

# Python & Artificial Intelligence

AGES 12+



## The Ultimate Programming Curriculum for Future AI

The Python & AI curriculum introduces Python programming through game development before moving onto Artificial Intelligence (AI) courses. Like all Exceed Robotics curriculums, programming concepts and languages are taught through relevant applications – Python is the leading coding language for Big Data, Advanced Robotics and Artificial Intelligence.

Higher level courses move onto programming for image manipulation, object detection and text to speech before integrating these elements in a final AI project. The end goal of this program is to teach Python towards creating advanced devices with Artificial Intelligence

### PROGRAM DETAILS

20-month curriculum (in-centre)  
8-month curriculum (online)

Classes once per week classes

One-hour in duration

6 max students per class

*The Python and Artificial Intelligence curriculum was created by a team of software engineers working in the tech industry, with years of experience in teaching and course development. The program's vision is to create a community of young innovators by developing relevant computer science & engineering skills with industry-related experience to kickstart their career in STEM*

## PY-01: INTRODUCTION TO PYTHON GAME PROGRAMMING

Prerequisite: ages 12+ (no experience required)

The first robotics course in the Exceed Robotics curriculum focuses on building programming logic using robots.

Sequential programming and conditional statements are introduced to program a robot to perform specific tasks, utilizing various sensors to make decisions.

STEM topics are integrated into each lesson by presenting the science behind a specific sensor or applying math for motor drive and control

```
"Guess the Number"
Programmed by Zachary Fruhling
Copyright 2020

import random
correctAnswer = random.randint(1, 100)
gameOver = False

while gameOver == False:

    playerGuess = int(input("Guess a number between 1 and

    if playerGuess == correctAnswer:
        compareAnswer = "Right"
        gameOver = True
    elif playerGuess > correctAnswer:
        compareAnswer = "High"
    elif playerGuess < correctAnswer:
        compareAnswer = "Low"

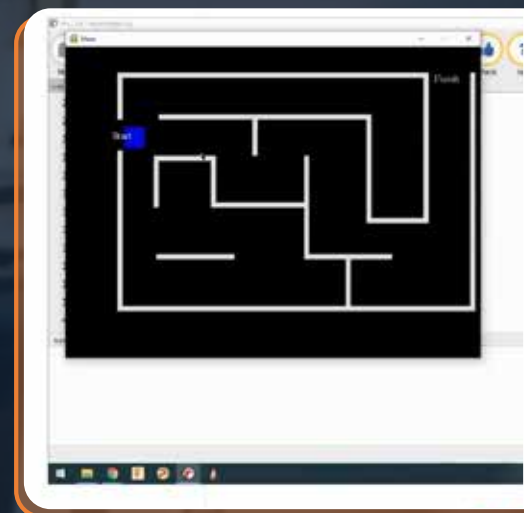
    if compareAnswer == "Right":
        print("Correct! You Win!")
    elif compareAnswer == "High":
        print("Too High! Guess Again!")
    elif compareAnswer == "Low":
        print("Too Low! Guess Again!")
```

## PY-02: GAME PROGRAMMING FUNDAMENTALS I

Prerequisite: PY-01

Students are introduced to more advanced concepts including Functions, Lists and Keyboard input. The material covered in this course could be extended to any object-oriented programming language and serve to advance our game development skills.

Students will complete the course by creating a new game applying the learned fundamentals



## PY-03: GAME PROGRAMMING FUNDAMENTALS II

Prerequisite: PY-03

The first robotics course in the Exceed Robotics curriculum focuses on building programming logic using robots.

Sequential programming and conditional statements are introduced to program a robot to perform specific tasks, utilizing various sensors to make decisions.

STEM topics are integrated into each lesson by presenting the science behind a specific sensor or applying math for motor drive and control



## **PY-04: GAME PROGRAMMING APPLICATION**

Prerequisite: COD-03

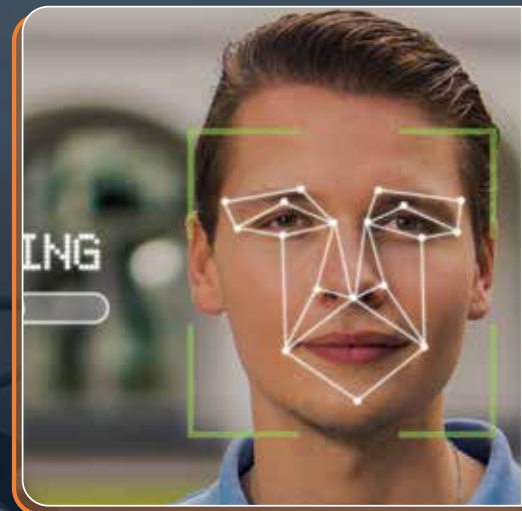
The final Game Programming course has an open project to provide students with the opportunity to apply the learned concepts for programming a game on their own. Students receive a project outline with game requirements and options to make the game more interesting. At the end of this series of courses, students would have built a solid understanding in programming and coding in Python.



