

Intro to Computers

9th-12th

Prepared by:

Danielle Vandenberghe

Superintendent of Schools:

Marie C. Cirasella, Ed.D.

Approved by the Midland Park Board of Education on ,

August 23, 2022

Intro to Computers

Course Description: Intro to Computers is an entry-level Computer Science course. This class is designed to teach students about computational thinking, problem solving, and the design process. Students will learn basic computer programming as well as problem solving skills, computational thinking skills and basic game design. The beginning of the class will look at appropriate use of the internet, careers and ethical matters in Computer Science. Throughout the course we will also look at the global impact of advancements in Computer Science. By the end of the course students will have a better idea of a computer's limitations and how to use them in an ethical and responsible way. Students will also have a general understanding of basic programming, giving them a good foundation for future programming classes.

Course Sequence:

Unit 1: Appropriate Use of the Internet, Careers & Ethics – Independent work / 6-8 classes

Unit 2: Introducing Programming through Computational Thinking - approximately 3 week

Unit 3: Programming – approximately 5 weeks

Unit 4: Design / Final Project - approximately 10 weeks

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Unit 1 - Overview

Core Ideas: Students will learn about appropriate online behavior for individuals and companies. Students will also look at how the media uses the internet and privacy issues. Lastly they will look at different careers in Computer Science. Unit 1 - Standards

8.2.12.ITH.3 Analyze the impact that globalization, social media, and access to open source technologies has had on innovation and on a society's economy, politics, and culture.

8.2.12.ETW.2 Synthesize and analyze data collected to monitor the effects of a technological product or system on the environment.

8.2.12.EC.1 Analyze controversial technological issues and determine the degree to which individuals, businesses, and governments have an ethical role in decisions that are made.

8.2.12.EC.2 Assess the positive and negative impacts on emerging technology on developing countries and evaluate how individuals, non-profit organizations, and governments have responded.

8.2.12.EC.3 Synthesize data, analyze trends, and draw conclusions regarding the effect of a technology on the individual, culture, society and environment and share this information with the appropriate audience.

8.2.12.ETW.4 Research historical tensions between environmental and economic considerations as driven by human needs and wants in the development of a technological product and present the competing viewpoints.

9.2.12.CAP.2 Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs.

9.2.12.CAP.8 Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, and drug tests) used by employers in various industry sectors.

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.IML.3 Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S-ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8)

9.4.12.TL.1 Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).

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).

LGBTQ and Disabilities NJSA 18A:35- 4.35

Ann Horton, and Audrey Tang

Amistad Law NJSA 18A:35- 4.43

Explore computer scientist in the LGBTQ community, including but not limited to Sofia Kovalevskaya, Alan Turing, Christopher Strachey, Peter Landin, Edith Windsor, Lynn Conway, Jon Hall, Sphie Wilson, Mary

Explore African-American computer scientist, including but not limited to Clarence Ellis, Melba Roy Mouton, Katherine Johnson, Mary Jackson, and Annie Easley

Holocaust Law NJSA 18A:35- 28

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Explore Asian-American/Pacific Islander computer

Science

HS-ETS1-4 History

6.1.12.SE.14.a

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. Explore the various ways women, racial and ethnic minorities, the LGBTQ community, and individuals with disabilities have contributed to the American economy, politics and society

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.

NJSLSA.SL2 Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.

Self-Awareness Examining prejudices and biases
 Having a growth mindset

Self Management Social Awareness Relationship Skills

Making
 Exhibiting self-discipline and self-motivation
 Using planning and organizational skills
 Taking others' perspectives
 Understanding the influences of

Responsible Decision

- organizations/systems on behavior
- Communicating effectively
- Practicing teamwork and collaborative problem-solving
- Showing leadership in groups

- Demonstrating curiosity and open-mindedness
- Recognizing how critical thinking skills are useful both inside & outside of school

Unit Essential Question(s):

- How can we counter online hate speech and what are the consequences?
- How does online disinhibition sometimes lead to cyberbullying?
- How can I create a social media presence that represents the real me?
- How can you respect the privacy of others online?
- How can information you post online affect your future opportunities?
- How can we challenge our own confirmation bias?
- How does internet advertising contribute to the spread of disinformation?
- How can you avoid being filled by fake videos and other information online?
- Should the government have access to all your social media and cell phone data?
- What privacy risks do new technologies present, and how do we decide if they're worth it?
- What are the benefits and drawbacks of online

tracking? How does ethics play a part in Computer Science? What careers can are related to Computer Science?

