Training: CompTIA
CompTIA DataAI Prep Course

TRAINING GOALS:

CompTIA DataAI (formerly DataX) is the premier certification for highly experienced professionals seeking to validate competency in the rapidly evolving field of data science. DataAI equips you with the skills to precisely and confidently demonstrate expertise in handling complex data sets, implementing data-driven solutions, and driving business growth through insightful data interpretation.

This course can help prepare you for the CompTIA DataAI (DY0-001)Certification Exam and broaden your knowledge for a diverse range of career paths, creating opportunities for advancement and specialization in the rapidly evolving data science industry. With CompTIA DataAI, possible career paths include data scientist, quantitative analyst, machine learning engineer/specialist, predictive analyst, and artificial intelligence (AI)engineer.

On course completion, you will be able to:

- Illustrate the data science lifecycle.
- Analyze business problems.
- Collect data.
- Clean and prepare data.
- Describe data features.
- Explore data.
- Navigate the model selection process.
- Employ machine learning methods.
- Experiment with deep learning.
- Evaluate and refine data models.
- Communicate for business impact.
- Deploy data models.
- Discover specialized data science applications.

Skills you'll learn

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- Apply mathematical and statistical methods appropriately, including data processing, cleaning, statistical modeling, linear algebra, and calculus concepts.
- Utilize appropriate analysis and modeling methods to make justified model recommendations for modeling, analysis, and outcomes.
- Implement machine learning models and understand deep learning concepts to advance data science capabilities.
- Implement data science operations and processes effectively to support organizational goals.
- Demonstrate an understanding of industry trends and specialized applications of data science in various fields.

Job roles that benefit from DataAI skills

- Data Architect
- Machine Learning Operations (MLOps) Engineer
- Data Engineer
- AI Solutions Architect
- Senior Data Analyst
- Data Systems Designer

This training is for specialists who not only analyze data, but also design the entire infrastructure needed for artificial intelligence to "learn" from large data sets in an automated and secure manner.

Each participant in an authorized training CompTIA DataAI Prep Course held in Compendium CE will receive a free DY0-001 CompTIA DataAI Certification Exam vouchers.

CONSPECT:

- Illustrating the Data Science Lifecycle
  - Recognize Lifecycle Frameworks
    - Common Lifecycle Frameworks
    - Activity: Apply the CRISP Workflow
  - Identify Tools and Best Practices
    - Activity: Develop a Folder Structure
    - Software Libraries and Dependency Licenses
    - Software Composition Analysis
    - APIs and Data Access

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- Documentation and Code Quality
- The Basics of Syntax: R and Python
- Activity: Ensure Code Quality
- Live Lab: Exploring the DataAI Lab Environment

- Analyzing Business Problems
  - Select the Appropriate Solution
    - Business Needs and Solution Identification
    - Model Selection
    - Live Lab: Enhancing Efficiency with Cost-Benefit Analysis
  - Recognize the Importance of Data Privacy and Security
    - Privacy and Security in Data Use
    - Masking Sensitive Data
  - Challenge Live Lab: Using Data Science to Predict Costs
- Collecting Data
  - Recognize Considerations of Data
    - Structured and Unstructured Data
    - Generated, Synthetic, and Public Data
    - Activity: Ensure Data Quality and Consistency
  - Store and Manipulate Data
    - Data Processing Infrastructure
    - Data Formats and Compression
    - Automated Workflows and Data Persistence
    - Data Refresh Cycles and Archiving
    - Data Batching, Streaming, and Pipelines
    - Activity: Consider Data Lineage to Perform Merging Techniques
    - Data Operations and Error Management
    - Live Lab: Streamlining Data Ingestion
- Cleaning and Preparing Data
  - Wrangle and Prepare Data
    - Data Transformation in Preprocessing
    - Encoding Techniques in Data Transformation
    - Applied Live Lab: Navigating Expansion through Data Insights
    - Preparing Data for Feature Engineering
    - Geocoding in Data Preprocessing
    - Scaling and Standardization in Machine Learning
    - Data Augmentation and Synthetic Data Generation

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- Challenge Live Lab: Unraveling Anomalies with EDA
- Describing Data Features
  - Explain the Basics of Time Series
    - Non-Linearity in Data
    - Non-Stationarity
    - Activity: Identify Lagged Observations
    - Seasonality in Time Series Data
    - Difference Observations in Time Series Analysis
    - Live Lab: Interpreting Data Features for Predictive Analytics
  - Identify Common Issues in Data
    - Multicollinearity in Time Series
    - Activity: Solve Matrix and Vectorization Problems
    - Granularity Misalignment in Data
    - Impact of Insufficient Features
    - Multivariate Outliers in a Dataset
  - Challenge Live Lab: Discovering Business Insights Through Data Features
- Exploring Data
  - Demonstrate Exploratory Data Analysis
    - Introduction to Exploratory Data Analysis
    - EDA Tasks
    - Common EDA Mistakes
    - Categorizing Data
    - Univariate and Multivariate Analysis
    - Visualization Techniques
    - Common Visualizations
  - Conduct Statistical Analysis
    - Introduction to Statistical Analysis
    - Comparative Analysis
    - Regression Tests
    - Introduction to Probability Distributions
    - Probability Functions
    - Sampling Techniques
  - Utilize Techniques in Unsupervised Methods
    - Introduction to Clustering
    - Dimensionality Reduction
    - Eigenvectors and Eigenvalues

