



Thinkland AI Courses for Children

1. AI000 Scratch Jr. for 5-7 years old
Introduction to the world of coding
2. AI001 Scratch for 7-9 years old
Getting started with Scratch Coding based on Google CS First
3. AI001+ Scratch Game Design for 7-9 years old
Scratch Application and Game Design
4. AI002 Scratch + AI for 9-12 years old
Introduction to Machine-Learning based AI using Scratch
5. AI003 Python for 10-14 years old
Getting started with Python programming
6. AI003+ Python PyGame for 10-14 years old
Python Application and PyGame
7. AI005 Java for 11-15 years old
Getting started with Java programming
8. AI006 Data Structures & Algorithm for 12+ years old
In-depth course on data structures & algorithms in Java
9. AI007 C++ for 13+ years old
Getting started with C++ programming
10. AI101 Arduino for 9+ years old
Getting started with Arduino for Robotics
11. AI201 Web Development HTML & CSS for 9+ years old
Introduction to Web Development and Design
12. AI301 Python + AI for 11-15 years old
Introduction to Machine Learning using Python

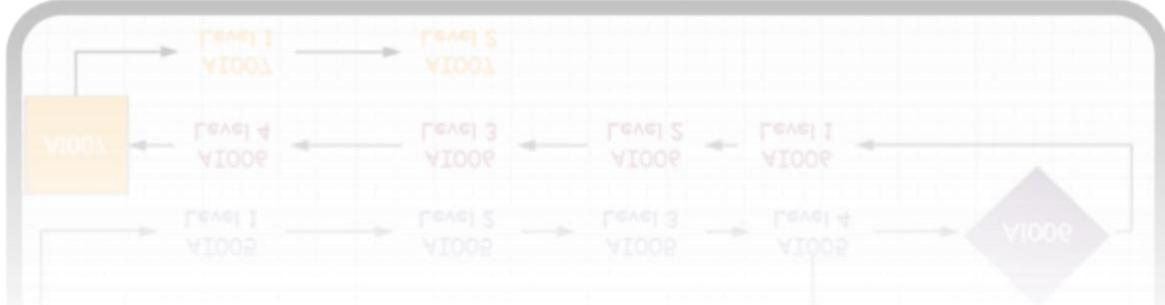
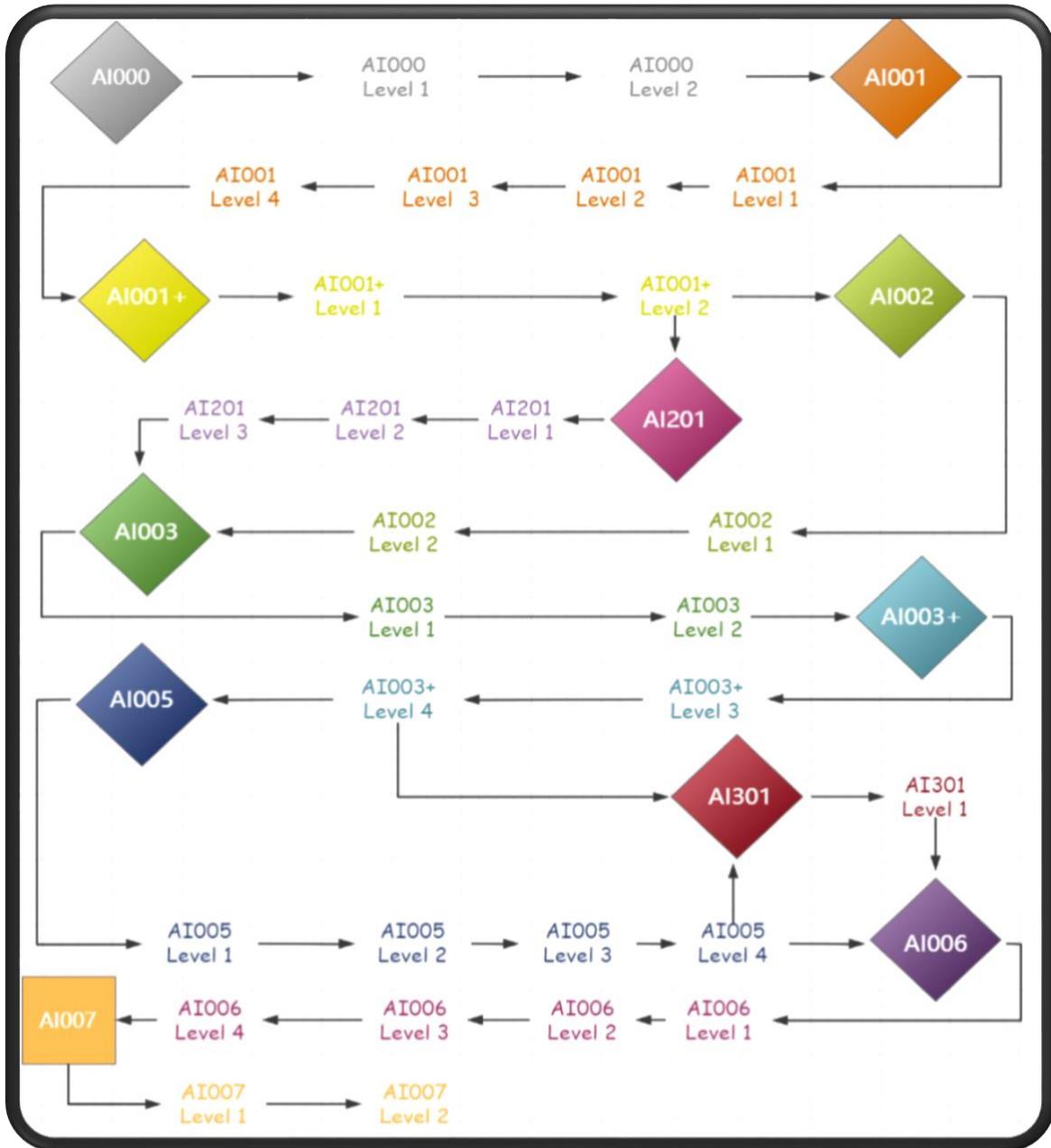
<https://school.thinkland.ai/class>

