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.

HS-ETS1-2. - Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

HS-ETS1-4. - Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

Intended Outcomes - {Essential Questions}

- What types of data do we need to model in our programs?
- What are programming conventions and why are they useful?
- What are the positive and negative impacts of technology on society?
- What is programming?
- How should our programs communicate to our end users?
- What does it mean to program in an Object Oriented way?

Enduring Understandings

- Technology and programming languages are constantly evolving.
- Technology has impacted virtually every industry and field of endeavor in our society.
- Programs are fundamentally very specific and literal instructions with specific syntax.
- Object Oriented Programming allows us to create modular, portable, re-usable code in a very powerful way.

In this unit plan, the following 21st Century themes and skills are addressed.

<i>Check all that apply.</i> 21st Century Themes		<i>Indicate whether these skills are E-Encouraged, T-Taught, or A-Assessed in this unit by marking E, T, A on the line before the appropriate skill.</i> 21st Century Skills	
X	Global Awareness	A	Creativity and Innovation
<input type="checkbox"/>	Environmental Literacy	A	Critical Thinking and Problem Solving
<input type="checkbox"/>	Health Literacy	E	Communication
<input type="checkbox"/>	Civic Literacy	E	Collaboration
X	Financial, Economic, Business, and Entrepreneurial Literacy		

Student Learning Targets/Objectives (Students will know/Students will understand)

- Gain familiarity with programming environment for compiling, running and debugging
- Utilize proper documenting for methods and programs
- Use appropriate identifiers when solving problems
- Apply knowledge of string and string interpolation
- Customize programming environment and apply skills in debugging
- Create effective user interfaces with Interface Builder
- Use iOS simulator

Assessments (Pre, Formative, Summative, Other)

*Denote required common assessments with an **

- Project Based Learning
- Utilize program specification to build/create their own creative solutions to problems
- Formative and summative evaluations via worksheets, quizzes, and tests (electronic and paper)
- Demonstrate working mobile applications

Teaching and Learning Activities

<i>Activities</i>	<ul style="list-style-type: none"> • Lecture and class discussion. • Video and multimedia presentations. • Build a console, applet and GUI based application. • Review and extend program functionality. • Group and collaborative work. • Student presentations of projects.
<i>Differentiation Strategies</i>	<ul style="list-style-type: none"> • Individual and collaborative research, design and problem solving • Student interest and skill level assessment • Individual, small group, and large group instruction • Media presentations and guest speakers • Student presentations and Flipped Lessons <p> Differentiation Strategies for Special Education Students Differentiation Strategies for Gifted and Talented Students Differentiation Strategies for ELL Students Differentiation Strategies for At Risk Students </p>
<i>Honors</i>	N/A

Resources	
<ul style="list-style-type: none">• https://images.apple.com/ca/education/docs/App_Development_w_Swift_Resource_Guide_CAEN-May2017.pdf• https://developer.apple.com/swift/resources/• http://www.state.nj.us/education/cccs/• https://www.nextgenscience.org/dci-arrangement/hs-ets1-engineering-design	

Content Area/ Grade Level/ Course:	Computer Science 9-12 Mobile Applications
Unit Plan Title:	Unit 2: Introduction to a Data, Methods Collections and User Interface
Time Frame	4 weeks

Anchor Standards/Domain* *i.e: ELA: reading, writing i.e.: Math: Number and Operations in Base 10

Data and Analysis	DA
Algorithms and Programming	AP
Engineering Design	ED
Computer Systems	CS
21st Century Life Skills: Career Preparation	9.2.12.C
Career & Technical Education: Information Technology	9.3.IT-PRG

Unit Overview

Unit 2: Unit 2: Introduction to a Data, Methods Collections and User Interface

- A. Strings
- B. Functions
- C. Structures
- D. Collections
- E. Loops
- F. User Interface Kit / API

Standard Number(s) * i.e: Math: 3.NBT.1 i.e.: RL 8.1

8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.

8.1.12.AP.1: Design algorithms to solve computational problems using a combination of original and existing algorithms.

8.1.12.AP.2: Create generalized computational solutions using collections instead of repeatedly using simple variables.

8.1.12.AP.3: Select and combine control structures for a specific application based upon performance and readability, and identify trade-offs to justify the choice.

8.1.12.AP.4: Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue.

8.1.12.AP.5: Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects

8.1.12.AP.6: Create artifacts by using procedures within a program, combinations of data and procedures, or independent but interrelated programs.

