

Course Title:	Java Programming
Department:	Business/Computers/Technology
Course #:	7558
Grade Level/s:	11-12
Length of Course:	Year
Prerequisite/s:	Introduction to Programing/Video Game Design and grade or C or better in Geometry
UC/CSU (A-G) Req:	(G) College Prep Elective - Interdisciplinary

Brief Course Description:

This course is an introductory mobile application design & programming course using Touch Development, Java and Eclipse for Android devices. The course starts by taking students through the history of mobile applications moving onto learning about the current industry standards, languages and platforms used in mobile apps development with a special focus on career opportunities within the industry and the entrepreneurial potential that exists. The core component of the course is learning basic Java programming and working with Eclipse in order to start the development of real working apps. Students will be taught object oriented design. Basic programming concepts such as input and output, variables, functions, data structures, control structures, searching, storing, and retrieving data will be emphasized. By the end of the course, students are able to successfully download real working mobile applications for Android devices. How thinking like a programmer – using the engineering design cycle – solves problems and how science & math concepts and skills are thoroughly integrated into mobile application development. By the end of this course, students will have a solid foundation of the Java programming language, advance principles, of object orientated programming, how to create programs for the Java-based Android platform, a strong knowledge of the roles the Java programming languages plays in the development, and computer concepts including algorithmic methods design.

I. GOALS

This course teaches computer science concepts and skills by covering and giving students experience with each topic repeatedly and with progressive level of skill through a series of programming projects. This course gives an outlines of the basic concepts taught first and describes in detail where sequences of programming projects and subtopics projects. Listed below are the six key areas of skills students will master.

1. Programming skills related to software development and computer programming with Java and Microsoft Touch Development programming
2. Game Development skills with Java programming with APP development
3. Creative, innovative & critical thinking

4. Communication and collaboration as an individual and part of a team
5. Using appropriate and accessible digital tools for research and learning
6. Using engineering, physics & mathematical concepts critical to game development

1. Programming Skills

- a. Demonstrate an understanding of the core principles of programming with Java
- b. Create, name, and assign values to variables
- c. Create custom methods that can return values and take parameters
- d. Utilize common built-in objects and references types
- e. Utilize common programming statements to implement flow control, looping, and exception handling
- f. Create, initialize, and use collections
- g. Design and create custom classes and use the object-oriented techniques of inheritance, abstraction, polymorphism, and encapsulation
- h. Understands and create events with reactive actions
- i. Builds data and the global variables with record and different record and structured data types
- j. Understand and identify cloud data, distributed and shared data in structured order
- k. Describe and create user input that allows one to get text, numbers or other inputs from the user
- l. Employ the core programming logic and techniques that are used in every game built with Camera, location, microphone and other sensors for the app necessary with the filtered accelerometer data using a combination of a low-pass and threshold triggered high-pass on each axis

2. Game Development Skills

- a. Demonstrate significant understanding of Microsoft's Windows game development tool
- b. Employ the core programming logic and techniques that are used in every Java App built in eclipse
- c. Identify the code, structure, and layout of a Java code structure
- d. Create and customize new APP with characters, sounds and backgrounds
- e. Create enhancements elements of Android game
- f. Describe how a two-dimensional tile-based rendering and collision system works to create maps in a game
- g. To effectively use Microsoft library of code and sprites in developing own games
- h. Employ and launch into the app a leaderboard allows you to add a high score across all players of your game in no time through Facebook, the cloud, or the maintain high scores
- i. Create and develop new app from code with sprites and backgrounds
- j. Publishing script and exporting scripts to apps then authenticating and using the Microsoft Live APIs

3. Creative, Innovative & Critical Thinking

- a. Demonstrate ability to enhance existing game program
- b. Create, design & program original working game features
- c. Explain how separated game logic fits together to form a cohesive game application
- d. Troubleshoot existing applications and game programs to fix bugs and ensure performance
- e. Perform self-evaluations of projects against the required established directives
- f. Follow technical and increasingly complex programming instructions in order and detail