Unit Enduring Understandings:

- Online hate speech can have consequences and can lead to cyberbullying.
- Social media can affect future opportunities and paint a positive and or negative picture of oneself.
- Determine if online sources are factual. The privacy risks that emerge with new technology. How online tracking works and the benefits and drawbacks.
- How data is collected and what it could be used for. Understand ethical ramifications of computing innovations.
- Understand what careers are available in the Computer Science field.

Evidence of Learning

Formative Assessments:

- Do Now
- Teacher observations
- Questioning
- Quizzes
- Practice Programs

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- Entry tickets
- Exit tickets
- Online games
- Discussions
- Homework

Summative/Benchmark Assessment(s):

- Projects
- Tests
- Chapter Review / Quizzes
- Chapter Assignments

- Labs
- Final Project

Alternative Assessments:

- Portfolio
- Projects
- Online tests / assignments

Resources/Materials:

Common Sense Media:

<https://www.commonsense.org/education/scope-and-sequence>

Coded Bias Documentary

Key Vocabulary:

Digital Dilemma, Counter Speech, Extremism, Hate Speech, Xenophobia, Cyberbullying, Online disinhibition effect, Freedom of Speech, Digital Footprint, Digital Reputation, Sharenting, Curate, Personal Branding, Rescinded, Corroboration, Lateral Reading, Misinformation Cognitive Bias, Confirmation

Bias, Mnemonic device, Advertisement, Advertiser, Clickbait, Disinformation, Cookies, Online Tracking, Personalized content, Targeted advertising, Third party, Facial recognition, Fourth Amendment to The Constitution, Surveillance

Lesson

Name/Topic

Suggested Pacing Guide

Student Learning Objective(s) Suggested Tasks/Activities: Day(s) to Complete

<p>Cyberbullying, Digital Drama & Hate Speech</p>	<ul style="list-style-type: none"> Describe the relationship between hate speech and xenophobia Analyze how the internet has contributed to an increase in hate speech and extremist views. Describe one way to use the internet to combat one type of hate speech. Define “online disinhibition” and describe how it can be both positive and negative. Explain how anonymity, lag time, and lack of nonverbal cues all contribute to online disinhibition. Analyze how online disinhibition can cause cyberbullying and brainstorm ways to counter it. Reflect on whether hate speech is considered free speech. Identify the reasons for and against regulating online hate speech. 	<ul style="list-style-type: none"> Have a class discussion Have students answer questions on what they learn/feel on the topic Have students learn through an online journal that combines information about the topic, key vocabulary and discussion topics. 	<p>Each lesson will run as an independent assignment with an online class discussion.</p>
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consequences of online hate speech.

- Identify examples of online behaviors that may hurt, embarrass, or offend others

Digital Footprint & Identity

- Describe how their curated self may or may not represent their real self.
- Analyze the benefits and drawbacks of representing different parts of their real self online.
- Define “digital reputation,” and identify examples of social media posts that can have positive or negative effect.

- Consider the causes and effects of posting about others online.

- Consider different ways that people have used their digital footprint to make a positive impact on the world and whether you would do something similar.
- Learn that they have a public presence online called a digital footprint.
- Recognize that any information they post online

can help or hurt their future opportunities.

- Have a class discussion
- Have students answer questions on what they learn/feel on the topic
- Have students learn through an online journal that combines information about the topic, key vocabulary and discussion topics.

<p>News & Media Literacy</p>	<ul style="list-style-type: none"> Define confirmation bias and identify why it occurs. Explore examples of confirmation bias, particularly related to news and online information. Identify strategies for challenging their own confirmation biases. Describe how advertisers and publishers make money through online advertising. Describe how clickbait can contribute to the spread of fake news and disinformation. Define “misinformation” and explore the consequences of spreading misinformation online. Learn how to use lateral reading as a strategy to verify the accuracy of information online. Apply lateral reading to examples of questionable video to determine their accuracy. 	<ul style="list-style-type: none"> Have a class discussion Have students answer questions on what they learn/feel on the topic Have students learn through an online journal that combines information about the topic, key vocabulary and discussion topics. 	
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Privacy & Security

- related to government access to social media and cellphone data, including those related to free speech and privacy.
- ▣ Choose a position for or against government access to social media and cellphone data, and support that position with reasons and examples.
- ▣ Identify important benefits and privacy risks that new technologies present
- ▣ Decide whether or not the benefits of new technologies outweigh their privacy risks.
- ▣ Define online tracking and describe how companies use it. ▣ Identify the benefits and drawbacks of online tracking to both companies and users.
- ▣ Analyze specific examples of online tracking and take a position for or against them.

