

Loughborough 5-day Hands-on Workshop on:

# A Simple Introduction to Python

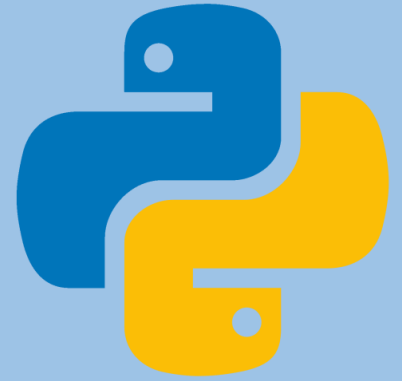
By Professor Stephen Lynch NTF FIMA SFHEA

Homepage: [Professor Stephen Lynch at Loughborough University](#)

Author of Two Patents and Ranked #18 in the World for Dynamical Systems

Author of PYTHON™, MATLAB®, MAPLE™ AND MATHEMATICA® BOOKS

National Teaching Fellow, STEM Ambassador, Public Engagement Champion and Speaker for Schools



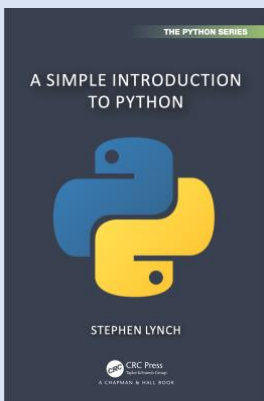
## Workshop Dates

Dates: 31<sup>st</sup> March – 4<sup>th</sup> April, 2025

## Certificate of Attendance

You must attend over 80% of the sessions.

The workshop is based on Stephen's book, "A Simple Introduction to Python", CRC Press, 2024.



*A free copy of this 124-page reference e-book can be downloaded here:*  
[CRC Press](#)

## Aim

To learn a high-level general-purpose programming language.

## Objectives

- Use Python as a powerful calculator.
- Write simple programs.
- Produce figures and animations.
- Write professional notebooks.
- Incorporate programming into research and project dissertations.

## Attend this workshop and learn:

- how to use Python as a powerful calculator
- how to program Python using IDLE
- how to plot fractals with the Turtle module
- how to plot 2-dimensional and 3-dimensional plots and animations
- how to do Mathematics with Python
- about cryptography, artificial intelligence, data science and object oriented programming

The workshop participants need no knowledge of any programming language.

The methods used in this workshop have been successfully tested on undergraduates and postgraduates for over 25 years.

*This is a practical workshop using Python.*

## OBJECTIVES

The main objective of this workshop is to introduce delegates to programming using Python.

Participants will be introduced to Python and a number of platforms to perform the computations. Delegates can download software onto their own computers or use cloud computing.

At the end of the workshop, delegates will have attained the following digital skillsets to add to their CV:



## WORKSHOP OUTLINE

### Day 1: INTRODUCTION to PYTHON IDLE

- Python as a Powerful Calculator
- Fractions and Symbolic Computation
- Powers
- The Math library
- Lists, Tuples, Sets & Dictionaries
- Defining Functions
- For and While Loops
- If, Elif, Else Statements

### Day 2: Turtle, NumPy and Matplotlib

- The Cantor Set Fractal
- The Koch Snowflake Fractal
- A Bifurcating Tree Fractal
- The Sierpinski Triangle Fractal
- Numerical Python (NumPy)
- Matplotlib for Plotting and Animations
- Scatter Plots
- Surface Plots

### Day 3: Google Colab, SymPy and GitHub

- Google Colab and Cloud Computing
- Formatting Notebooks
- Symbolic Python
- GitHub
- Basic Algebra
- Solving Equations
- Mathematical Functions
- Differentiation and Integration

### DAY 4: Cryptography and AI

- The Caesar Cipher
- The XOR Cipher
- Rivest-Shamir-Adleman (RSA) Cryptosystem
- Simple RSA Algorithm Example
- Artificial Neural Networks (ANNs)
- AND/OR and XOR Gate ANNs
- The Backpropagation Algorithm
- Boston Housing Data