Overview

Course ID	Course Name	Course Level			
AI000	Scratch Jr	Level #1	Level #2		
AI001	Scratch	Level #1	Level #2	Level #3	Level #4
AI001+	Scratch Plus	Level #1	Level #2		
AI002	Scratch + AI	Level #1	Level #2	Level #3	
AI003	Python	Level #1	Level #2	Level #3	
AI003+	Python PyGame	Level #1	Level #2		
AI005	Java	Level #1	Level #2	Level #3	Level #4
AI006	Data Structures & Algorithms	Level #1	Level #2	Level #3	Level #4
AI007	C++	Level #1	Level #2		
AI101	Arduino	Level #1	Level #2		
AI207	Web Design	Level #1	Level #2		
AI301	Python + AI	Level #1	Level #2		

* Each level is 16 hours of class

Class Flow



Children 's AI Programming 000

Scratch Jr., Introduction to the world of coding

AI000 Scratch Jr. COURSE DESCRIPTION:

Scratch Jr is an introductory programming language that encourages creativity and expression, enabling five- to seven-year-old children to create their own interactive projects through coding. It provides young children with opportunities to design, create, and express themselves. Using Scratch Jr, children can use the programming blocks to bring their characters to life.

Level#1: (16 hours)

- **Getting Started:**

Students will learn the basics of using Scratch Jr. and make a dance party!

- **Animations – 4 activities:**

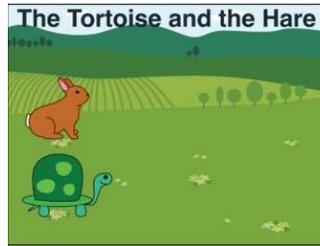
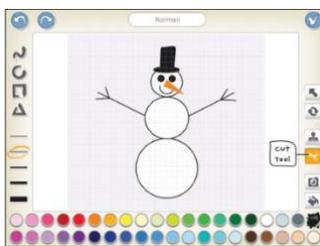
Students will create four small activities together, and then put all together to make a final animation.

- **Stories – 6 activities:**

Students will make their own stories by adding dialogue and new scenes to the animations. To make these stories come to life and play out like a movie!

- **Games – 5 activities:**

Students will learn how to make games. To make four different small games, and then use everything together to make one big game at the end.



Level#2: (16 hours)

- **Music and Sound**

An extension to the Scratch Jr. Curriculum.

Children 's AI Programming 001

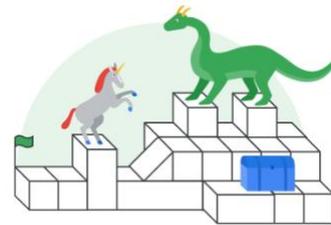
Scratch Coding Based on Google CS First

AI001 Scratch COURSE DESCRIPTION:

Extending from Google's CS First themed curriculum, we introduce grades 2-5 students (7 years-old and up) to coding principles, all in project-based activities. Kids will systematically learn to program in Scratch, meanwhile explore storytelling techniques, build fun games, and craft interesting presentations. The projects will showcase their creativity with the aid of coding and digital designs.

- **Level#1: Storytelling with Scratch (8 activities)**

Students use code to tell fun and interactive stories. Storytelling emphasizes creativity by encouraging students to tell a unique story each day.



- **Level#2: Sports with Scratch (8 activities)**

Students use computer science to simulate extreme sports, make their own commercials, and create commentary for a sporting event.



- **Level#3: Game Design with Scratch (8 activities)**

Students learn basic video game coding concepts by making different types of games, including racing, platform, and launching.



- **Level#4: Code Your Own Projects (3+ activities)**

Design and create your own Storytelling, Sports, and Game projects.

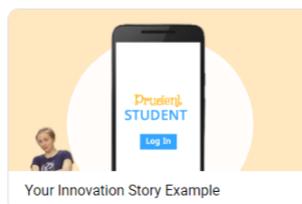
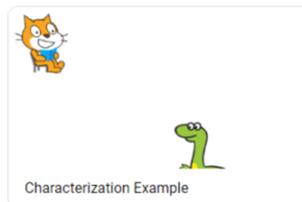
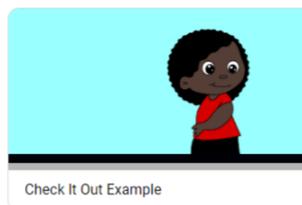
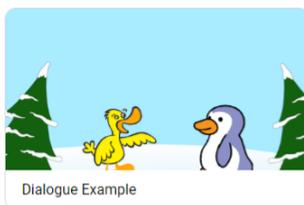
Children 's AI Programming 001 Curriculum in Detail

Scratch Coding Based on Google CS First



AI001 Level#1: STORYTELLING (16 hours)

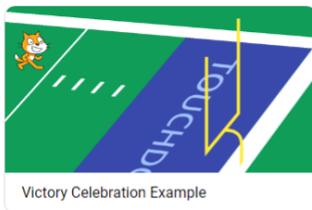
1. **Dialogue and Storytelling:** Learn about CS First and Scratch, then create a story in which two characters talk without using questions.
2. **Animation:** Tell a story in Scratch. In the story, a character walks through a scene describing what they see.
3. **Dynamic Setting:** Create a dynamic stormy day setting, complete with rain and lightning.
4. **Premise:** Build a story around one of four premises.
5. **Characterization:** One character narrates another character's actions and thoughts.
6. **Interactive Storytelling:** Create a story in which the audience can make a decision.
7. **Personal Narrative:** Create a personal narrative based on one of three premises.
8. **Your Innovation Story:** Create an innovative product or idea, then use storytelling to pitch or sell it.



