# 05 Final Project

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

## General Overview, Course Description or Course Philosophy

Introduction to Python is a semester course that introduces students to fundamental concepts of programming with an emphasis on helping students develop logical thinking and problem-solving skills. This course focuses on a fun and engaging approach to learning programming through visual problems requiring students to investigate and explore while honing their mastery of the topics. This course utilizes graphical problems that allow for multiple solutions and provides visual cues while debugging. Students will engage not only independently but will work collaboratively to accomplish creative tasks.

In this unit, students will combine their knowledge of python to create a program that shows off their new skills. Students will have the opportunity to work with fellow classmates to express their idea, and receive peer review and feedback.

## OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

Objectives

- Students will be able to incorporate images and sound into a game.
- Students will be able to apply iterative development, abstraction, and design fundamentals to create a game.

Essential Questions

- How is a storyboard incorporated into creating a computer program and everyday tasks?
- How do computers use simulation and modeling to represent real-world phenomena?
- Why is randomness important but unachievable inside a computer?
- In what ways do simulation and modeling extend our knowledge and benefit society?

Enduring Understanding

- Multiple levels of abstraction are used to write programs
- Programs can be developed to solve problems
- Programs are developed, maintained, and used by people for different purposes.

- Computing enhances communication, interaction, and cognition.

## CONTENT AREA STANDARDS

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| CS.9-12.8.1.12.AP.1 | Design algorithms to solve computational problems using a combination of original and existing algorithms. |
| CS.9-12.8.1.12.AP.2 | Create generalized computational solutions using collections instead of repeatedly using simple variables. |
| 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.AP.4 | Design and iteratively develop computational artifacts for practical intent, personal expression, or to address a societal issue. |
| CS.9-12.8.1.12.AP.5 | Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects. |
| CS.9-12.8.1.12.AP.6 | Create artifacts by using procedures within a program, combinations of data and procedures, or independent but interrelated programs. |
| CS.9-12.8.1.12.AP.7 | Collaboratively design and develop programs and artifacts for broad audiences by incorporating feedback from users. |
| CS.9-12.8.1.12.AP.8 | Evaluate and refine computational artifacts to make them more usable and accessible. |
| CS.9-12.8.1.12.AP.9 | Collaboratively document and present design decisions in the development of complex programs. |
| CS.9-12.8.1.12.IC.1 | Evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices. |
| | Programmers choose data structures to manage program complexity based on functionality, storage, and performance trade-offs. |
| | Individuals evaluate and select algorithms based on performance, reusability, and ease of implementation. |

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

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| LA.K-12.NJSLSA.R7 | Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words. |
| LA.K-12.NJSLSA.W7 | Conduct short as well as more sustained research projects, utilizing an inquiry-based research process, based on focused questions, demonstrating understanding of the subject under investigation. |
| LA.K-12.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. |
| LA.K-12.NJSLSA.SL2 | Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally. |
| LA.K-12.NJSLSA.SL4 | Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, |

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| | purpose, and audience. |
| LA.K-12.NJSLSA.SL5 | Make strategic use of digital media and visual displays of data to express information and enhance understanding of presentations. |
| MA.K-12.1 | Make sense of problems and persevere in solving them. |
| MA.K-12.2 | Reason abstractly and quantitatively. |
| MA.K-12.3 | Construct viable arguments and critique the reasoning of others. |
| MA.K-12.4 | Model with mathematics. |
| MA.K-12.5 | Use appropriate tools strategically. |
| MA.K-12.6 | Attend to precision. |
| MA.K-12.7 | Look for and make use of structure. |
| MA.K-12.8 | Look for and express regularity in repeated reasoning. |
| PFL.9.1.K12.P.1 | Act as a responsible and contributing community members and employee. |
| PFL.9.1.K12.P.4 | Demonstrate creativity and innovation. |
| PFL.9.1.K12.P.5 | Utilize critical thinking to make sense of problems and persevere in solving them. |
| PFL.9.1.K12.P.8 | Use technology to enhance productivity increase collaboration and communicate effectively. |
| PFL.9.1.K12.P.9 | Work productively in teams while using cultural/global competence. |

## STUDENT LEARNING TARGETS

### Declarative Knowledge

Students will understand that:

- No program can be written without data
- Any complicated program idea can be broken-down using abstraction

### Procedural Knowledge

Students will be able to:

- Explain components, interactions, and how the program will progress
- Turn an idea and a sketch into a working program
- Use peer feedback when debugging and fine tuning a program

## EVIDENCE OF LEARNING

### Formative Assessments

- Design Guide
- Development Guide
- Checklists
- Class Discussion
- Exit Tickets
- Rubrics
- Teacher Observation
- Exit/Entrance Tickets

### Summative Assessments

- Creative Task

## RESOURCES (Instructional, Supplemental, Intervention Materials)

Example Creative Tasks

## INTERDISCIPLINARY CONNECTIONS

Interdisciplinary connections are frequently addressed through examples whereby creating solutions that draw from cultures around the world, athletics, mathematics and geography are used. Examples can be found in topic specific examples, practice exercises, guided projects and digital resources.

## ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.