### DAY 5: Data Science and Object Oriented Programming

- Introduction to Pandas and Data Frames
- Load, Clean and Preprocess the Data
- Exploring the Data
- Violin, Scatter and Hexagonal Bin Plots
- Classes and Objects
- Encapsulation
- Inheritance and Polymorphism
- The Brick Breaker Game

*The workshop includes practical, hands-on sessions where participants are given the opportunity to apply in practice the theory they have learnt. All Python solution program files can be downloaded through GitHub:*

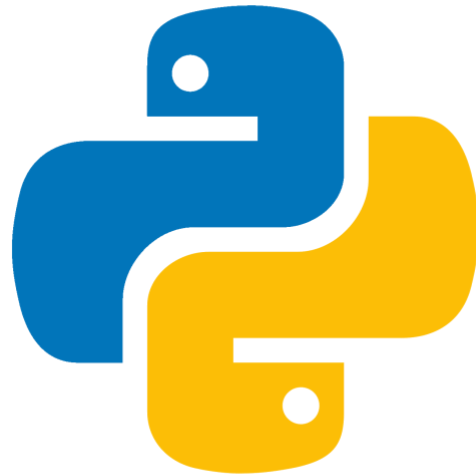
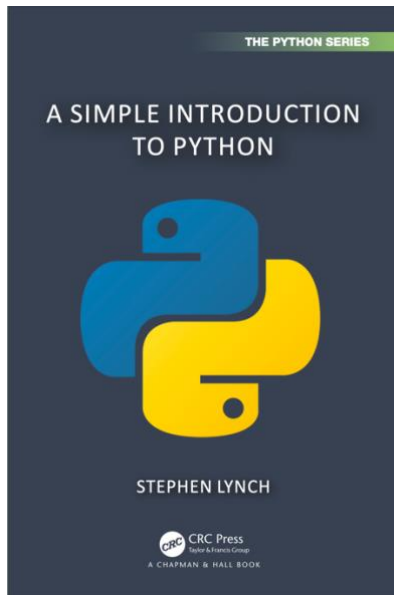
[Solutions in GitHub](#)

*Delegates can view Python solution programs online via Jupyter notebooks:*

[Solutions Jupyter Notebook](#)

# A SIMPLE INTRODUCTION to PYTHON

Workshop Itinerary  
Professor Stephen Lynch NTF FIMA SFHEA



<b>Day 1: Morning</b>		<b>Afternoon</b>	
Using Python as a Calculator	10am-11am	Simple Programming	1:30pm-2:30pm
Coffee Break	11am-11:30am	Coffee Break	2:30pm-3:00pm
Exercises	11:30am-12:30pm	Exercises	3:00pm-4:00pm
<b>Day 2: Morning</b>		<b>Afternoon</b>	
The Turtle Library	10am-11am	NumPy and Matplotlib	1:30pm-2:30pm
Coffee Break	11am-11:30am	Coffee Break	2:30pm-3:00pm
Exercises	11:30am-12:30pm	Exercises	3:00pm-4:00pm
<b>Day 3: Morning</b>		<b>Afternoon</b>	
Google Colab, SymPy and GitHub	10am-11am	Python for Mathematics	1:30pm-2:30pm
Coffee Break	11am-11:30am	Coffee Break	2:30pm-3:00pm
Exercises	11:30am-12:30pm	Exercises	3:00pm-4:00pm
<b>Day 4: Morning</b>		<b>Afternoon</b>	
Cryptography	10am-11am	Artificial Intelligence	1:30pm-2:30pm
Coffee Break	11am-11:30am	Coffee Break	2:30pm-3:00pm
Exercises	11:30am-12:30pm	Exercises	3:00pm-4:00pm
<b>Day 5: Morning</b>		<b>Afternoon</b>	
Data Science	10am-11am	Object Oriented Programming	1:30pm-2:30pm
Coffee Break	11am-11:30am	Coffee Break	2:30pm-3:00pm
Exercises	11:30am-12:30pm	Exercises	3:00pm-4:00pm