AI001 Level#2: SPORTS (16 hours)



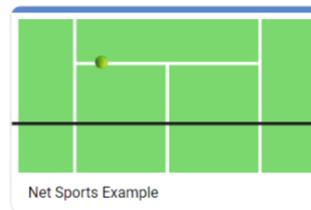
- 1. Victory Celebration:** Learn about CS First and Scratch, then create a victory celebration in Scratch.
- 2. Sports Commentary:** Create a dance, cheerleading, karate, or basketball performance competition. Then write the commentary for each of the competitions.
- 3. Net Sports:** Create a fun net sport game with a bouncing ball and an athlete.
- 4. Fitness Gadget Commercial:** Create a commercial around one of four fitness gadgets: wrist wear, eyewear, headwear, footwear.
- 5. All-Star Passing Drill:** Build an all-star passing game where you try to aim at a moving receiver.
- 6. Batter Up:** Build a home run derby style baseball game.
- 7. Extreme Sports:** Build an extreme sports game in which a racer navigates an obstacle course for as long as possible.
- 8. Post-Game Interview:** Build a project in which you get interviewed about what you programmed and learned in class.



Victory Celebration Example



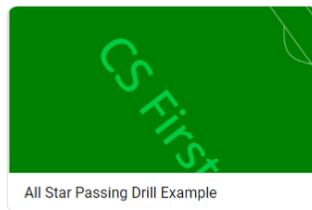
Sports Commentary Example



Net Sports Example



Fitness Gadget Commercial Example



All Star Passing Drill Example



Batter Up Example



Extreme Sports Example



Post-Game Example



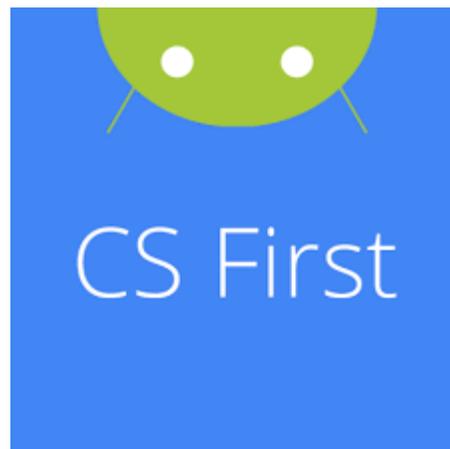
1. **Gaming Story:** Learn about CS First and Scratch, then create a gaming story.
2. **Racing Game:** Create a two-player racing game in which users control movement with the keyboard.
3. **Maze Game:** Create a game in which the user guides a sprite through a maze.
4. **2-D Platform Game:** Create and learn about platform games. Students program a player sprite to move and jump across platforms.
5. **Escape Game:** Create an escape game in which a player must avoid other sprites that move randomly.
6. **Launcher Game:** Create a launcher game using key press events, clones, and variables.
7. **Quest Game:** Learn how to use storytelling in video game design while building an RPG style Quest Game.
8. **Cave Surfing Game:** Create a game with a side scrolling background (like the popular game Flappy Bird).



AI001 Level#4: ADVANCED TOPICS AND PROJECTS BUILDING



-
1. **Code Your Own Storytelling Project**
 2. **Code Your Own Sports Project**
 3. **Code Your Own Game Project**



Children 's AI Programming 001+

Scratch Plus: Game Design

AI002 Scratch Plus COURSE DESCRIPTION

Scratch Plus: Game Design is centered around the various logic concepts used within many common games. Students will apply their basic knowledge of scratch as well as new important logic and computer science concepts through recreating existing and original games. Students can express their creativity through game design. The course focuses on the application of code in original game mechanics created by the students.

Overview:

This course builds off a basic understanding of coding through scratch and introduces more advanced concepts through the creations of popular games

Level#1: Classic Games (16 hours)

- Unit 1: Maze Game
- Unit 2: Platformer
- Unit 3: Tower Game
- Unit 4: Breakout
- Unit 5: Snake

Level #2: Modern Games (16 hours)

- Unit 6: Top-down Shooter
- Unit 7: Scrolling Platformer
- Unit 8: Online Multiplayer Board Game
- Unit 9: Online Multiplayer Fighting Game

Children 's AI Programming 001+ in Detail

Scratch Plus: Game Design

Level #1 (16 hours)

Unit 1: Maze Game

Description: We are making a course for the player to find their way to the exit. Students will imagine and create original obstacles and learn the basic concepts that all games follow

Unit 2: Platformer

Description: We recreate a popular game genre and design our own levels and add in new game mechanics

Unit 3: Tower Game

Description: We expand upon what we learned in the previous unit, and try our hand at making a game completely random and endless

Unit 4: Breakout

Description: Students dive deeper into more mathematically complex code to create physics inside our games to create the realistic bouncing of a ball

Unit 4.5: Snake (If class moves quickly and there's extra time)

Description: This project explores different ways to use clones as well as tests the creativity of the students by creating new mechanics for the originally simple game, snake!

