# Course Outline

**DNA Center, SD-Access, and Catalyst 9k Programmability Integration Fundamentals**
**Course DNACPF: 3 days Instructor Led**

***All Cisco courses are delivered by a Cisco Authorized Platinum Learning Partner***

**About this course**
(Cisco DNA Center Programmability Integration Fundamentals) is a 3-day, instructor-led, Cisco DNA Center course that will help you to become familiar with programmable infrastructure concepts and integrations that support Cisco SD-Access, DNA Center, and the Cisco Catalyst 9000 Series switch programming. In this course, you will learn about production solutions that run on or interact with IOS-XE on the Catalyst 9000 switches.

**Audience profile**
- Network Operations team with SD-Access solution
- Network admin staff that deal with Software Defined Networking
- Network Administrators
- Network Architects
- Network Engineers

**At course completion**
After completing this course, students will be able to:
- Describe what is SDN and Network Programmability
- Describe use cases and examples of Catalyst 9000 programmability
- Learn about Python and how it automates the Catalyst 9000
- Understand object-oriented programming
- Understand SD-Access
- Discuss how to apply Cisco Software-Defined Access programmatically
- Understand the Use Cases and Problems Solved with SDN programmability
- Explain an overview of OpenFlow and Network Controllers
- Explain an overview of Human Interaction DevOps-Style

## Course Outline

Module 1: SD-Access Introduction

- SDA Quick Overview
- SDA Key Benefits
- Technical Overview
    - LISP
    - Cisco Trustsec
    - VXLAN
- Network Fabric
- SDA Overlay Key Components
    - Control Plane
    - Data Plane
    - Policy Plane

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- SDA Fabric Roles & Terminology
    - DNA Controller
    - Identity Services
    - Analytics Engine (NDP)
    - Control Plane
    - Edge Nodes
    - Border Nodes
    - Virtual Network
    - Scalable Groups
    - VXLAN Encapsulation

Module 2: SDA Wireless Architecture

- SDA Wireless Architecture Overview
- SDA Wireless Benefits
- Policy Rollout
- Wireless Integration in SDA Fabric

Module 3: SDA Deployment

- Digital Network Architecture
- Campus Fabric Automation
- Smart CLI
- Programmable APIs
- DNA Center – SD-Access WorkFlow
    - Design
    - Provision
    - Policy
    - Assurance

Module 4: SDA Center Ecosystems Integrations

- Event Notifications and Webhooks
- Integrations Overview
- DevOps Integrations
- ChatOps Integrations
- Use Cases
    - ITSM Integrations
    - Client Insights with Apple Analytics
    - IP Address Management (IPAM)
    - Network Orchestrators
    - Policy Orchestrators
    - Security Analytics
    - Firewalls
    - Public and Private Cloud Integration

Module 5: DNA Assurance

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# Course Outline

- DNA Center Architecture
- Cisco DNA Assurance Introduction
- DNA Assurance Architecture
- Telemetry Collection Overview
- DNA Assurance Getting Started
- Full Stack Visibility
- Network & Client Experience
- Intelligent Capture
- Real Time Monitoring RF
- Path Trace
- Sensor-based Proactive Monitoring
- Application Experience
- Issue Remediation
- AI Network Analytics
- Machine Reasoning

Module 6: Python Programming

- Programmability Overview
- APIs Primer
- Python Foundation Overview
- Lists, Tuples & Dictionaries
- Control Sentences
- Functions
- Modules
- Classes
- Error Handling (Exceptions)

Module 7: Programming SDA and DNA Center

- DNA Center Architecture Overview
- DNA Controller
- DNA Center Automation
- DNA Center APIs
- Building DNA Center Applications

Module 8: Cisco Catalyst 9K Introduction

- Intent Based Networking
- Cisco Catalyst 9K Features and Characteristics
- Cisco Catalyst 9K IOS-XE
- Catalyst 9K Platform Support
- Linux Service Containers Introduction
- Python Programmability Introduction
- Zero-Touch Provisioning, iPXE, PnP
- CLI – Legacy, Python CLI, Guest Shell

Module 9: Catalyst 9K and Cisco Application Framework

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- Cisco Application Framework / Virtual Service Infra (IOX)
- Cisco Catalyst 9K Application Hosting
- Application Hosting Value Proposition
- Catalyst 9K Switching Application Ecosystem
- Virtual Machines
- KVMs
- Containers
    - General LXC (Linux Service Containers)
    - GuestShell (pre-packaged LXC)
- Other pre-packaged LXCs, ie PerfSonar
- Python Programmability in Depth
- Python API
- Zero Touch Provisioning (ZTP) and Plug 'n Play

Module 10: Catalyst 9K EEM Python Module

- EEM Overview
- Python Scripting in EEM
- EEM Python Package
- Python-Supported EEM Actions
- EEM CLI Library Command Extensions

Module 11: Data Models & Model Driven Programmability

- Why Models are Important
- YANG data models
    - Native models
    - IETF models
    - OpenConfig models
- Data Encoding
    - XML
    - JSON
- YANG Tools
    - YANG Explorer
    - YANG Catalog
    - Pyang
- NetConf
    - History
    - Protocol layers
    - Operations
    - Messages
    - Using NetConf
- RESTConf
    - History
    - Protocol layers
    - Operations
    - Messages
    - Using RestConf

# Course Outline

- Telemetry Introduction

Module 12: Model Driven Telemetry

- Yang Data Streaming
- Telemetry History
- gRPC
- Collectors & Renderers
- ELK
    - Elastic Search
    - Logstash
    - Kibana
- TIG
    - Telegraph
    - Influx
    - Grafana
- Quick Start with Docker
- Publication Types
- Telemetry Subscriptions
- IOS-XE 16.x and 17.x Yang Model Support
- Yang Model Metadata
- CLI and XML Configuration Examples
- Pipeline
- Splunk

Module 13: 3rd Party Integrations

- ServiceNow
- Splunk

**Lab Outline:**

- Lab 1: Intro DNA Center
- Lab 2: DNA Assurance
- Lab 3: DNA Center API Discovery
- Lab 4: Setup Machine for Development
- Lab 5: Python Overview
- Lab 6: Programming Cisco DNA Center
- Lab 7: Managing the Guest Shell
- Lab 8: Running Python Scripts as Part of EEM Applet Actions
- Lab 9: NETCONF/RESTConf
- Lab 10: YANG Data Modeling & YANG Explorer, YANG Catalog and pYANG
- Lab 11: Catalyst 9K - Application Hosting
- Lab 12: Programming Telemetry
- Lab 13: Integrating DNAC with ServiceNow
- Lab 14: Integrating DNAC with Splunk