- g. Be able to make and manipulate graphics and background for own games
4. Communication & Collaboration
 - a. Conduct in-class presentations including demonstration of original game concepts.
 - b. Collaborate with classmates in problem solving and debugging program errors.
 - c. Use technical writing skills to explain game design concepts, document programming logic, document development processes.
 - d. Writing company perspective with background, with possibilities of profit and loss statements and each game will have detailed documentation during publishing.
 5. Using Digital Research Tools
 - a. Use appropriate websites, wiki's, and blogs to engage other users of Java, Microsoft DreamSpark Program, and Touch Development for research, ideas and help
 - b. Use MSDN and other websites to explore concepts learned and to reference Java Syntax
 - c. C Use reference sites for tutorials and instructional videos for step by step instructions for coding
 6. Engineering, Physics & Math
 - a. Apply mathematical calculations and formulas to programming logic, creating custom behavior and functionality in an application and a game
 - b. Perform physics calculations on objects within a game
 - c. Recognize software engineering design principles by working within and enhancing a complex fully functional game
 - d. Reverse engineer existing game functionality in order to understand game design
 - e. Apply knowledge of math & physics to evaluate behavior in an existing game in order to enhance core logic

II. OUTLINE OF CONTENT FOR MAJOR AREAS OF STUDY

Areas of Study for Java Programming Concepts:

- A. Introduction to Careers and Industry Standards
- B. Build Free Mobile/MIT APP/ Web Apps
- C. Codecademy: Intro to Java script
- D. Mobile-It curriculum through Java programming Eclipse software
- E. Touch Development App Programming by Microsoft

II. ACCOUNTABILITY DETERMINANTS

A. Gaming Industry

Software and Systems Development Pathway Anchor(C1.1,C1.2,C1.4,C2.1, C2.4)
Games and Simulation Pathway Anchors (D1.0, D2.0)

1. History
2. New technology
3. Game hardware
4. Career opportunities

B. APP creation and websites for the web

1. Part One

Software and Systems Development Pathway Anchor(C1.1,C1.2,C1.4,C2.0, C3.0, C4.0,,C5.0,C6.0)
Games and Simulation Pathway Anchors (D1.0, D2.0, D3.0, D4.0, D5.0, D6.0, D7.0)

- a. Evaluate and try apps from: <http://appsaga.com/category/apps-gone-free>
 - b. Build and Maintain App from these websites:
<http://www.appmakr.com/> and <https://www.yapp.us/>
2. Part Two: MIT App Builder
Software and Systems Development Pathway Anchor(C1.0, C2.0, C3.0, C4.0,,C5.0,C6.0,C7.0,C9.0,C10.0)
Games and Simulation Pathway Anchors (D1.0, D2.0, D3.0, D4.0, D5.0, D6.0, D7.0)
- a. Overview and goals APP Inventor tutorials
 - b. Introduce the concept of block programming
 - c. Creating your first App
 - d. Publishing your App
 1. [FreeSound](#) - Excellent library of free sound clips
 2. [Google Images](#) - image search engine allows you to search images by size and type
 3. [Mobile CSP](#) - App Inventor curriculum to teach computer science principles
 4. [Computer Science Unplugged](#) - Teach computer science concepts without a computer
 5. [Hour of Code](#) - Angry Birds tutorial is an excellent lead in to using App Inventor resources
 - e. Tutorials for App Inventor 2 more Tutorials for App Inventor to build apps use this site: <http://appinventor.mit.edu/explore/ai2/tutorials>
3. Part Three
Software and Systems Development Pathway Anchor(C1.0, C2.0, C3.0, C4.0,,C5.0,C6.0,C7.0,C9.0,C10.0)
Games and Simulation Pathway Anchors (D1.0, D2.0, D3.0, D4.0, D5.0, D6.0, D7.0)
Students will build an app for a teacher on campus. The student will meet with the teacher in a series of meeting to determine his or her needs for the APP. First is to determine the needs of the teacher for the APP is to be used for their class, club, sports, or another needs. APP design process will take place. The projects plan will be to execute code direction in the create the his sound and sprites. The app will have high score and start screen. The player will be a controlled character or puzzle format. Students will identify the limitations of the App programming for the client, such as creating elements that are too easy or too difficult. Students will evaluate methods of working for a client.
4. Part Four
- a. Students will attempt to publish their Apps at the play store Google, Window, and Apple
 - b. Students maintain their Apps the and upgrade coding and debugging their app

