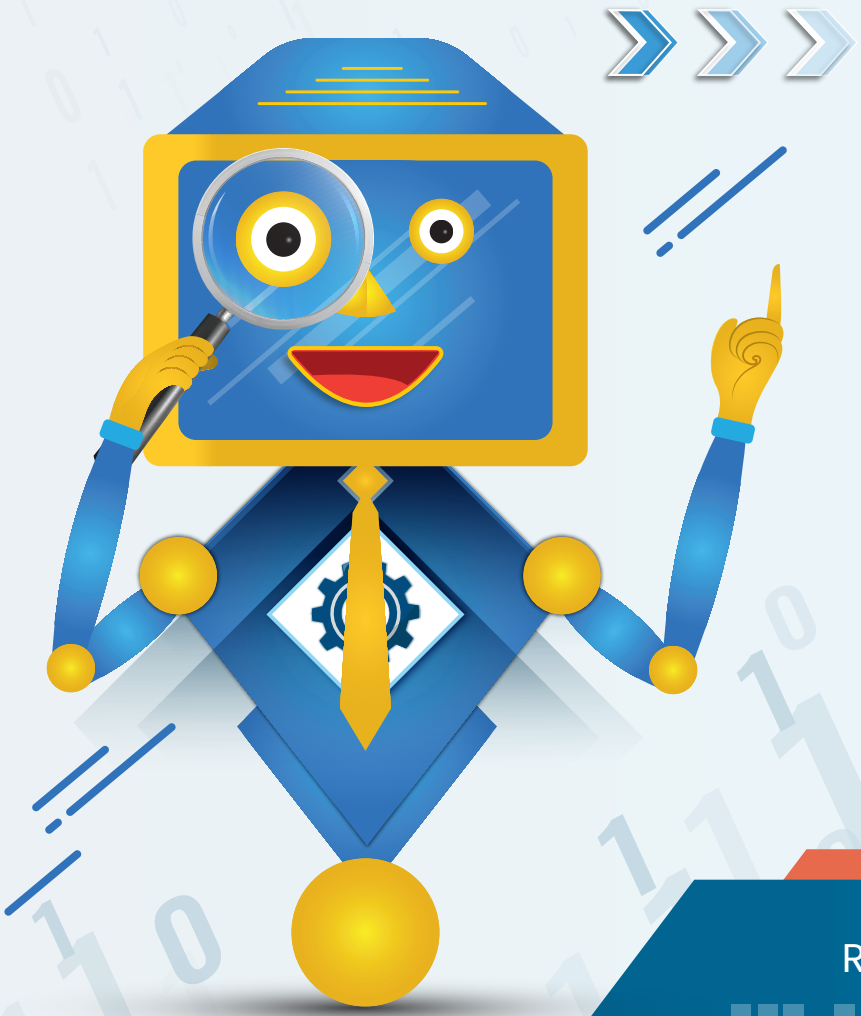
Learning Python

Advanced Level

Python Run

Teacher's Book

Level 3



Rana Dajani

LKD EDUCATIONAL RESOURCES

PythonRun - Advanced Level

Published by **LKD Educational Resources 2022**

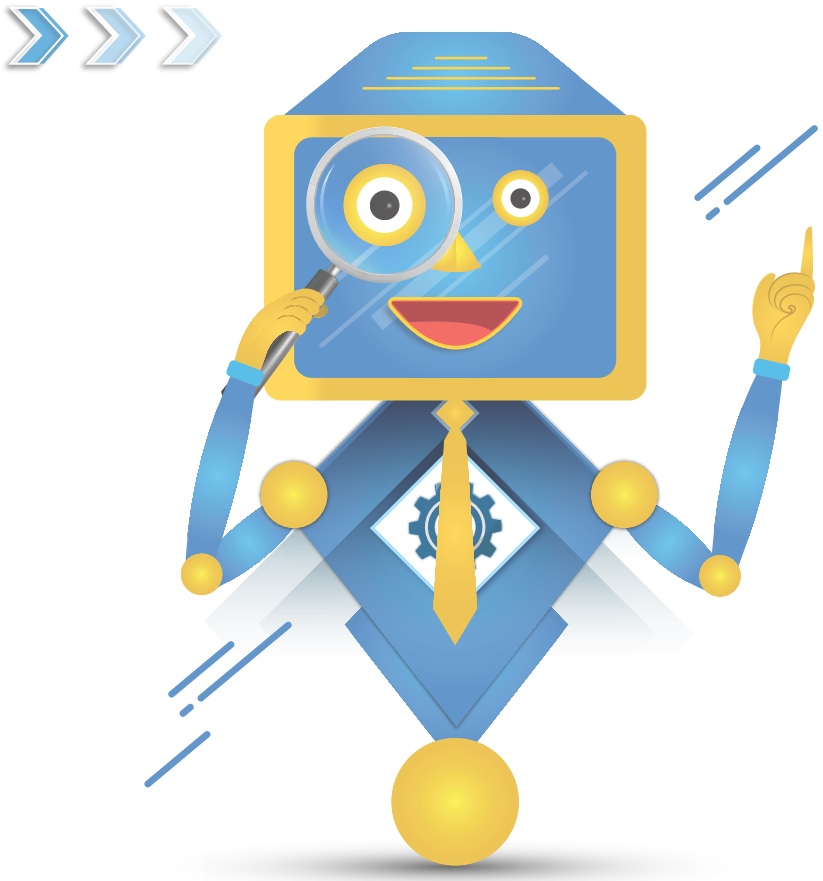
Amman - Jordan
Tel: +962 6 5374141
Fax: +962 6 5516404
P.O.Box: 851346
Email: info@lkd.com.jo
Website: www.lkd.com.jo

