Course Title: Python Learning with Turtle Graphics – Level 1

Course Description: This course provides a comprehensive introduction to Python programming and Python Turtle graphics. It covers the basic concepts of programming and gradually progresses to more advanced topics, equipping students with the skills to develop Python applications by using Python Turtle.

Course Duration: 33 weeks (1 hours per session, 1 session per week)

Prerequisites:

- No prior programming experience is required.
- Windows 10/11 laptop or desktop.

Course Syllabus:

Week 1-3: Introduction to Python

- Basic Python syntax
- What is data type
- Simple data type
- Collection data type
- Variables
- Operators
- Math operators
- Bitwise operators
- Assign and equal
- Comments
- Input and Output

Week 4-6: Introduction to Turtle Graphics

- Introduction to Turtle Graphics and its features
- Two-dimensional Plane
- Directions and degrees on 2-D plane
- Basic Turtle commands: forward, backward, left, right, penup, pendown
- Drawing simple shapes (lines, squares, circles)
- Coordinates and angles calculation

Week 7-9: Colors and Filling

- Using colors in Turtle Graphics
- Choose color by name
- Choose color by RGB value
- Drawing shapes with different colors
- Filling shapes with colors
- Creating gradients and patterns

Week 10-12: Circles with Python Turtle

- Circle starting point and starting directions
- How to draw various circles
- How to draw oval with circles
- Programming workshop for circle graphics
- Circle and PI
- How to find point location on a circle
- Using multiple pens to find location
- Using Math Sin/Cos to calculate location
- Programming workshop for circle graphics

Week 13-16 RGB Color and HLS Color

- What is HLS color
- Compare RGB color with HLS color
- Convert RGB color from/to HLS color
- HLS color pros and cons
- Programming workshop using HLS color

Week 17-19 Animation Basics

- How to draw animation using Python Turtle
- Turtle Trace Function
- Turtle Update function
- Demo of animation graphics
- Programming workshop for animation graphics

Week 20-22 More Animation Graphics

- Animation graphics using multiple pens.

- Illusions with animations
- Demo of illustration graphics
- Programming workshop for illusion graphics

Week 23-25 Recursive Function

- What is Recursive Function
- Recursive usage
- Recursive function pros and cons
- Programming workshop using recursive Function

Week 26-28 Recursive Function for Fractal Graphics

- What is fractal graphics
- How to draw fractal graphics using recursive function
- Programming workshop for fractal graphics
- Demo of drawing fractal trees
- Demo of drawing fractal snowflake
- Fractal Programming workshop 2
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Week 29-31: Final Projects 1 – Tic-Tac-Toe

- Draw the board for Tic-Tac-Toe
- How to draw the cross and circle on the board
- Programming workshop for Tick-Tac-Toe
- How to find out three pieces in a row on the board
- Find winner using 2 dimensional list
- Find winner using bitwise operators
- Programming workshop for Tick-Tac-Toe
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Week 32-33: Final Projects 2 – Tic-Tac-Toe to GoBang

- Piece all together
- Expand tic-tac-toe to Gobang
- Basic AI algorithms for chess game
- Programming workshop for Tick-Tac-Toe
- for Gobang