- careers
- ▣ Have a class discussion
- ▣ Have students answer questions on what they learn/feel on the topic
- ▣ Have students learn through an online journal that combines information about the topic, key vocabulary and discussion topics.

- Computer Science Careers
- ▣ Identify the pros and cons of schools having access to students' social media.
 - ▣ Describe the concerns

- ▣ Students will look at and research different careers in Computer Science
- ▣ Students will use research skills to find out information about Computer Science
- ▣ Web exploration of different Computer Science careers
- ▣ Research paper on a single career

- Coding Bias
- ▣ Students will recognize and understand coding bias
 - ▣ Students will come up with thoughts and ideas on how to

- combat coding bias
- ▣ Have students watch Coded Bias documentary
 - ▣ Answer questions throughout the film

Teacher Notes: These lessons can be broken apart into single day lessons. For time though they will be given as independent assignments to students with discussion days built in.

Additional Resources:

Differentiation/Modification Strategies

Students with Disabilities Learners Students Students
 English Language Gifted and Talented Students at Risk 504

<ul style="list-style-type: none"> • Allow errors • Rephrase questions, directions, and explanations 	<ul style="list-style-type: none"> • Assign a buddy, same language or English speaking • Allow errors in speaking 	<ul style="list-style-type: none"> • Provide extension activities • Build on students' intrinsic 	<ul style="list-style-type: none"> • Provide extended time to complete tasks • Consult with Guidance 	<ul style="list-style-type: none"> • Allow errors • Rephrase questions, directions, and explanations
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• Allow extended time to answer		motivation • Consult with parents to accommodate	Counselors and follow I&RS	• Allow extended time to answer
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questions and permit drawing as an explanation • Accept participation on any level, even one word • Consult with Case Managers and follow IEP accommodations/modifications	• Rephrase questions, directions, and explanations • Allow extended time to answer questions • Accept participation at any level, even one word	students' interests in completing tasks at their level of engagement	procedures/action plans • Consult with other members of the 7th grade team for specific behavior interventions • Provide rewards as necessary	questions and permit drawing as an explanation • Accept participation on any level, even one word • Consult with Case Managers and follow IEP accommodations/modifications • Assign a buddy, same language or English speaking
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Unit 2- Overview

[Redacted text]

Core Ideas: Students will first become familiar with the problem solving process and how it relates to Computer Science. Students will then learn computer science concepts such as conditional statements, loops, and the value of order and sequence. This unit relies heavily on data flow diagramming to promote computational and algorithmic thinking without requiring programming or coding experience.

Unit 2 - Standards

[Redacted text]

8.1.12.DA.1 Create interactive data visualizations using software tools to help others better understand real world phenomena, including climate change.

[Redacted text]

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.

[Redacted]

9.2.12.CAP.2 Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs.

9.2.12.CAP.8 Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, and drug tests) used by employers in various industry sectors.

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).

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Science
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numerous criteria and constraints on interactions within and between systems relevant to the problem. Explore the various ways women, racial and ethnic minorities, the LGBTQ community, and individuals with disabilities have contributed to the American economy, politics and society

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NJLSLA.SL2 Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.

Self-Awareness ■ Examining prejudices and biases
■ Having a growth mindset

Self Management Social

Awareness Relationship Skills

Responsible Decision

Making

- ▣ Exhibiting self-discipline and self-motivation
- ▣ Using planning and organizational skills
- ▣ Taking others' perspectives
- ▣ Understanding the influences of organizations/systems on behavior

Unit Essential Question(s):

- ▣ What strategies and processes can I use to become a more effective problem solver?
- ▣ How do computers help people to solve problems? ▣ How do people and computers approach problems differently?
- ▣ What does a computer need from people in order to solve problems effectively?
- ▣ What are loops?
- ▣ What are conditional statements?
- ▣ Does order matter?