8.1.12.AP.7: Collaboratively design and develop programs and artifacts for broad audiences by incorporating feedback from users.

8.1.12.AP.8: Evaluate and refine computational artifacts to make them more usable and Accessible

8.1.12.AP.9: Collaboratively document and present design decisions in the development of complex programs.

8.2.12.ED.2: Create scaled engineering drawings for a new product or system and make modification to increase optimization based on feedback.

8.1.12.CS.1: Describe ways in which integrated systems hide underlying implementation details to simplify user experiences.

9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.

9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).

9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).

9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).

9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a)

9.4.12.CT.4: Participate in online strategy and planning sessions for course-based, school-based, or other project and determine the strategies that contribute to effective outcomes.

9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).

WHST.11-12.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

WHST.11-12.5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

WHST.11-12.6. Use technology, including the Internet, to produce, share, and update writing products in response to ongoing feedback, including new arguments or information.

NJSLSA.SL1. - Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.

SL.11-12.4 - Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.

HS-ETS1-2. - Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

HS-ETS1-4. - Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

Intended Outcomes - {Essential Questions}

- What types of data do we need to model in our programs?
- What are programming conventions and why are they useful?
- What are the positive and negative impacts of technology on society?
- What is programming?
- How should our programs communicate to our end users?
- What does it mean to program in an Object Oriented way?

Enduring Understandings

- Technology and programming languages are constantly evolving.
- Technology has impacted virtually every industry and field of endeavor in our society.
- Programs are fundamentally very specific and literal instructions with specific syntax.
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In this unit plan, the following 21st Century themes and skills are addressed.

<i>Check all that apply.</i> 21st Century Themes		<i>Indicate whether these skills are E-Encouraged, T-Taught, or A-Assessed in this unit by marking E, T, A on the line before the appropriate skill.</i> 21st Century Skills	
X	Global Awareness	A	Creativity and Innovation
	Environmental Literacy	A	Critical Thinking and Problem Solving
	Health Literacy	E	Communication
	Civic Literacy	E	Collaboration
X	Financial, Economic, Business, and Entrepreneurial Literacy		

Student Learning Targets/Objectives (Students will know/Students will understand)

- Gain familiarity with how to build a successful User Interface
- Use appropriate views to display and analyze data
- Apply knowledge of strings, methods, structures, collections and loops
- Customize views and controls in a User Interface
- Build and test a mobile app

Assessments (Pre, Formative, Summative, Other)

*Denote required common assessments with an **

- Project Based Learning
- Utilize program specification to build/create their own creative solutions to problems
- Formative and summative evaluations via worksheets, quizzes, and tests (electronic and paper)
- Demonstrate working mobile applications

Teaching and Learning Activities

<i>Activities</i>	<ul style="list-style-type: none"> • Lecture and class discussion. • Video and multimedia presentations. • Guided Projects (ie. Apple Pie, a word-guessing game app) • Build a console, applet and GUI based application. • Review and extend program functionality. • Group and collaborative work. • Student presentations of projects.
<i>Differentiation Strategies</i>	<ul style="list-style-type: none"> • Individual and collaborative research, design and problem solving • Student interest and skill level assessment • Individual, small group, and large group instruction • Media presentations and guest speakers • Student presentations and Flipped Lessons <p>Differentiation Strategies for Special Education Students Differentiation Strategies for Gifted and Talented Students Differentiation Strategies for ELL Students Differentiation Strategies for At Risk Students</p>
<i>Honors</i>	N/A

Resources

- https://images.apple.com/ca/education/docs/App_Development_w_Swift_Resource_Guide_CAEN-May2017.pdf
- <https://developer.apple.com/swift/resources/>
- <http://www.state.nj.us/education/cccs/>
- <https://www.nextgenscience.org/dci-arrangement/hs-ets1-engineering-design>

Content Area/ Grade Level/ Course:	Computer Science 9-12 Mobile Applications
Unit Plan Title:	Unit 3: Navigation and Workflows
Time Frame	4 weeks
Anchor Standards/Domain* *i.e: ELA: reading, writing i.e.: Math: Number and Operations in Base 10	
Data and Analysis	DA
Algorithms and Programming	AP
Engineering Design	ED
Computer Systems	CS
21st Century Life Skills: Career Preparation	9.2.12.C
Career & Technical Education: Information Technology	9.3.IT-PRG
Unit Overview	
Unit 1: Getting Started with App Development <ul style="list-style-type: none"> A. Navigation Controllers B. Tab Bar Controllers C. Segues D. Optionals and Enumerations E. Guided Project: Personality Quiz (a personalized survey) 	