Level #2 (16 hours)

Unit 5: Horde Fighter/Top-down Shooter

Description: Students create a simple top-down shooter but can imagine and code their own enemies, bosses, and weapons!

Unit 6: Scrolling Platformer

Description: Students take their knowledge of variables to the next level to create a massive platformer level, stretching on a level infinite in size in all directions

Unit 7: Online Multiplayer Board Game

Description: Students create their favorite board game and play it with their friends! Students include original game mechanics into the board game as well as learn the basics to play it with a friend across the cloud

Unit 8: Online Multiplayer fighting game

Description: Taking the cloud variables to the next level, students create an action-packed fighting game where they can imagine and code original attacks and characters while also being able to play it with a friend online

Children's AI Programming 002

Introduction to Machine-learning based AI using Scratch

AI002 Scratch + AI COURSE DESCRIPTION

Have you ever wondered how Alexa could always find an answer to your whimsical questions? We have and we figured that out, in Scratch. Using the proprietary AI platform built by Thinkland.ai, we introduce grades 4-8 students to the concept of machine learning and its applications in real life. Learning with 10 projects from different AI focuses all implemented in Scratch, the kids will explore the meanings of artificial intelligence in our daily life and the engineering principles behind these AI-based applications.

Level #1 (16 hours)

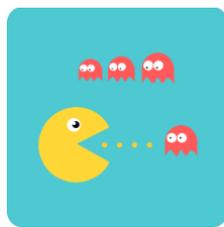
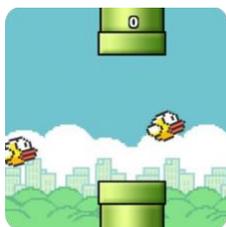
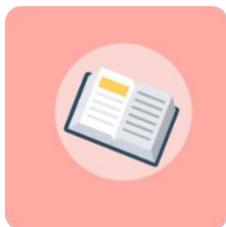
1. Introduction to Machine Learning
2. Image Recognition & SpongeBob and Friends
3. Natural Language Processing & Simple Smart Home
4. Sentiment Analysis & Praises and Criticisms

Level #2 (16 hours)

5. Facial Recognition & Face lock
6. Decision Trees & Flappy Bird
7. Decision Trees & Pacman
8. Speech + Speaker Recognition & Voice Lock

Level #3 (16 hours)

9. Problem Solving through Brainstorming Ideas + Workshop
10. Capstone A.I. Project: Create your own project & Implement Multiple ML Concepts



Children's AI Programming 002 in Detail

Introduction to Machine-learning based AI using Scratch

Level#1 (16 hours)

1. INTRODUCTION TO MACHINE LEARNING

- a. Introduce concepts of Artificial Intelligence and Machine Learning, Strong AI vs Weak AI to students. Discuss what a machine learning model is. Also briefly discuss future topics. Includes a project that teaches computers the ability to identify an apple from and orange.
- b. Project: Apple or Orange. Create a Machine Learning model that can allow the computer to identify an apple from and orange.

2. IMAGE RECOGNITION & SPONGEBOB AND FRIENDS

- a. Discuss image recognition, including how it works, applications. Also create an image recognition model that helps the computer to identify images and create a scratch project that utilizes this model.
- b. Project: SpongeBob and Friends. Help the computer send different images of SpongeBob, Patrick and other characters to their home/destination using a machine learning model.

3. NATURAL LANGUAGE PROCESSING AND SIMPLE SMART HOME

- a. Discuss Natural Language Processing, how it works, as well as applications of it in the real world. Create a project that utilizes the NLP learning model.
- b. Project: Smart Home (Simple Version). Create a project that allows the player to type commands of any variation to open and close home appliances.

4. SENTIMENT ANALYSIS & PRAISES AND CRITICISMS

- a. Discuss sentiment analysis, how to teach the computer to recognize sentiments, as well as applications of this concept. Create a project that utilizes the corresponding machine learning model.
- b. Project: Praises or Criticisms. Create a program that reacts accordingly to the user's comments; if the comment is positive or is a praise, the program will react happily. If the comment is negative or a criticism, the program will be sad.

Level#2 (16 hours)

5. FACIAL RECOGNITION & FACELOCK

- a. Discuss facial recognition, how a computer can recognize and identify a person through facial features, as well as applications. Create a project that utilizes the corresponding machine learning model.
- b. Project: Face lock. Create a simulation of a phone that will unlock depending on the user's face, like an iPhone X.

6. DECISION TREES & FLAPPY BIRD

- a. Discuss decision tree and machine learning algorithm, and how computers can use this concept to make decisions. Create a flappy bird project that uses this machine learning algorithm.
- b. Project: Flappy Bird. Create a flappy bird game through Scratch, in which the computer will learn and adapt a human player's strategy and be able to play flappy bird by itself.

