

SCHOOL DISTRICT OF THE CHATHAMS

Animation & Movement Grades 9 - 12 Semester

Course Overview

Animation and Movement provides an introduction to the field of computer animation programming through the utilization of humanoid robots and block based programming environments. The course emphasizes problem solving in a real-world context and computational thinking utilizing both gaming and robotics platforms. This class is an alternative for those students who have an interest in computer science but are not interested in the Advanced Placement track.

New Jersey Student Learning Standards

The New Jersey Student Learning Standards (NJSLS) can be located at www.nj.gov/education/cccs/2020/.

Algorithm & Programming

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 tradeoffs 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.

Technology Standards

9.4.12.DC.5: Debate laws and regulations that impact the development and use of software.

21st Century Integration | NJSLS 9

9.4.12.CI.1: Demonstrate the ability to reflect, analyze and use creative skills and ideas.

9.4.12.CI.2: Identify career pathways that highlight personal talents, skills and abilities.

9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice.

9.4.12.CT.2: Explain the potential benefits of collaborating to enhance critical thinking and problem solving.

9.3.IT-PRG.1 Analyze customer software needs and requirements.

9.3.IT-PRG.6 Program a computer application using the appropriate programming language.

9.3.IT-PRG.8 Perform quality assurance tasks as part of the software development cycle.

Career Ready Practices

CRP2. Apply appropriate academic and technical skills.

CRP4. Communicate clearly and effectively and with reason.

CRP6. Demonstrate creativity and innovation.

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

CRP11. Use technology to enhance productivity.

Interdisciplinary Connections

Science

- 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.

Units of Study

Unit 1: Introduction to Block Based Programming (~8 days)

- What are the types of animations?
- How do we navigate a block based language?
- What are objects and how do we add them to the world?
- How can we manipulate an object's 'parts'?
- What are classes vs. instances?

Unit 2: Creating an Animation (~8 days)

- What are the steps to solving a problem (or writing a program)?
- What is the storyboard design technique?
- What are action blocks?
- What are methods?
- What are arguments?
- What is nesting?
- What is the incremental development process?
- What are comments and how do we use them?

Unit 3: Using built-in functions and expressions (~12 days)

- What is an instruction (method)?
- What is a control structure?
- What is a function?
- What is an expression?
- How do we implement instructions, control structures, functions and expressions in a block based programming language?

Unit 4: Simple Control Structures (~12 days)

- What is a conditional execution (if/else)?
- What is a boolean?
- How can we use math operators to create our own boolean statement?
- How can we create a repetition (loop)?

Unit 5: Writing methods and using parameters (~12 days)

- What is the difference between a class, object and method?
- How do we write our own methods?
- What is stepwise refinement?
- What are parameters?
- How do we implement methods with parameters?

Unit 6: Interactive Programming (12 days)

- What is flow of control and how do we alter it?

Revision Date: November 2021

- What is an input and how can a user provide input?
- What is an event and how do we 'handle' them?

Learning Objectives/Discipline Standards of Practice

- Understand what a block based programming language is.
- Understand what animations are.
- Understand what 'objects' are and their 'parts'.
- Differentiate between classes and instances.
- Create a 'scene'.
- Understand how to implement the storyboard design technique to write a program.
- Differentiate between action blocks, methods and arguments.
- Understand how to nest blocks.
- Understand the value of commenting in the design process.
- Create a basic animation.
- Understand what an instruction (method) is.
- Differentiate between a control structure, function and expression.
- Create an animation implementing control structures, functions and expressions.
- Understand what a conditional execution is (if/else).
- Understand how to use booleans and construct booleans from math operators.
- Understand the flow of a loop.
- Create an animation implementing if and loop conditionals.
- Differentiate between a class object and method.
- Understand the stepwise refinement process.
- Implement the stepwise refinement process to create basic methods and methods with parameters.
- Create animations involving user defined methods.
- Understand how to alter flow of control.
- Understand various types of user input and ways of processing those inputs.
- Create fully responsive animations.

Discipline Standards of Practice:

- Computing Systems
 - People interact with a wide variety of computing devices that collect, store, analyze, and act upon information in ways that can affect human capabilities both positively and negatively. The physical components (hardware) and instructions (software) that make up a computing system communicate and process information in digital form.
- Networks and the Internet
 - Computing devices typically do not operate in isolation. Networks connect computing devices to share information and resources and are an increasingly integral part of computing. Networks and communication systems provide greater connectivity in the computing world.
- Impacts of Computing
 - Computing affects many aspects of the world in both positive and negative ways at local, national, and global levels. Individuals and communities influence computing through their behaviors and cultural and social interactions, and, in turn, computing influences new cultural practices.

- Data & Analysis
 - Computing systems exist to process data. The amount of digital data generated in the world is rapidly expanding, so the need to process data effectively is increasingly important. Data is collected and stored so that it can be analyzed to better understand the world and make more accurate predictions.
- Algorithms & Programming
 - An algorithm is a sequence of steps designed to accomplish a specific task. Algorithms are translated into programs, or code, to provide instructions for computing devices. Algorithms and programming control all computing systems, empowering people to communicate with the world in new ways and solve compelling problems.
- Engineering Design
 - People design for enjoyment and to solve problems, extend human capabilities, satisfy needs and wants, and improve the human condition. Engineering Design, a systematic approach to creating solutions to technological problems and finding ways to meet people's needs and desires, allows for the effective and efficient development of products and systems.
- Interaction of Technology and Humans
 - Societies influence technological development. Societies are characterized by common elements such as shared values, differentiated roles, and cultural norms, as well as by entities such as community institutions, organizations, and businesses. Interaction of Technology and Humans concerns the ways society drives the improvement and creation of new technologies, and how technologies both serve and change society.
- Nature of Technology
 - Human population, patterns and movement focus on the size, composition, distribution, and movement of human populations and how they are fundamental and active features on Earth's surface. This includes understanding that the expansion and redistribution of the human population affects patterns of settlement, environmental changes, and resource use. Patterns and movements of population also relate to physical phenomena including climate variability, landforms, and locations of various natural hazards and their effects on population size, composition, and distribution.
- Effects of Technology on the Natural World
 - Many of engineering and technology's impacts on society and the environment are widely regarded as desirable. However, other impacts are regarded as less desirable. Effects of Technology on the Natural World concerns the positive and negative ways that technologies affect the natural world.
- Ethics & Culture
 - Ethics and Culture concerns the profound effects that technologies have on people, how those effects can widen or narrow disparities, and the responsibility that people have for the societal consequences of their technological decisions.

Instructional Resources and Materials

Whole class resources have been identified with an asterisk.

Resources

- Alice or equivalent block based programming language with associated text
- NAO Robot

Materials

- Demonstrations/Slideshows

Revision Date: November 2021

Assessment Strategies

Assessment is designed to measure a student's mastery of a course standard and learning objective. Assessment can be used for both instructional purposes (formative assessment) and for evaluative purposes (summative assessment).

The following is a general list of the many forms assessment may take in learning.

- Tests
- Design Challenges/Projects
 - Design & Rationale
 - Performance
 - Rubrics
- Digital Portfolio