C. Intro to Javascript <http://www.codecademy.com/>

Software and Systems Development Pathway Anchor(C1.0, C2.0, C3.0, C4.0,,C5.0,C6.0,C7.0,C9.0,C10.0)
Games and Simulation Pathway Anchors (D1.0, D2.0, D3.0, D4.0, D6.0)

Students will visit <http://www.codecademy.com/> to learn the basic about Java programming. After completion of the course, students will be awarded with a certificate of completion for the exercise and hours spend on the Java School of coding. They will also find other sources at docs.oracle.com/javase/7/docs/ for reference. This the official documentation for coding and reference guide. Using Microsoft Word, students will save their certificate document that briefly describes introduction to Java programming and how they can best utilize it for their programming future.

1. Java lessons 5 hour, 10 hours and beginning lessons
2. Complete the Java Glossary worksheet
3. Take coding and technical notes
4. Take Java Quiz

Student will continue to Mobile-It to learn more Java Programming the industry. As students are learning the Stempfuse curriculum, Introduction to Programming using Java by David Ecks online

free video lessons will be introduced with the at <http://math.hws.edu/javanotesthe>. The videos and the text lesson will be matched to enforce the programming concepts.

Software and Systems Development Pathway Anchor (C1.0, C2.0, C3.0, C4.0, C5.0, C6.0, C7.0, C8.0, C9.0, C10.0)
Games and Simulation Pathway Anchors (D1.0, D2.0, D3.0, D4.0, D5.0, D6.0, D7.0)

D. Mobile-It curriculum from Stemfuse

1. Unit 1
 - a. Mobile Apps and History
 - b. Mobile Platforms
 - c. Mobile Application Review Worksheet
 - d. Mobile Application Careers
 - e. Mobile Application Careers Worksheet
 - f. Android Platform
 - g. Open Source Video Worksheet
 - h. Thinking Like a Programmer Worksheet
 - i. Unit 1 Quiz
2. Unit 2
 - a. Java Programming Basics
 - b. Eclipse Basics Hello World
 - c. Java Methods
 - d. Java Variables
 - e. Java Control Structures
 - f. Java Data Structure
 - g. Java Users Input
 - h. Random Number Game
 - i. Unit 2 Quiz Review
 - j. Unit 2 Quiz
3. Unit 3
 - a. Android Basics
 - b. Toast Notifications
 - c. Button Apps
 - d. Layout Apps
 - e. Unit 3 Quiz Review
 - f. Unit 3 Quiz
 - g. NoteDroid App
 - h. MineSweeper App
 - i. DroidMaze
4. Semester Test
 - a. Semester Test Review
 - b. Semester Test

E. TouchDevelop is app programming for Windows

Students will bring their own device to life by learning TouchDevelop programming will let TouchDevelop uses the latest web technologies in Internet Explorer, Chrome and Safari to bring a cloud-connected, touch-friendly app creation environment to your PC, Mac, iPad, iPhone, Android or Windows Phone device. Oh, right, it also works offline.