7. DECISION TREES & PACMAN

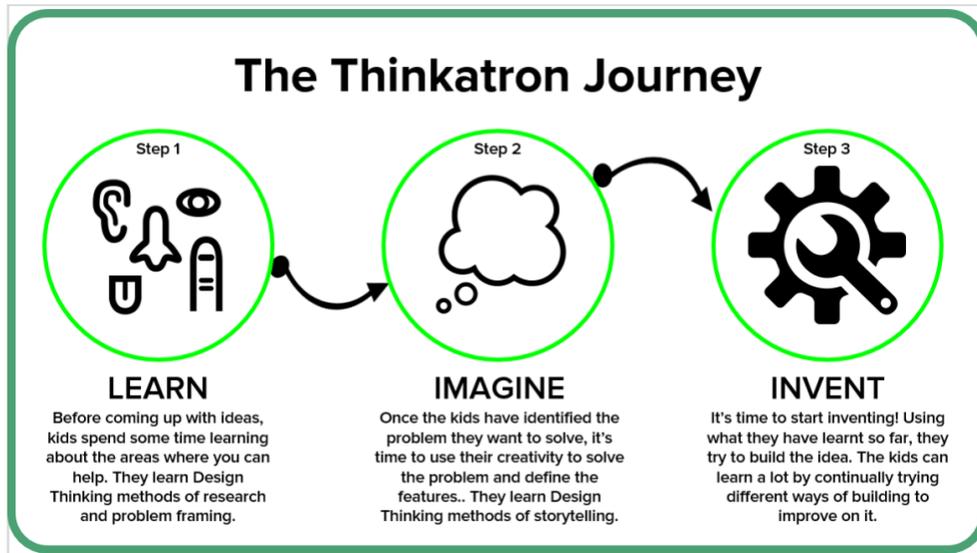
- a. Continue the discussion on decision trees and create another scratch program that uses decision trees to allow the computer to play a game.
- b. Project: Pac-Man. Create a Pac-Man game through Scratch, in which the computer will learn from the human player to play a simplified version of Pac-Man.

8. SPEECH+SPEAKER RECOGNITION & VOICE LOCK

- a. Discuss speech and speaker recognition, their differences, and their applications. Further discuss the idea of two factor authentication. Create a scratch project that utilizes both machine learning concepts.
- b. Project: Voice Lock. Create a simulation of a phone in which it can be unlocked if the speaker's voice matches the owner's voice. Further enhance the project by implementing two factor authentications, which forces the user to say a randomized specific phrase to bypass the security.

Level#3 (16 hours)

9. Problem Solving through Brainstorming Ideas + Workshop



10. Capstone A.I. Project

- a. Create your own project & Implement Multiple Machine Learning Concepts



Children 's AI Programming 003

Getting started with Python programming

AI003 Python Course Overview:

Python programming is a course designed to give an applicable introduction to programming using an actual programming language that is widely used in the industry. Over the course of 3 sessions, students will learn from Basics, to Functions, Library, and Object-Oriented Programming. The curriculum contains high quality guidelines and presentations with detailed classwork and homework activities.

Level #1 (16 hours)

Introduction to Python

- Introductory Topics
- Conditionals & Program Flows
- Lists & More Program Flows

Level #2 (16 hours)

Python Library and Functional Coding

- Turtles
- Functional Coding

Level #3 (16 hours)

Object Oriented Programming

- Object-Oriented Programming
- Inheritance
- Applications



Children 's AI Programming 003 in Detail

Getting started with Python programming

Level #1 – Introduction to Python

1. Numbers and Strings
2. Input and Output Methods
3. Variables and Assignment
4. Mad-Libs and String Formatting
5. Booleans and Comparators
6. If-elif-else statements
7. Making a List
8. For loops and range
9. While, break, and continue

Level 2 – Python Library and Functional Coding

1. Drawing with “Turtle”: Python Turtle
2. Coloring with Turtle
3. Turtle with Loops and Iterables
4. Introduction to Functions
5. Project Drawing
6. Modules
7. Returning Values
8. Project Cookie Typer

Level 3 – Object Oriented Programming

1. Introduction to OOP
2. Implementing Elementary Objects & Constructors
3. Project Student Management System
4. Intro to Inheritance
5. Implementing Inheritance
6. Magic Methods
7. Project Simulation for Buses

Children 's AI Programming 003+

Python Application and PyGame

AI003+ Python PyGame COURSE DESCRIPTION

Whether you want to learn to design beautiful things or to write complex and responsive programs, whether you want to be a Game Developer, or build robots, or even if you're not sure, this course will be a blast and teach you valuable skills. Learn to make your own games from start to finish all with Python and a handy tool called Pygame. Pygame is a game engine designed for making 2D games with Python, it allows you to create your own animations, add pictures, sounds, music, and much more to your very own game. This course will give you the opportunity to get creative and get technical. Everyone is highly encouraged to learn a little bit about Pygame.

Level#1 (16 hours)

1. Drawings, Images, Animations and Controls
2. Coding Collisions
3. Sounds, Music, Fonts, and Text
4. Create Your Own Game

Level#2 (16 hours)

1. Writing Cleaner Code for Bigger Projects
2. Advanced Graphics
3. Smarter AI
4. Game Creation

Children's AI Programming 003+ In Detail

Python Application and PyGame

Level #1:

- Unit 1: Drawings, Images, Animations and Controls
 - Learn how animations are made and how to create your own from images and Pygame drawings and shapes and move them around the screen.
 - This unit will also teach how to easily program your keyboard keys and mouse buttons to control your game.
- Unit 2: Coding Collisions
 - Collisions, meaning when two or more objects on the screen bump into each other or begin to overlap.
 - In this Unit you'll make a game like classic pong for 1 or 2 players
- Unit 3: Sounds, Music, Fonts, and Text
 - Here you'll learn about loading sounds and music into your game.
 - You'll also learn to display customized text (font, color, size, bold, italics)
- Unit 4: Create Your Own Game
 - Take everything you've learned and put it all together to make your game, work with classmates, or work as a class on totally original projects.