Standard Number(s) * i.e: Math: 3.NBT.1 i.e.: RL 8.1

- 8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.
- 8.1.12.AP.1: Design algorithms to solve computational problems using a combination of original and existing algorithms.
- 8.1.12.AP.2: Create generalized computational solutions using collections instead of repeatedly using simple variables.
- 8.1.12.AP.3: Select and combine control structures for a specific application based upon performance and readability, and identify trade-offs to justify the choice.
- 8.1.12.AP.4: Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue.
- 8.1.12.AP.5: Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects
- 8.1.12.AP.6: Create artifacts by using procedures within a program, combinations of data and procedures, or independent but interrelated programs.
- 8.1.12.AP.7: Collaboratively design and develop programs and artifacts for broad audiences by incorporating feedback from users.
- 8.1.12.AP.8: Evaluate and refine computational artifacts to make them more usable and Accessible
- 8.1.12.AP.9: Collaboratively document and present design decisions in the development of complex programs.
- 8.2.12.ED.2: Create scaled engineering drawings for a new product or system and make modification to increase optimization based on feedback.
- 9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.
- 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).
- 9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).
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- 9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a)
- 9.4.12.CT.4: Participate in online strategy and planning sessions for course-based, school-based, or other project and determine the strategies that contribute to effective outcomes.
- 9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).
- WHST.11-12.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
- WHST.11-12.5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.
- WHST.11-12.6. Use technology, including the Internet, to produce, share, and update writing products in response to ongoing feedback, including new arguments or information.
- NJSLSA.SL1. - Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.
- SL.11-12.4 - Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.
- HS-ETS1-2. - Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.
- HS-ETS1-4. - Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

Intended Outcomes - {Essential Questions}

- What types of data do we need to model in our programs?
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- What does it mean to program in an Object Oriented way?

Enduring Understandings

- Technology and programming languages are constantly evolving.
- Technology has impacted virtually every industry and field of endeavor in our society.
- Programs are fundamentally very specific and literal instructions with specific syntax.
- Object Oriented Programming allows us to create modular, portable, re-usable code in a very powerful way.

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X	Global Awareness	A	Creativity and Innovation
	Environmental Literacy	A	Critical Thinking and Problem Solving
	Health Literacy	E	Communication
	Civic Literacy	E	Collaboration
X	Financial, Economic, Business, and Entrepreneurial Literacy		

Student Learning Targets/Objectives (Students will know/Students will understand)

- Gain familiarity with workflows and navigation
- Successfully incorporate navigation and tab bar controllers and segues into a User Interface
- Use optionals and enumerations in a modern computer language such as Swift
- Synthesize and apply knowledge of programming structures to actual applications
- Create a quiz based application

Assessments (Pre, Formative, Summative, Other)

*Denote required common assessments with an **

- Project Based Learning
- Utilize program specification to build/create their own creative solutions to problems
- Formative and summative evaluations via worksheets, quizzes, and tests (electronic and paper)
- Demonstrate working mobile applications

Teaching and Learning Activities

<i>Activities</i>	<ul style="list-style-type: none"> • Lecture and class discussion. • Video and multimedia presentations. • Build a console, applet and GUI based application. • Review and extend program functionality. • Group and collaborative work. • Student presentations of projects.
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<p><i>Differentiation Strategies</i></p>	<ul style="list-style-type: none"> • Individual and collaborative research, design and problem solving • Student interest and skill level assessment • Individual, small group, and large group instruction • Media presentations and guest speakers • Student presentations and Flipped Lessons <p>Differentiation Strategies for Special Education Students</p> <p>Differentiation Strategies for Gifted and Talented Students</p> <p>Differentiation Strategies for ELL Students</p> <p>Differentiation Strategies for At Risk Students</p>
<p><i>Honors</i></p>	<p>N/A</p>
<p>Resources</p>	
<ul style="list-style-type: none"> • https://images.apple.com/ca/education/docs/App_Development_w_Swift_Resource_Guide_CAEN-May2017.pdf • https://developer.apple.com/swift/resources/ • http://www.state.nj.us/education/cccs/ • https://www.nextgenscience.org/dci-arrangement/hs-ets1-engineering-design 	

