Python Programming Foundations for Data Science

Module 1: Python Programming Foundations

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Preface

This first core book builds the Python habits that every later data-science module depends on. The focus is not just syntax. The focus is clear problem-solving, clean decomposition, file and text handling, and the ability to explain code confidently enough that it can become a visible artifact.

The primer [1] handles orientation: notebooks, local environments, terminal basics, Git, and the surrounding workflow. This volume, *Python Programming Foundations for Data Science* [2], moves the center of attention to the language itself. That is an important shift. The reader should no longer be asking mainly "Where do I work?" The more useful question becomes "How do I use Python to make small tasks clear, correct, and repeatable?"

Positioning

Module 1 begins where the primer ends. Setup and tooling are assumed to be stable enough that the reader can focus on Python itself: values, flow, functions, files, and small structured tasks.

That shift is worth stating plainly. The book is not trying to turn the reader into a software engineer in one jump. It is trying to make Python feel usable. Usable means that a short script, a small notebook, or a tidy function no longer looks like a wall of symbols. It starts to look like a sequence of decisions that can be followed, checked, and improved.

This book is written for absolute beginners and early-stage returners. It does not assume that confidence exists already. Instead, it tries to build confidence through repetition, clarity, and visible completion.

One theme runs through the whole module: a small finished example is worth more than a larger half-understood one. For that reason, the early chapters stay close to simple values, simple control flow, and short artifacts. The goal is not to avoid ambition forever. The goal is to create a stable base on which later ambition can rest.

By the end of the book, the reader should be able to:

- read and write small Python scripts,
- work comfortably with the main built-in data types,
- create basic reusable functions,
- handle strings and files,
- reason through small coding tasks step by step,
- and package the result in a first coherent portfolio artifact.

How to Use This Book

Treat each chapter as something to work through, not just something to read. Run the examples, change at least one input, and save the result in a notebook or script. The habit of producing small visible artifacts matters as much as the content itself.

The module also has a deliberate scale. Many examples are intentionally small: counting, cleaning a short string, scanning a list, writing a helper function, reading a text file. That is not because the ambitions are low. It is because small examples reveal structure. Later data work becomes easier when these building blocks no longer consume all of the reader's attention.

That is a meaningful outcome. It is also the right foundation for the next stage, where Python fluency becomes data fluency. The next volume, *Python Data Analysis, Visualization, and Storytelling* [3], builds directly on this foundation.

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