Level #2

- Unit 1: Writing Cleaner Code for Bigger Projects
 - Writing any program can get complicated, disorganized, hard to add onto, and hard to read.
 - In this unit you'll learn how to write clean, efficient programs, how to make them run faster, and learn how you can organize your whole project to make it easier to work with and build on.
- Unit 2: Advanced Graphics
 - In this Unit you'll learn how to write code for effects like fire, shading, and lighting and how to add them to your games.
- Unit 3: Smarter AI
 - Get an Introduction to some advanced concepts around writing AI.
 - Learn how to use Python to develop an AI that can learn through experience. An intro to basic Machine Learning.
- Unit 4: Game Creation
 - Work as a class to create a game with a character you can control, an AI to compete with or work with, fancy graphics and effects, multiple levels, and anything else there's time for.

Children's AI Programming 005

Introduction to Java and Advanced Java

AI005 Java Course Overview:

An in-depth course detailing everything related to java, from basic concepts of how a computer functions to advanced concepts that appear on the AP exams. This course blends rigor with fun as students participate in hands-on projects and labs to better understand the language of java and take the step into more advanced coding.

Introduction to Java

Level #1 (14 hours):

1. How a Computer Works
2. Formatting and Keywords in Java
3. Data Types
4. System Input and Output
5. Project Lab 1 - Mini market

Level #2 (18 hours):

6. Decision Structure and Advanced Boolean
7. Loops and Iterators
8. Project Lab 2 - Rock paper scissors game
9. Basics of Errors and Exception
10. Array and ArrayLists
11. Final Project - Mini market revisited

Advanced Java

Level #3 (22 hours):

1. Binary, hexadecimal, and ASCII
2. Math class and arithmetic functions
3. Project lab 3 – Create a calculator
4. Object-oriented concepts
5. Project lab 4 - Create your own objects

Level #4 (21 hours):

6. Threads, Runnables and Concurrency
7. Advanced Exceptions and Errors
8. Advanced ArrayLists and list
9. Lambda Functions and new java additions
10. Final project - Create your own objects expanded

Children's AI Programming 005 in Detail

Introduction to Java and Advanced Java

Level #1

1. How a Computer Works
 - CPU, GPU, SSD/hard drive, and RAM
 - Memory allocation
 - CPU cycles
2. Formatting and Keywords in java
 - Strategic programming
 - Java formatting
 - Java keywords
3. Data Types
 - Primitive data types
 - Strings and StringBuilder objects
4. System Input and Output
 - Scanner objects
 - Data collection
 - Outputting formatted information
5. Project Lab 1
 - Mini market: Students will create a project that prompts the user for purchases and can output a receipt following a format.

Level #2

6. Control Flow Structures and Boolean Logic
 - Boolean operators
 - If and if-else statements
 - Ternary operators
 - Switch statements
7. Loops and Iterators
 - For, while, and do-while loops
 - Nested loops
8. Project Lab 2
 - Rock paper scissors game: students will create a program that can play rock paper scissors against the user
9. Basics of Errors and Exception
 - Compile-time errors
 - Run-time errors
 - Handling and try-catch blocks

- Outputting formatted information
- 10. Array and ArrayLists
 - Arrays and ArrayLists objects
 - How to navigate and find things in arrays
- 11. Final Project
 - Mini market revisited: Students will build onto their first project lab using arrays and loops to make the program more efficient and detailed.

Level #3

1. Binary, hexadecimal, and ASCII
 - Converting between the different base systems
2. Math class and arithmetic functions
 - Converting and casting between different casts
 - All arithmetic methods declared in the Javadoc
3. Project lab 3
 - Students will create a calculator using the math functions that solve a mathematical problem
4. Object-oriented concepts
 - Accessor and constructor methods
 - Inheritance and polymorphism
 - Interfaces
 - Enums
 - Abstract classes
5. Project lab 4:
 - Create your own objects: students will use objects to create their own network of code

Level #4

6. Threads, Runnables and Concurrency
 - Threads, Runnables, and concurrency
7. Advanced Exceptions and Errors
 - Custom exception
 - Throw and finally code blocks
8. Advanced ArrayLists and list
 - Lists, LinkedLists, and other collections
9. Lambda Functions and new java additions
 - New additions to java
10. Final project:
 - Create your own objects expanded
 - Use everything you learned to create anything you want

Children's AI Programming 006

Data Structures & Algorithms in Java

AI006 DS&A COUSE DESCRIPTION

An in-depth course about two of the fundamental topics in computer science -- data structures and algorithms. This course is designed for those who have basic knowledge of Java programming and ready to move a step beyond the programming language.

AI 006 is part one of two DS&A courses; each consists of multiple sessions with the difficulty gradually increasing. It covers everything you need to know for competitive programming, from basic concepts to practical experience. If you're able to master all the content in this course, trust me, you'll be able to stand out in USACO open contests (or even get a job in Silicon Valley). Most importantly, this course develops the skills of modeling and logical thinking and clears the way towards advanced topics in computer science and artificial intelligence.

Level #1: bronze (16 hours)

Introduction to Data Structures and Algorithms. Some content this session covers include ArrayList, Linked List, Time/Space Complexity, Recursion, Sorting, Binary Search Tree, etc.

Level #2: silver (16 hours)

A more in-depth exploration of DS&A by building on top of the previous level's materials as well as introducing new concepts. Some content this session covers include Binary Search, more advanced sorting algorithms, queue/stack/heap, etc.

Level #3: gold (16 hours)

Introduces and discusses more difficult data structures and algorithms as well as build on top of previous concepts. Some content this session covers include Map/Set, Graph, Breadth-First/Best First/Depth First Searches, Prefix Sum, Bit Operation, etc.