Content Area/ Grade Level/ Course:	Computer Science 9-12 Mobile Applications
Unit Plan Title:	Unit 4: Tables and Persistence
Time Frame	4 weeks
Anchor Standards/Domain* *i.e: ELA: reading, writing i.e.: Math: Number and Operations in Base 10	
Data and Analysis	DA
Algorithms and Programming	AP
Engineering Design	ED
Computer Systems	CS
21st Century Life Skills: Career Preparation	9.2.12.C
Career & Technical Education: Information Technology	9.3.IT-PRG
Unit Overview	
Unit 4: Tables and Persistence <ul style="list-style-type: none"> A. Scroll Views and Table Views B. Complex Input Screens C. Saving and Sharing Data to Other Apps D. Access Images in a User Photo Library E. Guided Project - List (Task tracking app that allows users to add, edit and delete items in a table-based interface.) 	
Standard Number(s) * i.e: Math: 3.NBT.1 i.e.: RL 8.1	
8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena. 8.1.12.AP.1: Design algorithms to solve computational problems using a combination of original and existing algorithms. 8.1.12.AP.2: Create generalized computational solutions using collections instead of repeatedly using simple variables. 8.1.12.AP.3: Select and combine control structures for a specific application based upon performance and readability, and identify trade-offs to justify the choice. 8.1.12.AP.4: Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue.	

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8.1.12.AP.8: Evaluate and refine computational artifacts to make them more usable and Accessible

8.1.12.AP.9: Collaboratively document and present design decisions in the development of complex programs.

8.2.12.ED.2: Create scaled engineering drawings for a new product or system and make modification to increase optimization based on feedback.

8.2.12.ED.3: Evaluate several models of the same type of product and make recommendations for a new design based on a cost benefit analysis.

8.2.12.E.4 Use appropriate terms in conversation (e.g., troubleshooting, peripherals, diagnostic software, GUI, abstraction, variables, data types and conditional statements).

9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.

9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).

9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).

9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).

9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a)

9.4.12.CT.4: Participate in online strategy and planning sessions for course-based, school-based, or other project and determine the strategies that contribute to effective outcomes.

9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).

WHST.11-12.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

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HS-ETS1-2. - Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

HS-ETS1-4. - Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

Intended Outcomes - {Essential Questions}

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<input checked="" type="checkbox"/>	Global Awareness	<input checked="" type="checkbox"/>	Creativity and Innovation
<input type="checkbox"/>	Environmental Literacy	<input type="checkbox"/>	Critical Thinking and Problem Solving
<input type="checkbox"/>	Health Literacy	<input type="checkbox"/>	Communication
<input type="checkbox"/>	Civic Literacy	<input type="checkbox"/>	Collaboration
<input checked="" type="checkbox"/>	Financial, Economic, Business, and Entrepreneurial Literacy		

Student Learning Targets/Objectives (Students will know/Students will understand)

- Explore ways to save and share data between different apps
- Incorporate scroll views and table views into an input screen in a user interface
- Add and remove items from both a data structure and a corresponding table-based interface
- Customize an application to accommodate a variety of data

Assessments (Pre, Formative, Summative, Other)

*Denote required common assessments with an **

- Project Based Learning
- Utilize program specification to build/create their own creative solutions to problems
- Formative and summative evaluations via worksheets, quizzes, and tests (electronic and paper)
- Demonstrate working mobile applications
- Build a mobile app that utilizes flexible data structures

Teaching and Learning Activities

<i>Activities</i>	<ul style="list-style-type: none"> • Lecture and class discussion. • Video and multimedia presentations. • Build a console, applet and GUI based application. • Review and extend program functionality. • Group and collaborative work. • Student presentations of projects.
<i>Differentiation Strategies</i>	<ul style="list-style-type: none"> • Individual and collaborative research, design and problem solving • Student interest and skill level assessment • Individual, small group, and large group instruction • Media presentations and guest speakers • Student presentations and Flipped Lessons <p>Differentiation Strategies for Special Education Students Differentiation Strategies for Gifted and Talented Students</p>

	Differentiation Strategies for ELL Students Differentiation Strategies for At Risk Students
<i>Honors</i>	N/A

Resources

- https://images.apple.com/ca/education/docs/App_Development_w_Swift_Resource_Guide_CAEN-May2017.pdf
- <https://developer.apple.com/swift/resources/>
- <http://www.state.nj.us/education/cccs/>
- <https://www.nextgenscience.org/dci-arrangement/hs-ets1-engineering-design>

Content Area/ Grade Level/ Course:	Computer Science 9-12 Mobile Applications
Unit Plan Title:	Unit 5: Working With The Web
Time Frame	4 weeks

Anchor Standards/Domain* *i.e: ELA: reading, writing i.e.: Math: Number and Operations in Base 10

Data and Analysis	DA
Algorithms and Programming	AP
Engineering Design	ED
Computer Systems	CS
21st Century Life Skills: Career Preparation	9.2.12.C
Career & Technical Education: Information Technology	9.3.IT-PRG

Unit Overview

Unit 5: Working With The Web

- A. Animations
- B. Concurrency
- C. Working With The Web
- D. Guided Project: Restaurant - a customizable menu app that displays the available dishes from a restaurant and allows the user to submit an order. This app will use a web service.

