

# 05 AR Apps (Optional)

Content Area: **Math**  
Course(s):  
Time Period: **Semester**  
Length: **2 Weeks**  
Status: **Published**

## General Overview, Course Description or Course Philosophy

The course is designed to give students an introduction to the programming language Swift and mobile app design. Students will have the opportunity to foster their ability to develop and apply computational and design thinking to address real-world problems and design creative solutions. Students will engage not only independently but will work collaboratively to navigate the dynamic digital landscape.

## OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

### Essential Questions

- How is equitable access to opportunities affected by computer technology?
- How can local and global problems be addressed using creativity and analysis?
- When creating a program, how does one choose between readability and performance?



### Enduring Understanding

- Objects in AR can not only interact with each other but can interact with the real world.

## CONTENT AREA STANDARDS

|                     |   |
|---------------------|---|
| CS.9-12.8.1.12.AP.3 | Select and combine control structures for a specific application based upon performance and readability, and identify trade-offs to justify the choice. |
| CS.9-12.8.1.12.IC.2 | Test and refine computational artifacts to reduce bias and equity deficits.   |
| CS.9-12.8.2.12.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.          |

## RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)

|                   |  |
|-------------------|--|
| LA.K-12.NJSLSA.L1 | Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.   |
| LA.K-12.NJSLSA.L6 | Acquire and use accurately a range of general academic and domain-specific words and phrases sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when |

|                    |  |
|--------------------|--|
| LA.K-12.NJSLSA.SL1 | encountering an unknown term important to comprehension or expression.<br>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. |
| LA.K-12.NJSLSA.SL2 | Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.   |

## **STUDENT LEARNING TARGETS**

---

- I can create a new ARKit project based on SceneKit.
- I can state the position of an object in a scene.
- I can add an object to a scene using the Object library.
- I can add an object to a scene programmatically.
- I can add light to a scene.
- I can change the position, rotation, and color of an object.
- I can detect a flat surface in the real world.
- I can create a physics body that responds to gravity.

## **Declarative Knowledge**

---

Students will understand that:

- ARKit applies a layer of abstraction incorporating motion and camera to create Augmented Reality
- Augmented reality using x, y, and z planes when placing objects, geometry, or physics
- Geometric vectors and nodes are used to not only have object interacts but are used to set properties
- Digital objects can interact to object in the real world as well as act like objects in the real world

## **Procedural Knowledge**

---

Students will be able to

- Explain why the Info.plist file must contain specific settings to enable an ARKit app
- Explain what a 3D vector is and how it's used to express the position
- Explain the difference between an ARKit anchor and a SceneKit object
- Explain the relationship between a node, a geometry, and a physics body
- Describe how hit testing for planes works
- Create new physics bodies that respond to gravity and to each other

## **EVIDENCE OF LEARNING**

---

## **Formative Assessments**

---

- Guided practice
- Independent practice
- Exit Ticket
- Check Lists
- Conversations

## **Summative Assessments**

---

- End of Unit Test
- End of Unit: Design and code word game app

## **RESOURCES (Instructional, Supplemental, Intervention Materials)**

---

- Developing in Swift Fundamentals - Teachers Guide
- Developing in Swift Fundamentals - Student Book
- Unit Slides
- Lesson Starter Code
- Lesson Solution Code

## **INTERDISCIPLINARY CONNECTIONS**

---

|                  |  |
|------------------|--|
| TECH.9.4.12.CI.1 | Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).  |
| TECH.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).                     |
| TECH.9.4.12.CT.2 | Explain the potential benefits of collaborating to enhance critical thinking and problem solving (e.g., 1.3E.12profCR3.a).                               |
| TECH.9.4.12.DC.1 | Explain the beneficial and harmful effects that intellectual property laws can have on the creation and sharing of content (e.g., 6.1.12.CivicsPR.16.a). |

## **ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS**

---

See link to Accommodations & Modifications document in course folder.

