

# Python Programming for Network Engineering

## Course Overview:

Using hands-on lab-based learning, this course takes you all the way from the basics of Python programming to the specific skills and tools needed to manage network devices en masse using programming and reduces implementation time for software-based technologies in a Cisco enterprise.

The course provides a comprehensive Python programming experience for Cisco networking professionals to automate and manage across the entire Cisco networking product line. With a focus on the Python programming language, you will learn to write, edit, modify, and expand complex Python scripts to utilize APIs and data models to effectively automate Cisco networking tasks throughout the enterprise. This will enable you to create and implement Python programming to automate configuration and operational needs in a Cisco enterprise.

## What You Will Learn:

- Write and test several functional Python scripts.
- Write, edit, modify, and expand complex Python scripts to utilise APIs and data models.
- Use the following APIs to automate configuration and management of Cisco networking devices:
  - Paramiko
  - REST
  - XML
  - JSON
  - NETCONF
  - RESTCONF
- Use the YANG and MIT data models to read and manage objects to automate configuration and management of Cisco networking devices.
- Use the following DevOps / learning tools to enable efficient use of APIs and data models and effectively create Python scripts:
  - Postman
  - IDEs for both Windows and Linux
    - Notepad++
    - Sublime
    - PyCharm
    - Microsoft Visual Studio
    - Anaconda
    - Linux VI Editor
  - Lint tools for XML and JSON
  - Visore for Cisco Data Center
  - API Inspector for Cisco ACI
  - YANG Validator
- Automate configuration of multiple Cisco devices.

## Course Outline:

- Introduction
- Fundamental Python programming
- Python data structure
- Using Python to read from and write to a file

- Python loops and conditional code
- GitHub
- Programming Python Functions
- Python Libraries, Packages, and Modules
- Integrated Development Environments
- Python code analysis and error handling
- Cisco-supported APIs and automation protocols
- Cisco IOS XE RESTCONF API
- Cisco IOS XE NETCONF API
- Cisco ASA REST API
- Cisco Nexus NX-OS APIs
- YANG data model
- Cisco Application Centric Infrastructure
- Cisco ACI whitelists
- Extracting XML and JSON from the Cisco ACI
- Modifying the ACI policy with Postman and Python
- The Cisco ACI Visore tool
- Cisco UCS topology
- Configuring UCS with Python

**Labs:**

1. Practice the effects of fundamental Python commands
2. Program Python data structure
3. Create Python scripts to interact with files
4. Write scripts to demonstrate Python loops and conditional code
5. Create a Python script
6. Share files using Git and GitHub
7. Write Python Functions
8. Write Python code of Modules and Packages
9. Implement Python code in IDEs
10. Debug and test Python code
11. Create, execute, and validate a Python script with an IDE
12. Explore and validate automation protocols
13. Perform a configuration change on an IOS XE device with the RESTCONF API
14. Perform a configuration change on an IOS XE device with the NETCONF API
15. Perform a configuration change on an ASA device with the REST API
16. Perform a configuration change on a Nexus NX-OS device using APIs
17. Troubleshoot existing Python scripts with an IDE
18. Analyze YANG files with the online YANG validator tool
19. Perform an ACI fabric discovery
20. Manually configure a Cisco ACI whitelist
21. Extract XML and JSON from the Cisco ACI
22. Utilize the API inspector and Postman to create Python scripts
23. Use the Cisco ACI Visore tool
24. Create a Python script to modify an ACI fabric
25. Manually configure Cisco UCS
26. Configure UCS with Python
27. Create a Python script to modify a UCS configuration