Communicating effectively

- ▣ Practicing teamwork and collaborative problem-solving
- ▣ Showing leadership in groups
- ▣ Demonstrating curiosity and open-mindedness
- ▣ Recognizing how critical thinking skills are useful both inside & outside of school

Unit Enduring Understandings:

- ▣ How general problem solving skills help with all situations, not just computer science.
- ▣ What a computer is and how it works. ▣ How computers use input, output and process information.
- ▣ How storage is important to computing. ▣ Students will be able to create algorithms demonstrating the understanding of basic programming

Evidence of Learning

Formative Assessments:

- Do Now
- Teacher observations
- Questioning
- Quizzes
- Practice Programs
- Entry tickets
- Exit tickets
- Online games
- Discussions
- Homework

Summative/Benchmark Assessment(s):

- Projects
- Tests
- Chapter Review / Quizzes
- Chapter Assignments

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- Labs
- Final Project

Alternative Assessments:

- Portfolio
- Projects
- Online tests / assignments

Resources/Materials: www.code.org

Cubelets

Key Vocabulary:

Computer, Input, Output, Processing, Storage,

Modular, Complexity, Robot, Sense, Think, Act ,
Data, Input,
Output, Value, Variable, Loop, Order, Conditional
Statements, Algorithm

Suggested Pacing Guide

Student Learning Objective(s) Suggested Tasks/Activities: Day(s) to Complete

Lesson

Name/Topic

<p>The Problem Solving Process</p>	<p>within each step of the problem solving process</p> <ul style="list-style-type: none"> ▣ Identify useful strategies within each step of the problem solving process ▣ Apply the problem solving process to approach a variety of problems ▣ Assess how well-defined a problem is and use strategies to define the problem more precisely ▣ Students will investigate and be able to explain the role of each individual Cubelet. ▣ Students will investigate the effect of using two SENSE Cubelets in a robot construction ▣ Students will design multiple steering robot constructions ▣ Students will use computational thinking skills to build a specific 	<p>robot based on a description using different Cubelets combinations.</p> <p>Students will use spatial reasoning and computational thinking skills to use paper as a programming tool for a robot construction</p> <ul style="list-style-type: none"> ▣ Problem solving tasks such as: <ul style="list-style-type: none"> o Logic Puzzles o Floating Boats o Paper Towers o Spaghetti Bridge o Newspaper Table ▣ Code.org activity guides and slides from Computer Science Discovery Curriculum 	<p>using the cubelets to figure out what the function of each individual cubelet is</p> <p>1 Days 5 Days</p>
<p>Investigating Cubelets</p> <ul style="list-style-type: none"> ▣ Communicate and collaborate with classmates in order to solve problems ▣ Iteratively improve a solution to a problem ▣ Identify different strategies used to solve a problem ▣ Given a problem, identify individual actions that would fall 	<p>each individual Cubelet.</p> <ul style="list-style-type: none"> ▣ Students will investigate the effect of using two SENSE Cubelets in a robot construction ▣ Students will design multiple steering robot constructions ▣ Students will use computational thinking skills to build a specific 	<p>robot based on a description using different Cubelets combinations.</p> <p>Students will use spatial reasoning and computational thinking skills to use paper as a programming tool for a robot construction</p> <ul style="list-style-type: none"> ▣ Problem solving tasks such as: <ul style="list-style-type: none"> o Logic Puzzles o Floating Boats o Paper Towers o Spaghetti Bridge o Newspaper Table ▣ Code.org activity guides and slides from Computer Science Discovery Curriculum 	<p>using the cubelets to figure out what the function of each individual cubelet is</p> <p>1 Days 5 Days</p>

Intro to Program min g through	▣ Students will accurately diagram the flow of data in simple Cubelets robot constructions.	▣ Use Cubelets to investigate key programming concepts without coding	8 Days
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<p>Computation al Thinking Midland Park Public Schools</p> <ul style="list-style-type: none"> ▣ Students will demonstrate their understanding of data flow in Cubelets constructions by adding 	<p>block values to their data flow diagrams and checking their work with the Bar Graph and/or the Cubelets app</p> <ul style="list-style-type: none"> ▣ Students demonstrate an understanding of loops by 	<ul style="list-style-type: none"> o Data Flow Diagrams o Variables and Block Values o Loops Museum o Does Order Matter o Generalized Algorithms o Conditional Statements
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conclusions about whether (and when) order matters in Cubelets constructions.