**PY-05: IMAGE PROCESSING**

rerequisite: PY-04

The first course in the Mechanics series relates to the design of 3D printed mechanical parts. Students learn various design tools using Autodesk Fusion 360 to create their own designs. Starting with sketching, students complete various design projects to practice using design tools and features. Through select projects, students will practice using fundamental tools in mechanical design. Design projects are assigned for students to independently apply their design skills and create functional mechanical components that could be 3D printed.

**PY-06: AI OBJECT DETECTION**

Prerequisite: PY-05

Building robots cannot be complete without learning how parts we design should fit together. This machine design course teaches students about the fundamentals of machine design including fits and clearances, structure design, levers, gears, and more. Students will design each component of the machine and will assemble them together in the design software. By learning about joints and constraints, students will create a virtual simulation of their creations. In industry, design simulation is an essential tool used by engineers to predict functionality and performance before building a single prototype.

**PY-07: AI SPEECH RECOGNITION**

Prerequisite: PY-06

The last course in this Mechatronics series is all about electronic circuits. After learning the fundamentals, students work on lab assignments by building and testing their own electronic circuits. Students will learn about principles of electricity and Ohm's law relating to voltage, current and resistance. Using multimeters to measure voltage/current, students take measurements to better understand the effects of the different electronic components. Electronic components including resistors, switches, motors and transistors will be covered in preparation for the next Microcontroller Programming series.



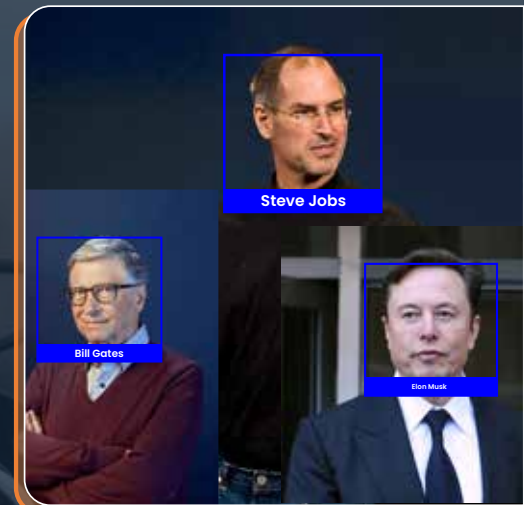
**PY-08: INTRODUCTION TO RASPBERRY PI**

Prerequisite: PY-07

The Arduino microcontroller is a widely used programmable development board that makers and hobbyists use to build robots amongst many other devices

Students will learn about digital and analog devices and introduced to Arduino-controlled circuits

Learning C-language programming in previous Programming & Robotics courses (COD-04,-05,-06) well prepared students for microcontroller programming which uses functions from the Clanguage

**PY-09: RASPBERRY PI CAPSTONE PROJECT I**

Prerequisite: PY-08

The second microcontrollers course moves onto wiring and programming circuits using advanced output devices and complex sensors

Students will practice wiring and programming circuits using various electronic devices throughout this course. The aim is to have students feel comfortable with coding microcontrollers to make decisions or vary output using any type of sensor input

**PY-10: RASPBERRY PI CAPSTONE PROJECT II**

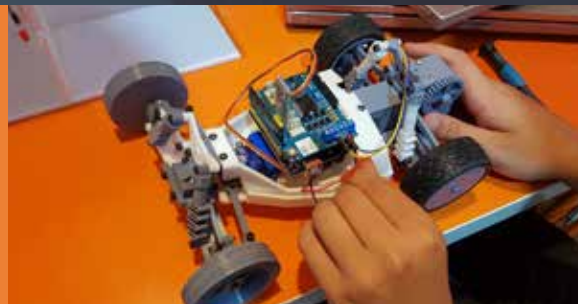
Prerequisite: PY-09

Building on our knowledge in creating circuits using analog sensors, this course teaches programming to drive and control various types of motors (DC, servo, stepper) allowing students to create and program complex microcontroller circuits.

Combined with the previous Mechanical Design courses, learning how to build and program such advanced microcontroller circuits is the final step towards creating custom robots!



## What's Next?



Robotics

*The Robotics curriculum was created by a team of mechatronics engineers with 25+ years of global industry experience with the aim of advancing STEM education amongst Canada's youth. The Robotics program's vision is to create a community of young innovators by developing computer science and engineering skills and directing them towards solving real-world problems*



ALUMNI WORKSHOP

*A project-based environment where students apply their learned skills and work on their own creations (products, programs and apps) under the supervision of a workshop manager. Ideal for students who are interested in working on their own ideas and projects.*