Rana Dajani

ISBN: 978-9923-781-06-7

Learning Python
Advanced Level
Python Run

Level
3



LKD
EDUCATIONAL RESOURCES

A guide to learning Python programming language

Table of Contents

Table of Contents

Introduction

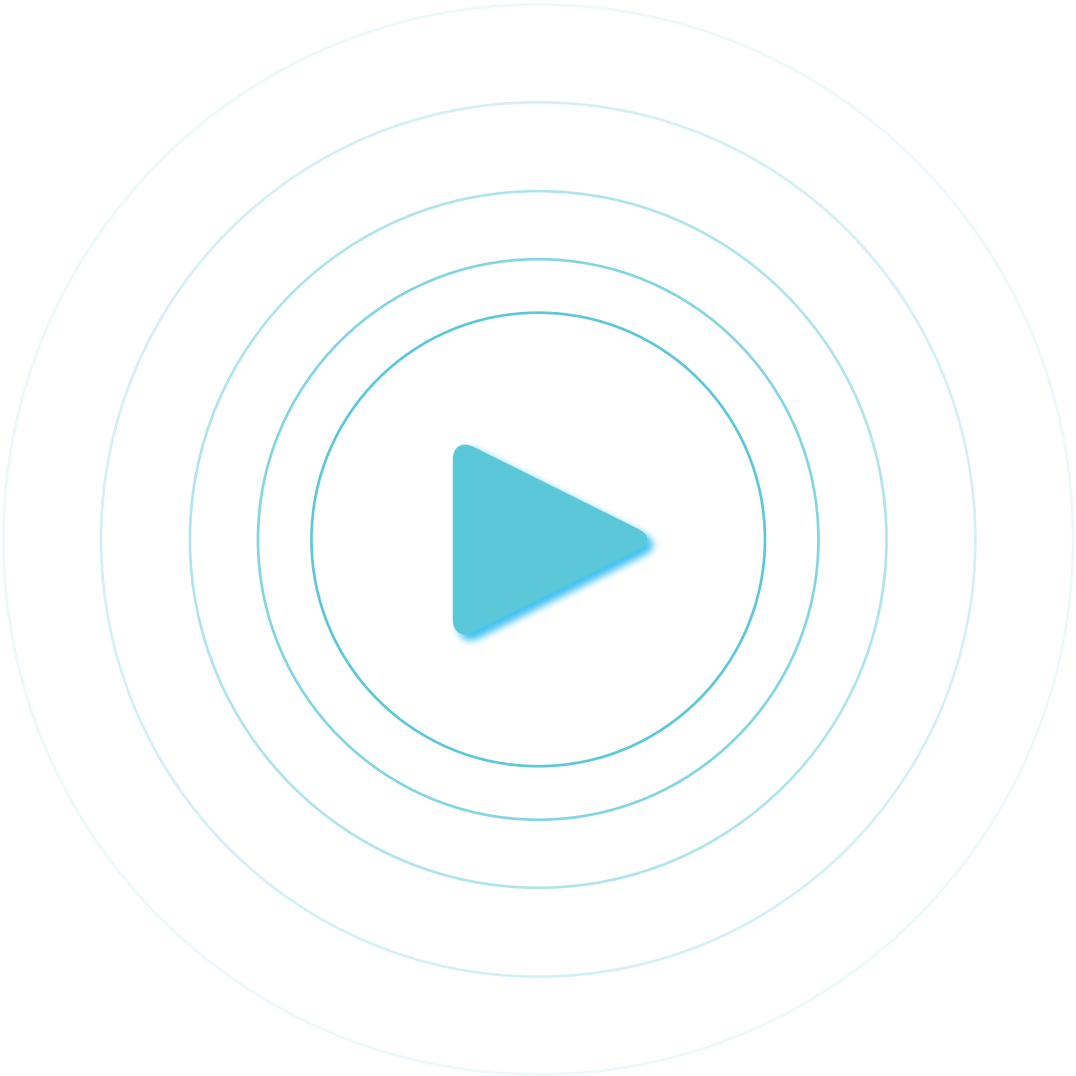
This is the advanced level book in the ***PythonRun*** series that provides an opportunity to consolidate all the previously learnt skills, from previous books from the series, in slightly **more challenging material**.

This teacher's guide serves as a comprehensive guide to equip teachers for project based learning. During the application process, teachers take the role of facilitators. They spark curiosity, cultivate the skills needed for inquiry and guide students along the way.