- ▣ Students will design robots that model generalizable algorithms and practice routines to test generalizable algorithms.
- ▣ Students design a light-detecting alarm clock based on conditional statements as shown by the Threshold Cubelet.
- ▣ Students will create algorithms to make the Cubelets perform certain tasks.
- ▣ Use unplugged activities to introduce programming concepts

Cubelets Challenge designing a looping robot construction and then matching panel-drawings of looped behaviors to their robot constructions.

- ▣ Students draw

▣ Students create robots given certain criteria

▣ Students can be given different tasks and be challenged to complete them given certain tools

1Day

Additional Resources:

Differentiation/Modification Strategies

Students with Disabilities Learners English Language Gifted and Talented Students Students at Risk 504 Students

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• Consult with Case Managers and follow IEP accommodations/modifications	one word		• Provide rewards as necessary	• Consult with Case Managers and follow IEP accommodations/modifications
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				• Assign a buddy, same language or English speaking
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Unit 3 - Overview

[Redacted]

Core Ideas: This unit is will teach students basic programming skills. Students will learn about methods, control flow, variables and arrays. Classes will be looked at from a very basic level as well as object-oriented programming. [Unit 3 - Standards](#)

[Redacted]

- 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.

[Redacted]

- 9.2.12.CAP.2 Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs.
- 9.2.12.CAP.8 Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, and drug tests) used by employers in various industry sectors.

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Interdisciplinary Connection

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Science

HS-ETS1-4 History

6.1.12.SE.14.a

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Self-Awareness ■ Examining prejudices and biases
■ Having a growth mindset

Self Management Social Awareness Relationship Skills

organizations/systems on behavior ■ Communicating effectively ■ Practicing teamwork and collaborative problem-solving ■ Showing leadership in groups ■ Demonstrating curiosity and open-mindedness ■ Recognizing how critical thinking skills are useful both inside & outside of school

Responsible Decision Making

■ Exhibiting self-discipline and self-motivation ■ Using planning and organizational skills ■ Taking others' perspectives ■ Understanding the influences of

Unit Essential Question(s):

■ What are the basic programming commands? ■ How do if statements work? ■ How can you use control flow statements? ■ How do variables work in programming?

■ Understand using objects and methods. ■ Use abstraction to hide details. ■ Compute and store data for later use. ■ Use Control flow with if, while, and for statements. ■ Use and process arrays.

Unit Enduring Understandings:

Evidence of Learning

Formative Assessments:

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Summative/Benchmark Assessment(s):

- Projects
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- Labs
- Final Project

Alternative Assessments:

- Portfolio
- Projects
- Online tests / assignments

Resources/Materials: 📖 Alice Programming
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Key Vocabulary:

Algorithm, Bug, Class, Debugging, Error, Flow, Function,

- o Text Book: Alice 3 in Action by Joel Adams
- o

http://www.alice.org/index.php?page=downloads/download_alice3.1

📖 Sphero's

- o <https://edu.sphero.com/>

📖 Ozobots

- o <https://classroom.ozobot.com/dashboard>

Method, Object, Properties, Software design, Software engineering, Testing, Abstraction, Class method, Comment, Subclass, Superclass, Argument,

Programming 📖 Build class methods to elicit desirable behaviors from objects

📖 Use variables to store values that can be used later in a method

📖 Use a variable to store the value of an arithmetic expression

📖 Use a variable to store the value produced by a function

Concatenation, Getter, Initializer, Instance variable, Local variable, Parameter, Procedure method, Property, Return statement, Setter, Variable, Assignment operator, Assignment statement, Boolean expression, Boolean operators, Boolean type, Condition, Control Structure, Counting loop, Flow Control, for statement, General Loop, if statement, Infinite loop, Nested if, while statement, Array, Index, Iterating, Random number

Lesson

Name/Topic Beginning

Suggested Pacing Guide

Student Learning Objective(s) Suggested

Tasks/Activities: Day(s) to Complete 4 Weeks

📖 Use parameters to write methods that are more broadly useful

📖 Create functions that return a value

📖 Use the Boolean type and its

basic operation

Use the if statement to perform some statements while skipping others

Use the for and while statements to perform statements more than once

Use Boolean variables and functions to control if and while statements

Use an array to store multiple items

Use random numbers to vary the behavior of a program

behavior of a program

Project To use what was learned to create a program

Students will learn the following topics through lecture and demonstration:

- o Methods
- o Variables and Expressions
- o Flow Control
- o Arrays
- After each lesson students will be asked to complete practice programs
- Each lesson will also include vocabulary and multiple choice questions to check for understanding.

