Intermediate Python for Network Engineers (IPYNE)

COURSE OVERVIEW

The Intermediate Python for Network Engineers (IPYNE) training introduces the fundamental concepts of network programmability and automation using Python. It is designed for network engineers new to programming or professionals looking to enhance their automation skills through Python and Cisco APIs. The training focuses on practical use cases, such as automating device configurations, managing network inventories, and integrating with Cisco products like IOS XE, Meraki, and ThousandEyes for API automation. You will also learn the basics of creating reusable programs using object-oriented programming, building web interfaces with Flask, and interacting with large language models for advanced network automation. Upon completion, you will be able to write Python scripts, interact with network devices via APIs, and design automation workflows to streamline network management tasks.

WHO WILL BENEFIT FROM THIS COURSE?

- Network Engineers with little or no programming or Python experience
- Network Administrators
- Network Managers
- Systems Engineers

PREREQUISITES

There are no prerequisites for this training. However, the knowledge and skills you are recommended to have before attending this training are:

- Familiarity and basic understanding of core networking concepts
- Familiarity with Cisco IOS-XE software or other Cisco network device configuration and operation skills
- Cisco CCNA certification or equivalent knowledge

These skills can be found in the following Cisco Learning Offerings:

- Implementing and Administering Cisco Solutions (CCNA)

COURSE OBJECTIVES

- Describe Python's versatility and suitability for network programmability and automation
- Explain why network programmability is needed and how it enables modern network automation
- Describe programmatic interaction with network devices and the benefits of network automation for scaling from traditional to programmable networks
- Identify practical examples and existing Python tools for network automation

- Write and run basic Python scripts, demonstrating foundational syntax, elements (variables, data types, operators), and logic (decisions and loops)
- Introduce standard and third-party libraries, the import statement, and using the Python interpreter
- Demonstrate hands-on interaction with Python, including accepting input and performing basic network tasks (e.g., connectivity checks)
- Emphasize code styles, readability, and development environment setup, including Python installation, VS Code, virtual environments, Docker, and Git
- Implement Python tools for automating device inventory, including data storage with variables, grouping devices with lists and dictionaries, iterating and filtering device data, and file operations (load/save)
- Organize code with functions and develop scripts for inventory management
- Use external libraries (e.g., Netmiko) for SSH connections and scaling network configurations with Python and templates
- Parse and analyze device output, handle exceptions, and build CLI applications for device management
- Implement tools for testing and validating device state using PyATS and Genie, including retrieving and verifying configuration data
- Demonstrate Python context managers, parsing outputs, performing compliance validation, and running scripts on Cisco IOS-XE devices (Guest Shell)
- Create tools for backing up device configs, automating backup storage with Git, comparing configs, and periodic backups with logging
- Use PyATS for configuration comparison and automate backup processes
- Describe HTTP REST API fundamentals, interactive documentation, and creating API requests in Python
- Parse JSON data, automate interactions with APIs (e.g., Cisco Meraki Dashboard, ThousandEyes), and manage authentication securely
- Demonstrate creating, configuring, and analyzing network tests and monitoring data with API scripts
- Explain the importance of debugging, logging, unit testing, and integrating scripts with CI/CD pipelines
- Handle API errors, implement rate limiting/retries, and introduce telemetry collection with OpenTelemetry

COURSE OUTLINE

- Python Programming for Network Engineers
- Write Your First Python Scripts
- Python Development Environment Setup
- Device Inventory Automation
- Scale Configuration of Network Devices
- Network Monitoring and Validation
- Device Configuration Backup Automation

- HTTP API Fundamentals
- Cisco ThousandEyes Network Insights with HTTP API Automation
- Network Automation Debugging and Testing
- HTTP API Automation Wrapper
- Build a Web Interface for Network Automation
- Large Language Models for Network Automation

Lab Outline

- Interact with Python Using the Interpreter
- Run Your First Script
- Install Python and Setup Developer Environment
- Create a Device Inventory Tool
- Create a Network Device Configuration Tool
- Monitor and Validate Device Configurations
- Create a Backup Tool for Network Configurations
- Retrieve Data from Cisco Meraki Dashboard API
- Create and Monitor ThousandEyes Network Tests
- Write Unit Tests for Network Automation Scripts
- Harden Automation Scripts with Logging and Error Handling
- Build a Reusable Cisco ThousandEyes API Automation Wrapper
- Build a Web Interface for Network Device Management
- Build a Web Interface for Network Automation
- Build a Network Automation Tool with Ollama

WHY TRAIN WITH SUNSET LEARNING INSTITUTE?

Sunset Learning Institute (SLI) has been an innovative leader in developing and delivering authorized technical training since 1996. Our goal is to help our customers optimize their technology Investments by providing convenient, high quality technical training that our customers can rely on. We empower students to master their desired technologies for their unique environments.

What sets SLI apart is not only our immense selection of trainings options, but our convenient and consistent delivery system. No matter how complex your environment is or where you are located, SLI is sure to have a training solution that you can count on!

Premiere World Class Instruction Team

- All SLI instructors have a four-year technical degree, instructor level certifications and field consulting work experience
- Sunset Learning has won numerous Instructor Excellence and Instructor Quality Distinction awards since 2012

Enhanced Learning Experience

- The goal of our instructors during class is ensure students understand the material, guide them through our labs and encourage questions and interactive discussions.

Convenient and Reliable Training Experience

- You have the option to attend classes live with the instructor, at any of our established training facilities, or from the convenience of your home or office
- All Sunset Learning Institute classes are guaranteed to run – you can count on us to deliver the training you need when you need it!

Outstanding Customer Service

- You will work with a dedicated account manager to suggest the optimal learning path for you and/or your team
- An enthusiastic student services team is available to answer any questions and ensure a quality training experience

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