Standard Number(s) * i.e: Math: 3.NBT.1 i.e.: RL 8.1

- 8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.
- 8.1.12.AP.1: Design algorithms to solve computational problems using a combination of original and existing algorithms.
- 8.1.12.AP.2: Create generalized computational solutions using collections instead of repeatedly using simple variables.
- 8.1.12.AP.3: Select and combine control structures for a specific application based upon performance and readability, and identify trade-offs to justify the choice.
- 8.1.12.AP.4: Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue.
- 8.1.12.AP.5: Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects
- 8.1.12.AP.6: Create artifacts by using procedures within a program, combinations of data and procedures, or independent but interrelated programs.
- 8.1.12.AP.7: Collaboratively design and develop programs and artifacts for broad audiences by incorporating feedback from users.
- 8.1.12.AP.8: Evaluate and refine computational artifacts to make them more usable and Accessible
- 8.1.12.AP.9: Collaboratively document and present design decisions in the development of

complex programs.

8.2.12.ED.2: Create scaled engineering drawings for a new product or system and make modification to increase optimization based on feedback.

8.1.12.CS.1: Describe ways in which integrated systems hide underlying implementation details to simplify user experiences.

9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.

9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).

9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).

9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice (e.g., 1.1.12acc.C1b, 2.2.12.PF.3).

9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a)

9.4.12.CT.4: Participate in online strategy and planning sessions for course-based, school-based, or other project and determine the strategies that contribute to effective outcomes.

9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).

WHST.11-12.4. Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

WHST.11-12.5. Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

WHST.11-12.6. Use technology, including the Internet, to produce, share, and update writing products in response to ongoing feedback, including new arguments or information.

NJSLSA.SL1. - Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.

SL.11-12.4 - Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.

HS-ETS1-2. - Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

HS-ETS1-4. - Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem.

Intended Outcomes - {Essential Questions}

- What types of data do we need to model in our programs?
- What are programming conventions and why are they useful?
- What are the positive and negative impacts of technology on society?
- What is programming?
- How should our programs communicate to our end users?
- What does it mean to program in an Object Oriented way?

Enduring Understandings

- Technology and programming languages are constantly evolving.
- Technology has impacted virtually every industry and field of endeavor in our society.
- Programs are fundamentally very specific and literal instructions with specific syntax.
- Object Oriented Programming allows us to create modular, portable, re-usable code in a very powerful way.

In this unit plan, the following 21st Century themes and skills are addressed.

<i>Check all that apply.</i> 21st Century Themes		<i>Indicate whether these skills are E-Encouraged, T-Taught, or A-Assessed in this unit by marking E, T, A on the line before the appropriate skill.</i> 21st Century Skills	
<input checked="" type="checkbox"/>	Global Awareness	<input type="checkbox"/>	Creativity and Innovation
<input type="checkbox"/>	Environmental Literacy	<input type="checkbox"/>	Critical Thinking and Problem Solving
<input type="checkbox"/>	Health Literacy	<input type="checkbox"/>	Communication
<input type="checkbox"/>	Civic Literacy	<input type="checkbox"/>	Collaboration
<input checked="" type="checkbox"/>	Financial, Economic, Business, and Entrepreneurial Literacy		

Student Learning Targets/Objectives (Students will know/Students will understand)

- Gain familiarity with animations, concurrency and working with the web
- Build a dynamic menu app that uses a web service to set up a dynamic menu with custom menu items and photos
- Successfully create a mobile app that allows a user to place orders

Assessments (Pre, Formative, Summative, Other)

*Denote required common assessments with an **

- Project Based Learning
- Utilize program specification to build/create their own creative solutions to problems
- Formative and summative evaluations via worksheets, quizzes, and tests (electronic and paper)
- Demonstrate working mobile applications