Level #4: platinum (16 hours)

Comprehensive topics

Children's AI Programming 006 in Detail

Data Structures & Algorithms

Level #1: bronze (16 hours)

- Introduction to ArrayList & Time/Space Complexity & Binary Search
- Recursion
- Dynamic Programming (DP)
- LinkedList & Two Pointers
 - Two Pointers with ArrayList/String
 - Two Pointers with Linked List
- Sort
 - Bubble Sort
 - Selection Sort
- Tree & Introduction to Binary Search Tree
- Divide & Conquer

Level #2: silver (16 hours)

- Binary Search
- Recursion
- Dynamic Programming (DP)
- Sort
 - Merge Sort
 - Quick Sort
- Introduction to Queue/Stack/Heap
- Breadth-First Search
- Depth-First Search

Level #3: gold (16 hours)

- Introduction to Map/Set
- Graph
- Breadth-First Search
- Best First Search (Dijkstra's Algorithm)
- Depth First Search
- Prefix Sum
- Bit Operation
- Greedy

Level #4: platinum (16 hours)

Comprehensive topics

Children's AI Programming 007

C++ Programming

AI007 C++ Programming COURSE DESCRIPTION

In this course we will introduce students to the fundamental concepts of C++ in a comprehensive and efficient way. Being different from other programming languages such as Python or Java, C++ has memory management and can be made into a more efficient format which helps with execution time and memory usage where it is needed. Also, C++ brings benefits in the fact that it is a compiled language not an interpreted one, that means that once compile it should run on almost any machine. The course is structured in beginner and advanced levels, with multiple projects throughout. Students will gain a strong understanding on how to use C++ after completing this course. No prior programming knowledge is required but knowledge of other programming languages would help.

Level #1 – Beginner (16 hours)

- Class 1: C++ getting started / C++ syntax
- Class 2: Input/Variables/Data Types
- Class 3: Operators/C++ Math
- Class 4: Booleans/Conditionals
- Class 5: While/For Loop

Level 2 - Advanced (16 hours)

- Class 1: Arrays(1D/2D)/Pointers
- Class 2: Functions; C++ problems
- Class 3: Memory Management and Linked Lists
- Class 4: C++ Games (Mad Libs/Guessing Game/Calculator)

Children's AI Programming 007 in Detail

C++ Programming

Level #1 – Beginner (16 hours)

- Class 1: C++ getting started / C++ syntax
 - Introducing the C++ programming language, setting up the environment, and introducing C++ syntax. Also includes problem sets for practice
- Class 2: Input/Variables/Data Types
 - Working with inputs, variables, and different data types in C++. Also includes problem sets for practice.
- Class 3: Operators/C++ Math
 - Exploring arithmetic, logical, relational, compound assignment, and other operators. Also includes problem sets for practice.
- Class 4: Booleans/Conditionals
 - Working with Booleans, if conditions, and switch statements. Also includes problem sets for practice.
- Class 5: While/For Loop
 - Introducing different loops, including while, do/while, for loops. Discusses related statements such as continue and break. Also includes problem sets for practice.

Level 2 - Advanced (16 hours)

- Class 1: Arrays(1D/2D)/Pointers
 - Working with 1D and 2D arrays, pointers, and their interactions. Also includes problem sets for practice.
- Class 2: Functions; C++ problems
 - Introducing functions and its related components. Explore recursive functions Also includes problem sets for practice.
- Class 3: Memory Management and Linked Lists
- Class 4: C++ Games (Mad Libs/Guessing Game/Calculator)

Children 's AI Programming 101

Arduino for Robotics

AI101 Arduino COURSE DESCRIPTION

Combine the world of electronics with software and make your project ideas come to life! Whether it's programming your own smart watering device that will automatically water your plants according to the correct moisture level, or making a sun-tracking solar array, our Arduino course is the right place to start. You'll learn the basics of electronics and programming in Arduino C, while at the same time, incorporating the knowledge you learn into projects that you're passionate about. The future of microcontrollers is now and explore all the possibilities that Arduino has to offer!

Level #1 (16 hours)

- Unit #1 – Introduction
- Unit #2 - Ohm's Law, and short circuits
- Unit #3 - Basic Electrical Components
- Unit #4 - Arduino Programming
- Final Project: Button control, Multi-mode LED Strip (Fade, Strobe, Flash)

Level #2 (16 hours)

- Unit #1 –PWM (Pulse-width modulation)
- Unit #2 – Sensors: Analog vs Digital sensors, temperature / humidity sensors
- Unit #3 – Sensors Continued: ultrasonic, light, and IR
- Unit #4 - Piezoelectricity, tones, and how these bridges digital & analog world
 - Projects: Create a song of your choice (At least 16 notes)
- Final Project: Come up your own idea

Children 's AI Programming 101 in Detail

Arduino for Robotics

Level #1

- Unit 1: Course Introduction
 - Concepts Covered: Introductions, course overview, kit overview, tinkercad, microcontrollers, automation, robotics, engineering, electricity, programming.
 - Project: Create an account on tinkercad and create a simple circuit to power an LED

- Unit 2: Ohm's Law, and short circuits
 - Concepts Covered: Voltage, Current, Resistance, capacitance, and Formulas
 - Projects:
 - Ohm's law practice problem with circuit diagram (determine required resistor value for a 3.3V 20mA LED with a 6V power supply)
 - Show how a short circuit can be created.
 - Wire an LED to a button and a switch.