1 Week

Students are to use what they learned to create a final program

Teacher Notes: Any programming tool can be used to learn basic programming and would fall into this curriculum. The resources are just suggestions.

Additional Resources:

Differentiation/Modification Strategies

Students with Disabilities
English Language

Learners
Gifted and Talented

Students
Students at Risk 504

Students

<ul style="list-style-type: none"> • Allow errors • Rephrase questions, directions, and explanations 	<ul style="list-style-type: none"> • Assign a buddy, same language or English speaking • Allow errors in speaking 	<ul style="list-style-type: none"> • Provide extension activities • Build on students' intrinsic motivation 	<ul style="list-style-type: none"> • Provide extended time to complete tasks • Consult with Guidance Counselors and follow I&RS 	<ul style="list-style-type: none"> • Allow errors • Rephrase questions, directions, and explanations
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Unit 4 - Overview

[Redacted]

Core Ideas: In this unit students will learn different design tools available in Computer Science. Depending on time and equipment availability students will learn about Web Design, App Design, Game Design, 3D Printing and Circuitry (Physical Computing). The end of the unit and the course will be a project using the UN

Sustainable Goals. Unit 4 - Standards

[Redacted]

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

- 8.2.12.ED.1 Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.
- 8.2.12.ED.4 Design a product or system that addresses a global problem and document decisions made based on research, constraints, trade-offs, and aesthetic and ethical considerations and share this

information with an appropriate audience.

8.2.12.ED.5 Evaluate the effectiveness of a product or system based on factors that are related to its requirements, specifications, and constraints (e.g., safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, ergonomics).

8.2.12.ITH.1 Analyze a product to determine the impact that economic, political, social, and/or cultural factors have had on its design, including its design constraints.

8.2.12.ITH.2 Propose an innovation to meet future demands supported by an analysis of the potential costs, benefits, trade-offs, and risks related to the use of the innovation.

8.2.12.ETW.3 Identify a complex, global environmental or climate change issue, develop a systemic plan of investigation, and propose an innovative sustainable solution.

[Redacted]

9.2.12.CAP.2 Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs.

9.2.12.CAP.8 Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, and drug tests) used by employers in various industry sectors.

[Redacted]

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.IML.3 Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S-ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8)

9.4.12.TL.1 Assess digital tools based on features such as accessibility options, capacities, and utility for accomplishing a specified task (e.g., W.11-12.6.).

9.4.12.TL.3	Analyze the effectiveness of the process and quality of collaborative environments.
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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).

[Redacted]

LGBTQ and Disabilities NJSA 18A:35- 4.35

Amistad Law NJSA 18A:35- 4.43

Holocaust Law NJSA 18A:35- 28

AAPI Law

NJSA 18A:25- 4.44

Explore computer scientist in the LGBTQ community, including but not limited to Sofia Kovalevskaya, Alan Turing, Christopher Strachey, Peter Landin, Edith Windsor, Lynn Conway, Jon Hall, Sphie Wilson, Mary Ann Horton, and Audrey Tang

Explore African-American computer scientist, including but not limited to Clarence Ellis, Melba Roy Mouton,

[Redacted]

Science

HS-ETS1-4 History

6.1.12.SE.14.a

Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with

[Redacted]

Katherine Johnson, Mary Jackson, and Annie Easley

Explore Jewish computer scientist, including but not limited to Joseph Weizenbaum, Larry Page, Hilary Putnam, Jon von Neumann, Sergery Brin, Saul Amarel and Norbert Wiener

Explore Asian-American/Pacific Islander computer scientist, including but not limited to Peter Tsaai, Nainoa Thompson, Flossie Wong-Staal, Ajay Bhatt, Min Chueh Chang, Roseli Ocamp-Friedmann, Steven Shih Chen, and Ching Wan Tang

numerous criteria and constraints on interactions within and between systems relevant to the problem. Explore

the various ways women, racial and ethnic minorities, the LGBTQ community, and individuals with disabilities have contributed to the American economy, politics and society

NJLSA.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.