Software and Systems Development Pathway Anchor (C1.0, C2.0, C3.0, C4.0, C5.0, C6.0, C7.0, C8.0, C9.0, C10.0)
Games and Simulation Pathway Anchors (D1.0, D2.0, D3.0, D4.0, D5.0, D6.0, D7.0)

<https://www.touchdevelop.com>

1. Student will complete various online tutorials on the Microsoft site tutorials after completing the first Touchdevelopment academy
2. Microsoft Digital Literacy presents Build Your First App
 - a. Module 1 course introduction
 - b. Module 2 the environment
 - c. Module 3 the turtle
 - d. Module 4 create a physics with sprites
 - e. Module 5 course conclusion
3. Monster Slicer
4. Love me not
5. Falling rock
6. Bubble popper
7. Soundboard
8. Tap mania
9. Map of things
10. One pic social
11. More tutorials at <https://www.touchdevelop.com>

Student will learn the following concepts of coding and app building listed below. Student will sign up for DreamSpark which get you a code to register as a Windows developer for free and publish apps on the Windows Store. Students can export your scripts to Windows apps or can export their scripts to Windows Phone apps.

Software and Systems Development Pathway Anchor (C1.0, C2.0, C3.0, C4.0, C5.0, C6.0, C7.0, C8.0, C9.0, C10.0)
 Games and Simulation Pathway Anchors (D1.0, D2.0, D3.0, D4.0, D5.0, D6.0, D7.0)

12. Part 1 Introduction to TouchDevelop Microsoft Research
 - a. Introduction
 - b. Computers want to be programmed
 - c. What is TouchDevelop?
 - d. The TouchDevelop ecosystem
 - e. Platforms
12. Part 2 The Scripting Language
 - a. Introduction – the language flavor
 - b. Data types and variable
 - c. Expressions
 - d. Statements
 - e. Actions
 - f. Events
 - g. Pages
 - h. Creating library scripts
13. Part 3 View the screen
 - a. Output – the writing on the wall
 - b. Input of values from the touchscreen
 - c. Updating the wall's content
 - d. Events on the touchscreen
 - e. Pushing and popping pages
 - f. Titles and subtitles
 - g. Wall buttons
 - h. On-demand creation of output
14. Part 4 The Web

- a. URLs and webpages
 - b. Downloading and uploading files
 - c. Downloading structured data
15. Part 5 Audio
- a. Music
 - b. Sounds

III.INSTRUCTIONAL MATERIALS & METHODOLOGIES

A) METHODOLOGIES

- Teacher observations of day-to-day classroom participation, effort, behavior and achievement.
- Teacher will demonstrate through class lecture, small group and one-on-one demos of drag n drop, code base programming, and essentials to make and debug a game, and key features of the programs taught in the course. Assignments included learning vocabulary, problem solving, practice programming examples, and short answer written responses.
- Students will write code by hand to solve short problems and to demonstrate mastery of programming constructs without the benefit of the integrated development environment support structure.
- The entire class works on a series of group-based inquiry and work examples together, with the teacher. Students are encouraged to help each other with examples, to establish a culture of active, collaborative learning in the classroom environment.
- Individual will take quizzes and tests and write technical base code to explain industry standards. This provide students the opportunity to demonstrate the understanding of theoretical computer science topics. This is a formative assessment of computer concepts and topics learned.
- Students are assigned individual projects throughout the course to demonstrate their ability to translate an understanding of rigorous computer science concepts into a practical application. Students are given daily “lab time” to work on their projects in class, with the teacher acting as the facilitator. Students expand their understanding of how new topics, originally presented in a theoretical context, are applied to work in the context of building a complex software application. The instructor is available to draw connections between theory and application
- Student will produce and create DroidMaze and Mine sweeper APP through Java programming.
- Students will create, upload, and publish their own apps through the Google, Apple, and Microsoft App store
- Students will enter nation gaming completion and the Microsoft Gaming APPs Competition.
- One or two long term projects per semester in which students will demonstrate their progress through the development of a simulation, an apps, code related project or some similar project. There will be a grading rubric to gauge the functionality of each part of the software application project. Points are award base on the presence and accuracy of the required functions of each project. There are example of each project by unit.

