# *The Bronx High School of Science Mathematics, Computer Science & Technology Department*

*Dr. Jean M. Donahue, Ph.D., Principal Mr. Vikram Arora, Assistant Principal*

*Instructor: Ms. Wendy Qiu*

**2016 – 2017 Android App Development Curriculum (Draft)**

**Course Overview and Goals:**

The goal of this course is to teach the skills necessary to develop Android based applications using Android Studio Integrated Development Environment (IDE) and the Android 6 Software Development Kit (SDK). In the course, students will study the Android app development concepts in the context of complete working Android apps. In each unit, a complete working Android app will be shown to the students. Students will test drive each app and discuss the technologies overview, then we proceed with a detailed code walkthrough of the app’s source code and execution. By the end of each unit, students will work in small groups to design a new app using the technologies and concepts studied in the unit. The topics of SQLite, OpenGL ES will also be introduced in the course.

**Software Requirement:**

* Android Studio 2.1 and SDK 6
* Java Development Kit (JDK) 8

**Primary Resources:**

* Deitel, 2014, *Android for Programmers – An App – Driven Approach*
* Gerber & Craig, 2015, *Learn Android Studio*
* Smyth, 2015, *Android Studio Development - Android 6 Edition*

**Class Expectations, Projects and Grading:**

Programming Projects/Exams/Quizzes: 60%

Homework: 15%

Class Participation: 15%

Final Project: 10%\*

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| **Unit** | **Key Objectives** | **Project / Activity** | **Assessment** |
| Unit 1 – Introduction to Android and Android Studio | * Introduction to Android Operating System and Android architecture * Introducing Android Studio   + Installing and configuring Android Studio, SDK and JDK   + Creating your first project – HelloAndroid   + Using Android Virtual Device Manager   + Running project on an AVD   + Running project on an Android Device | HelloAndroid | -Project  -Homework  -Quiz |
| Unit 2 –Navigating Android Studio and introducing basic programming in Android Studio | * Navigating Android Studio   + Editor   + Navigation Tool Windows   + Main menu bar, tool bar, navigation bar and status bar   + Common Operations   + Context menus   + Navigating with keyboard   + Finding and replacing text * Introducing basic programming style in Android Studio   + Using Code Folding, code completion, commenting code, and suing code generation   + Inserting live templates * How to build a Tip Calculator app   + Introducing Class, Layouts, Event Handling, Number Format and Defining Functionality with Java   + Basic App GUI   + Introducing AndroidManifest.xml | ***Case Study:***  Tip Calculator App  ***Project:***  Payment Calculator | -Project  -Homework  -Quiz |
| Unit 3 – Introduction to the Anatomy of an Android app | * The Anatomy of an Android Application * How to build a Twitter Searches App   + Introducing ListView, List Activity, SharedPreferences,   + Building the MainActivity Class     - Overriding Activity Method onCreate()     - Interface and inner classes that implement the interface     - shareSearch and deleteSearch methods   + Building the App’s GUI     - activity\_main.xml     - Layouts     - Components     - List\_item.xml | ***Case study:***  Twitter Search App  ***Project:***  Social Media Search and Auto-respond App | -Project  -Homework  -Quiz |
| Unit 4 – Introduction to Android Views, how to use Preferences, Asset Manager and create Layouts for multiple device orientations | * Designing Android app for different Android devices * Android View, View Groups, View Hierarchy, and Layout Manager * How to build a Flag Quiz App   + Menus   + Fragments   + Fragment Lifecycle Methods   + Managing Fragments   + Preferences   + assets Folder   + Resource Folders   + Supporting Different Screen Sizes and Resolutions   + Determine the Screen Size   Toasts for Displaying | ***Case Study:***  Flag Quiz App  ***Project:***  Name a Pokemon (or a dinosaur) App | -Project  -Homework  -Quiz |
| Unit 5 – Listening for Touches, Manual Frame – By – Frame Animations, Graphics, Sound, Threading, and SurfaceView | * Introduction to Android game development tools * Introduction to TouchEvent and methods * How to build a simple collision game for android app   + More Activity and Fragment Lifecycle methods   + Adding Sound with SoundPool and AudioManager   + Frame – by – Frame Animation with Threads, SurfaceView and SurfaceHolder   + Simple Collision Detection in apps   + Drawing Graphics Using paint and Canvas   + Setting up the xml files   + Setting up the classes and subclasses | ***Case Study:***  Cannon Game App  ***Project:***  Bowling Game App | -Project  -Homework  -Quiz |
| Unit 6 – 2D Graphics, Accelerometer and Multi-touch events | * Introduction to Accelerometer Events and SensorManager * Android device’s Gallery and how to save images to the Gallery through program * Immersive Mode * Android Painting and the Android Support Library classes * How to build a Doodlz App?   + Using SensorManager to Listen for Accelerometer Events   + Custom DialogFragments   + Drawing with Canvas and Bitmap   + Processing Multiple Touch Events and Storing Lines in Paths   + Using Android Immersive Mode   + GestureDetector and SimpleOnGestureListener   + Saving the drawing to the device’s Gallery   + Using the PrintHelper class   + Building the App’s GUI and resource files | ***Case Study:***  Doodlz App  ***Project:***  Create an app that allows the user to choose an image from the Gallery, and draw on the image | -Project  -Homework  -Quiz |
| Unit 7 – Using data queries in Android apps - SQL and SQLite, CursorAdapter | * Introduction to relational data and data tables * What is a database? * What is a query? * SQL and SQLite * How to build an Address Book App using SQLite Database?   + Fragments and FragmentTransactions   + Communicating data between a Fragment and a Host activity   + onSaveInstanceState method   + Defining styles and applying them to GUI components   + Specifying a background for a TextView   + Extending class ListFragment to create a Fragment that contains a ListView   + Manipulating a SQLite database   + Performing database operations outside the GUI thread with AsyncTasks   + Building the GUI and resource files   + Building the classes | ***Case Study:***  Address Book App  ***Project:***  An app that allows students at Bronx Science to swap textbooks, clothes, accessories or other items | -Project  -Homework  -Quiz |
| Unit 8 – Google Play and preparing an android app for release | * Preparing your app for publication   + Testing   + End user license agreement   + Versioning   + Licensing to control access   + Obfuscating your code   + Private key for digitally signing your app   + Pricing and advertising | ***Project:***  Publish your app to Google Play | -Project  -Homework  -Quiz |
| Unit 9 – 3D and OpenGL | * Introduction to computer graphics * Introduction to OpenGL and OpenGL ES * Using OpenGL ES with Android | ***Project:*** 3D simulation on android device | -Project  -Homework  -Quiz |
| Unit 10 – Virtual Reality | TBD |  | Project design document, project, and presentation |
| Unit 11 – Final Project | Work with your partner, design an app that can be used by students at the Bronx Science | Project |  |