NJSLSA.SL2 Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.



- Self-Awareness
 - ▣ Examining prejudices and biases
 - ▣ Having a growth mindset

Self
Management Social
Awareness Relationship Skills

- organizations/systems on behavior
- ▣ Communicating effectively
- ▣ Practicing teamwork and collaborative problem-solving

- Responsible Decision Making
 - ▣ Exhibiting self-discipline and self-motivation
 - ▣ Using planning and organizational skills
 - ▣ Taking others' perspectives
 - ▣ Understanding the influences of

- ▣ Showing leadership in groups
- ▣ Demonstrating curiosity and open-mindedness
- ▣ Recognizing how critical thinking skills are useful both inside & outside of school

Unit Essential Question(s):

- ▣ How do different design products fit into Computer Science?
- ▣ How can I use these design products to create a product?
- ▣ How can I use technology to help or inform about a global problem?

Unit Enduring Understandings:

- ▣ Learn the basics of Web Design, App Design, 3D Printing, Game Design and Circuitry.
- ▣ Create a prototype that can either help or inform related to the UN Sustainable Goals

Evidence of Learning

Formative Assessments:

- Do Now
- Teacher observations
- Questioning
- Quizzes
- Practice Programs
- Entry tickets
- Exit tickets

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- Online games
- Discussions
- Homework

Summative/Benchmark Assessment(s):

- Projects
- Tests
- Chapter Review / Quizzes
- Chapter Assignments
- Labs
- Final Project

Alternative Assessments:

- Portfolio
- Projects
- Online tests / assignments

Resources/Materials:

- ▣ Wix:

<https://www.wix.com/education/teacher/courses?introToWixEditor=true>

- Game Maker
- App Lab: www.code.org
- 3D Printers
- Circuits

Key Vocabulary:

HTML, CSS, Javascript, Website, Editor, Blocks, Block Canvas, Heading, Speed, Duration, Control, Loop, Comment, Comparator, Condition, Refactor, Functions, Variable, Nested Control, Computational Thinking, Algorithm, Programming, Event, Action,

Web Design To learn basic web design using an online template platform

Learn how to create a website for a user not oneself

App Design To learn basic app design using an online template

Game Design To learn basic game design using an online template platform

Learn how to create a game for a user not oneself
Create a Space Bubbles

platform

Learn how to create an app for a user not oneself

Use an online platform to learn the basics of web design

Students will work independently though lessons, videos and templates

Use an online platform to learn

game in Game Maker

Show tutorials so students understand what to do

Demonstrate key

Iteration, Sequencing, Global Variables, Arrays, Boolean, Sprits, Empathy, User, Prototype, User Interface, Bug, Innovation, Output, Input, circuit

Lesson

Name/Topic

Suggested Pacing Guide

Student Learning Objective(s) Suggested Tasks/Activities: Day(s) to Complete

the basics of app design

Students will work independently though lessons, videos and templates

Students will work independently for 7 weeks completing these stations.

Students will rotate through them with Bonus challenges for those that finish early.

programming tools so

students understand why they are needed.

3D Printing	<ul style="list-style-type: none"> To learn basic 3D Printing Learn how to create for use not just for fun 	<ul style="list-style-type: none"> Learn 3D printings using Tinkercad Show tutorials so students understand what to do Demonstrate key concepts so students understand how to design and print 	
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Physical Computing

To learn basic circuitry and to program using an online template platform

Learn how to create for use not just for fun

Learn physical computing using Code.org

Show tutorials so students understand what to do

Demonstrate key concepts that can help a situation or so students understand how be informative

program and connect circuits.

Final Project To create a prototype that will help or inform using the UN

Sustainable goals

Students will work in groups to create a prototype

Students will pick a cause from the UN Sustainable goals

Students will create a concept, come up with a design, get feedback, refine, test and present,

3 Weeks

Teacher Notes: Timing on the stations and project can vary. All stations may not be completed by all students or run at all.

Additional Resources:

Differentiation/Modification Strategies

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English Language

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