Teaching and Learning Activities

<i>Activities</i>	<ul style="list-style-type: none"> • Lecture and class discussion. • Video and multimedia presentations. • Build a console, applet and GUI based application. • Review and extend program functionality. • Group and collaborative work. • Student presentations of projects.
<i>Differentiation Strategies</i>	<ul style="list-style-type: none"> • Individual and collaborative research, design and problem solving • Student interest and skill level assessment • Individual, small group, and large group instruction • Media presentations and guest speakers • Student presentations and Flipped Lessons <p>Differentiation Strategies for Special Education Students</p> <p>Differentiation Strategies for Gifted and Talented Students</p> <p>Differentiation Strategies for ELL Students</p> <p>Differentiation Strategies for At Risk Students</p>
<i>Honors</i>	N/A

Resources

- https://images.apple.com/ca/education/docs/App_Development_w_Swift_Resource_Guide_CAEN-May2017.pdf
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Content Area/ Grade Level/ Course:	Computer Science 9-12 Mobile Applications
Unit Plan Title:	Unit 6: Prototyping and Project Planning

Time Frame	4 weeks
Anchor Standards/Domain*	*i.e: ELA: reading, writing i.e.: Math: Number and Operations in Base 10
Data and Analysis	DA
Algorithms and Programming	AP
Engineering Design	ED
Computer Systems	CS
21st Century Life Skills: Career Preparation	9.2.12.C
Career & Technical Education: Information Technology	9.3.IT-PRG
Unit Overview	
<p>Unit 6: Prototyping and Project Planning</p> <p>A. District Project: Several projects will be proposed based upon the needs of our school district. Students will be working to complete projects that have the potential to help other students, teachers and administrators. Ideas will be welcomed from a variety of stakeholders throughout the district.</p> <p>B. Independent Project: Students will plan, design, prototype and fully execute a mobile app of their own design.</p>	
Standard Number(s)	* i.e: Math: 3.NBT.1 i.e.: RL 8.1
<p>8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.</p> <p>8.1.12.AP.1: Design algorithms to solve computational problems using a combination of original and existing algorithms.</p> <p>8.1.12.AP.2: Create generalized computational solutions using collections instead of repeatedly using simple variables.</p> <p>8.1.12.AP.3: Select and combine control structures for a specific application based upon performance and readability, and identify trade-offs to justify the choice.</p> <p>8.1.12.AP.4: Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue.</p> <p>8.1.12.AP.5: Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects</p> <p>8.1.12.AP.6: Create artifacts by using procedures within a program, combinations of data and procedures, or independent but interrelated programs.</p> <p>8.1.12.AP.7: Collaboratively design and develop programs and artifacts for broad audiences by incorporating feedback from users.</p> <p>8.1.12.AP.8: Evaluate and refine computational artifacts to make them more usable and Accessible</p> <p>8.1.12.AP.9: Collaboratively document and present design decisions in the development of complex programs.</p> <p>8.2.12.ED.2: Create scaled engineering drawings for a new product or system and make modification to increase optimization based on feedback.</p> <p>8.1.12.CS.4: Develop guidelines that convey systematic troubleshooting strategies that others can //use to identify and fix errors.</p> <p>8.2.12.ED.3: Evaluate several models of the same type of product and make recommendations for a new design based on a cost benefit analysis.</p> <p>9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.</p> <p>9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).</p> <p>9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).</p>	

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<input type="checkbox"/>	Environmental Literacy	A	Critical Thinking and Problem Solving
<input type="checkbox"/>	Health Literacy	E	Communication
<input type="checkbox"/>	Civic Literacy	E	Collaboration

X

Financial, Economic, Business, and Entrepreneurial Literacy

Student Learning Targets/Objectives (Students will know/Students will understand)

- Apply problem solving skills and knowledge of programming in the service of others
- Design mobile app solutions to solve a variety of problems in education and beyond
- Successfully take a program idea from concept to prototype to a working mobile application

Assessments (Pre, Formative, Summative, Other)

*Denote required common assessments with an **

- Project Based Learning
- Utilize program specification to build/create their own creative solutions to problems
- Formative and summative evaluations via worksheets, quizzes, and tests (electronic and paper)
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- Individual, small group, and large group instruction
- Media presentations and guest speakers
- Student presentations and Flipped Lessons

[Differentiation Strategies for Special Education Students](#)

[Differentiation Strategies for Gifted and Talented Students](#)

[Differentiation Strategies for ELL Students](#)

[Differentiation Strategies for At Risk Students](#)

Honors

N/A

Resources

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- <https://developer.apple.com/swift/resources/>
- <http://www.state.nj.us/education/cccs/>
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