- Create Student Portfolio of their work, art, ideas, games, apps, and executable games they created over the years in hard copy and electronic form.

B) Software

- Java SE Development Kit 7 Downloads run the 32 bit
- <http://www.oracle.com/technetwork/java/javase/downloads/jdk7-downloads-1880260.html> with Windows
- Eclipse ADT
- Eclipse IDE (java EE developers)
- Eclipse IDE (java developers)
- SDK Manager
- SQLITE Database Brower
- ai2.appinventor.mit.edu software file **MIT_Appinventor_Tools_2.3.0**
- Blender
- **Adobe Suite Professional Web-design Package**
 - OS developer kit must be purchase to publish to the Apple play store
 - Google and Windows play store is free
 - Microsoft Office
 - Icon Maker <http://www.towofu.net/soft/e-aicon.php>
 - x-icon editor <http://ie.microsoft.com/testdrive/Browser/IconEditor/Default.html>
 - Paint.net <http://www.getpaint.net/>
 - GIMP= <http://www.gimp.org/>
 - Audacity and the lame extension

C) Books

Mandatory

- Java Programming, 7th Edition, **Joyce Farrell, ISBN-10: 1285081951 | ISBN-13: 9781285081953**, Cengage Learning 2014.
- App Inventor: Create Your Own Android Apps Paperback – May 10, 2011 ISBN ISBN-13: 978-1449397487

Other

- Introduction to Java Programming y Daniel Liang 2015 Pearson Publishing ISBN:9780133592207
- MobileIt curriculum from Stemfuse <http://stemfuse.com/shop/mobileappit>
- Java API at Oracle's Java website: docs.**oracle.com/javase/7/docs/api**
- **TouchDevelop: Programming on the Go (The Expert's Voice)** by R. Nigel Horspool, Nikolai Tillmann ISBN-13: **978-1430261360 June 1, 2013 apress open**
- Java How to Program 5th edition student solutions manual by Harvey M. Deital and Paul J. Deital in April 2003 Deitel & Associates, Inc.http://www.pearsonhighered.com/educator/academic/product/0,,0131016210,00%2ben-USS_01DBC.html
- Supplementary textbook: Introduction to Programming Using Java, Seventh Edition Version 7.0, August 2014 by Author: [David J. Eck](http://math.hws.edu) (eck@hws.edu) online free textbook at <http://math.hws.edu/javanotes>

- Java for Complete Beginners by Jon Purcell at <https://www.udemy.com/java-tutorial/> with Java Programming using Eclipse: Learn to Write Java Code using the free Eclipse IDE with this Java Online training course for beginners.by Jose Vidal
- Android Programming: The Big Nerd Ranch Guide (Big Nerd Ranch Guides) Paperback – April **August 6, 2015** by [Bill Phillips](#) ISBN-13: 978-0321804334 <http://www.bignerdranch.com/>

D) Equipment

- **2 TB External Hard drive for storage**
- **35 Flash drives 4GB for students**
- 35 Samsung Galaxy Tab[®] 4 7.0 16GB with keyboard case – Mobile IT (eclipses software publishes the apps for 7” or mobile phone) requires you to use a tablet. With case and keyboards
- 35 Headphones
- Microphones to make sounds for the apps and games

E) Websites

- <https://www.touchdevelop.com>
- ai2.appinventor.mit.edu
- <http://appinventor.mit.edu/explore/ai2/windows.html>
- <http://appinventor.mit.edu/explore/front.html>
- <http://www.codecademy.com/>
- docs.oracle.com/javase/7/docs/
- http://www.tutorialspoint.com/java_technology_tutorials.htm
- <http://docs.oracle.com/javase/tutorial/>
- <http://www.javabeginner.com/>
- <http://www.vogella.com/tutorials/java.html>
- <http://www.freejavaguide.com/corejava.htm>