The text is divided into; tutorials, provided to give a detailed guide to programming concepts, alongside with practice exercises for hands on application. There are also quick test projects, at the end of most units which will help evaluate the students understanding and improve their programming and computational skills.

Students are encouraged to work in groups of two when working on the quick test at the end of units as well as the end of book project-based assessments. Working in a team, gives students opportunities to learn from others. It leads to resource building and team members become better equipped to deal with challenges. New skills and knowledge always benefit and positively influence the individual growth of students.

The material is divided into 14 lessons, each being 45 minutes long, along with project based assessments at the end of the book.



Methodolgy

The 5Es methadology is an instructional model encompassing the phases Engage, Explore, Explain, Elaborate, and Evaluate steps which educators have traditionally taught students to move through in phases. However, this is not actually a linear progression. Engaging is not separate from exploring. Exploring is not necessarily separate from explaining. Part of exploring requires elaborating and all of these elements require evaluating.

The lessons of the *PythonRun* book are made up of tutorials, which will engage the students with new topics and within the tutorials are practice exercises to implement the new concepts, which allow the students to explore them.

The process of enhancing programs, and fixing errors will support students to explain their processes. Quick tests, at the end of the units, and project-based assessments will elaborate on the lessons of the unit which will help test and evaluate the students level of understanding the material.

	Traditionaly (I do)	STEM Learning (You do)
Engage	- I tell them... - I show them...	- Students reflect - Students question
Explore	- I give the... - I demonstrate... - They look at models....	- Student unpacks problem - Student develops model - Student gathers data
Explain	- Talk & Turn - Carousel “Discussion” - What did... - What was	- Have you answered the question? - Have you solved the problem? - Does the evidence support the claim?
Elaborate	- Read about - Watch - Introduce new idea	- Concept - self connections - Concept - concept connections - Concept - world connections - Anchor - Investigative - Phenomena
Evaluate	- Give vocab - assessments - Keep journals to grade	- Reflect on investigative process - Reflection hypothesis - New reflection on anchor phenomena

Unit 1 »

» Turtles!

Unit 1: Turtles!

Overview:

The turtle module provides turtle graphics primitives, in both object oriented and procedure-oriented ways. Python turtle library helps new programmers get a feel for what programming with Python is like in a fun and interactive way.

Vocabulary:

- Turtles
- Canvas
- Stamps

Before the Lessons:

- Review information and knowledge of the previous session.
- Go through the lessons material and apply all the practical assignments.

Lesson 1 Plan

Suggested Time: 45 minutes

Section 1.1: Turtle Module (5 mins)

- Turtle is a pre-installed Python library that enables users to create pictures and shapes by providing them with a virtual canvas. The on screen pen that you use for drawing is called the turtle and this is what gives the library its name.

Section 1.2: Creating a Canvas (5 mins)

- Create a separate window (called the canvas) to carry out each drawing command. You can create this screen by initializing a variable using the **pen()** function.
- This is where you can view the output of your code. The little black triangular shape in the middle of the screen is called the turtle.

Section 1.3: Moving the Turtle (10 mins)

- The turtle acts like a pen. You can program the turtle to move around the screen. The turtle has certain changeable characteristics, like size, color, and speed. It always points in a specific direction, and will move in that direction unless you tell it otherwise.

Section 1.4: Turtle Position (10 mins)

- Turtle can be moved from its current position to any other arbitrary position on the screen. This is done with the help of coordinates.
- The screen is divided into four quadrants. The point where the turtle is initially positioned at the beginning of your program is **t.home(0,0)**. To move the turtle to any other area on the screen, you use .**goto()**
- Use **t.pos()** to know the position of the turtle on the screen at any time.

Section 1.5: Turtle Shape and Stamps (5 mins)

- The initial shape of the turtle is not really a turtle, but a triangular figure. However, you can change the way the turtle looks, and you do have a couple of options when it comes to doing so.
- You have the option of leaving a stamp of your turtle on the screen, which is nothing but an imprint of the turtle.

Section 1.6: Clean Canvas (10 mins)

- Clean up your screen so that you can continue drawing. Note here that your variables will not change, and the turtle will remain in the same position. If you have other turtles on your screen other than the original turtle, then their drawings will not be cleared out unless you specifically call them out in your code.

Lesson 2 Plan

Suggested Time: 45 minutes

Quick Tests

- Encourage students to work in teams of two.
- The best way to learn something is by implementing it! In this lesson the students will be working on these quick test exercises to hammer in the previous learnt concepts. Ideas and strategies are everywhere, but they will not do anything for students unless they take action and apply what they have learned.

Process:

Encourage students to use the **computational thinking process** of problem solving. Decomposition invites students to break down complex problems into smaller, simpler problems. Pattern recognition guides students to make connections between similar problems and experience. Abstraction invites students to identify important information while ignoring unrelated or irrelevant details. Lastly, students use algorithms when they design simple steps to solve problems.


LKD
EDUCATIONAL RESOURCES