- Unit 3: Basic Electrical Components
 - Concepts Covered: Resistors, Potentiometers, diodes, capacitors, ground, and LED
 - Projects:
 - Make a rainbow of LED's
 - Use an LED to display how a diode only allows current to flow one direction
 - Brightness control with potentiometer
 - Use capacitors to fade LEDs out

- Unit 4: Arduino Programming
 - Concepts Covered: syntax and difference between python/java, and overall language layout, Setup vs. Loop, Serial.println, simple arithmetic, variables, for loops
 - Projects:
 - Serial Communication between 2 Arduinos
 - Use serial input to write a simple login script that asks for a password and allows for limited attempts

- Final Project: Button control, Multi-mode LED Strip (Fade, Strobe, Flash, etc.)

Level #2

- Unit 1: PWM and Motors
 - Concepts Covered: PWM (Pulse-width modulation), dc motors, Stepper Motors, and Servo motors
 - Projects:
 - potentiometer servo control
 - PWM based dc motor speed controller
 - potentiometer servo control with variable speed

- Unit 2: Sensors
 - Concepts Covered: Analog vs Digital sensors, temperature / humidity sensors
 - Projects: Read atmospheric conditions with digital and analog sensors, compare.

- Unit 3: Sensors Continued
 - Concepts Covered: Ultrasonic, light, and IR
 - Projects:
 - Ultrasonic with and without temp factored in VS without
 - IR remote, relay control
 - Light sensor controlled circuit

- Unit 4: Piezo
 - Concepts Covered: Piezoelectricity, tones, and how this bridges the digital & analog world
 - Project:
 - Create a song of your choice (At least 16 notes)
 - Have a RGB diode change color depending on the voltage
 - Add potentiometer to change octave.

- Final Project Ideas
 - Project 1: Digital Thermometer.
 - Project 2: Simple Synth.
 - Project 3: Simple Arduino Gameboy - tic-tac-toe (LED) / dice roller etc.
 - Project 4: Connect servo and Ultrasonic for object detection.
 - Project 5: Remote controlled, multi-mode LED array.

Children 's AI Programming 201

Introduction to Web Development and Design

AI007 Web Design COURSE DESCRIPTION

Introduction to Web Development and Design serves as a beginner's guide to HTML and CSS, the major programming languages used to build static websites in the current technologically active age. Through this course, students will learn HTML and CSS in a fun, interactive, and project-based curriculum and develop key web development and design skills. Additionally, students will learn how to properly apply these two powerful languages in building websites of their very own.

Course Overview

This course covers the fundamental principles of programming and introduces the syntax and semantics of HTML in session 1 and CSS in session 2.

Level #1:

Getting started with HTML5.

Level #2:

Getting started with CSS.

Final Project

At the end of level 2, students can put everything they have learned into one final project: Create your own Landing Page



Children 's AI Programming 201 in Detail

Introduction to Web Development and Design

Level #1: HTML5

- Unit 1: Basic Elements and Structure
- Unit 2: Parent and Child Relationship
- Unit 3: Media Elements
- Unit 4: Readability and Semantics
- Unit 5: Tables and Forms

Level #2: CSS

- Unit 6: In-Line Styling
- Unit 7: Embedded CSS
- Unit 8: External CSS
- **Final Project:** Create your own Landing Page
 - Part 1: Creating your Company
 - Part 2: Creating its Landing Page
 - Part 3: Sharing and Presenting your Website

Children 's AI Programming 301

Introduction to Machine Learning using Python (Python + AI)

AI 301 Python + AI COURSE DESCRIPTION

Introduction to machine learning course is for those who have basic knowledge of Python programming and are curious about the magic behind Artificial Intelligence (AI). It covers machine learning key concepts, design principles, and classic algorithms from the widely used traditional algorithms to the booming technology of deep learning and neural networks. The students will be guided to solve real-world problems with what they learn and enjoy the fun of building AI projects from scratch.

Purpose:

- Inspire and cultivate the students' interests in machine learning and AI.
- Give a systematic introduction to machine learning concepts, algorithms, applications, and design principles.
- Provide hands-on experience in building AI projects from scratch.
- Lay the foundation for the future learning of advanced machine learning courses and cutting-edge AI technologies.

Highlights:

- Systematically designed and covers from the very basic concepts to the cutting-edge technologies.
- Based on the principle of “learning by doing”, enables the students to solve real-world problems and crack the competitions.
- Designed for youth with vivid teaching, free from dull theory and full of fun.

Level #1 (16 hours)

1. Introduction to ML basics
2. Decision Trees
3. K-Nearest Neighbors (KNN)
4. Linear Regression

Level #2 (16 hours)

5. Image Processing and Computer Vision
6. Deep Learning and Neural Networks
7. Image Classification and Face Recognition
8. A Tour of Modern Machine Learning Technologies

Children 's AI Programming 301 in Detail

Introduction to Machine Learning using Python (Python + AI)

Level #1 (16 hours)

- Topic 1: Introduction to machine learning basics
- Topic 2: Decision Trees
 - Project: Who wants to buy a Switch?
- Topic 3: K-Nearest Neighbors (KNN)
 - Project: Movie recommendation
- Topic 4: Linear Regression
 - Project: House price prediction

Level #2 (16 hours)

- Topic 5: Image Processing and Computer Vision
 - Project: Filter design
- Topic 6: Deep Learning and Neural Networks
 - Project: Sentiment analysis
- Topic 7: Image Classification and Face Recognition
 - Project: Emotion classification
- Topic 8: A Tour of Modern Machine Learning Technologies
 - GAN, reinforcement learning, ...



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