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- Implement Clustering
  - Clustering Models
  - Distance Metrics
  - Why Heuristics?
  - Heuristics Techniques
  - Finding the Optimal Number of Clusters
  - Live Lab: Decoding User Behavior with Cluster Analysis
  - Semi-Supervised Methods
- Challenge Live Lab: Using Cluster Analysis for Strategic Transformation

- Navigating the Model Selection Process
  - Optimize the Model Selection Process
    - Managing Model Design Constraints
    - Literature Review and Model Selection
  - Explore Mathematical Areas
    - Linear Algebra Concepts
    - Calculus Concepts
  - Use Temporal Models
    - Time Series and Prediction
    - Types of Time Series Models
    - Activity: Conduct Longitudinal Studies and Survival Analysis
    - Live Lab: Predictive Forecasting with ARIMA Models
  - Address Research Questions Requiring Causal Explanation
    - Causal Inference and Experimental Design
    - Activity: Analyze Ad Campaign Effectiveness Using Causal Inference
  - Challenge Live Lab: Using Comprehensive Time Series Analysis for Forecasting

- Employing Machine Learning Methods
  - Explain Machine Learning Methods
    - Introduction to Machine Learning
    - Supervised Learning
    - Unsupervised Learning
    - Reinforcement Learning
    - The Model Evaluation and Selection Process
    - Using Metrics to Evaluate Models
    - Selecting the Appropriate Model
    - Model Drift
    - Specialized Machine Learning Techniques

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- Utilize Techniques in Supervised Methods
  - Regression Analysis
  - Linear Regression
  - Other Regression Models
  - Live Lab: Tackling Business Challenges with Logistic Regression
  - Live Lab: Constructing Decision Trees for Predictive Analysis
  - Ensemble Learning
  - Ensemble Learning Techniques
  - Live Lab: Data Modeling Using Decision Trees and Random Forests
- Challenge Live Lab: Using Semi-Supervised Machine Learning Methods

- Experimenting with Deep Learning
  - Use Neural Network Architecture
    - Neural Networks
    - Artificial Neural Networks
    - Neural Network Layers
  - Perform Neural Network Activation Functions
    - Neural Network Activation Functions
    - Sigmoid
    - ReLU
    - Leaky ReLU
    - TanH
    - Plotting Activation Functions
  - Train Neural Networks
    - Training and Tuning Neural Networks
    - Neural Network Hyperparameters
    - Layer Tuning
    - Data Considerations in Neural Networks
    - Live Lab: Using Neural Networks for Image Processing
  - Use Advanced Deep Learning Concepts
    - Perceptron Algorithm
    - Word Embeddings
    - Live Lab: Using Transformers for Named Entity Recognition
  - Challenge Live Lab: Image Processing with Deep Learning Techniques
- Evaluating and Refining Data Models
  - Optimize Models and Resources
    - Introduction to Benchmarking and Analyzing Business Requirements

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        - Optimization Techniques
        - Applying Optimization Techniques in Scheduling and Pricing
        - Resource Allocation and Bundling Strategies Using Optimization Techniques
    - Explain Optimization Problem Types
        - Linear and Non-Linear Solvers in Optimization
        - Handling Boundary Cases and Unconstrained Optimization Techniques
        - Advanced Topics in Optimization: Bandit Problems and Local Maxima/Minima
    - Tune Hyperparameters
        - Accuracy of Predictions
        - Live Lab: Hyperparameter Tuning & Optimization
    - Challenge Live Lab: Evaluating and Tuning Data Models
- Communicating for Business Impact
    - Prepare Data for Stakeholders
        - Stakeholders
        - The Data Analysis Process
        - Data Quality and Integrity
    - Deliver the Data Story
        - Communication Approaches
        - Data Documentation and Compliance
        - Effective Reporting
        - Deep Dive Into Data Types and Visualization
        - Visualization for Diverse Dimensions
    - Challenge Live Lab: Communicating Data Science Insights to Stakeholders
- Deploying Data Models
    - Replicate Data
        - Data Replication Techniques
        - Activity: Identify Replication Techniques
    - Describe Deployment Methodologies
        - CI/CD Pipelines in Software Development
        - Deployment of Machine Learning Models
    - Decipher ML Ops
        - Virtualization in IT Infrastructure
        - Code Isolation Techniques
        - Monitoring and Validation of Machine Learning Models
        - A/B Testing
        - Containerization and Microservice-Based Applications

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        - Docker Containers
        - Pros and Cons of Microservices
        - Using Microservices
    - Illustrate Deployment Methodologies
        - On-Premises Deployment
        - Hybrid Deployment Models
        - Edge Deployment
        - Live Lab: Deploy IaC Templates in AWS
- Discovering Specialized Data Science Applications
    - Use Natural Language Processing
        - Introduction to Natural Language Processing
        - Preparing Data for NLP
        - Live Lab: Visualizing the Power of Word Through NLP
    - Use Computer Vision
        - Optical Character Recognition
        - Introduction to Image Processing
        - Advanced Concepts in Image Processing
        - Image Alterations and Adjustments
        - Image Augmentation in Machine Learning
        - Keras and TensorFlow
        - Live Lab: Using Computer Vision Tools to Mine Data
    - Perform Graph Analytics
        - Graph Theory and Heuristics
        - Introduction to Graph Analytics
        - Graph Machine Learning
    - Evaluate Techniques for Unique Events
        - Greedy Algorithms and Reinforcement Learning
        - Event Detection and Anomaly Detection
        - Multimodal Machine Learning
        - Edge Computing
        - Signal Processing

REQUIREMENTS:

Recommended experience: 5+ years in data science or a similar role.

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Difficulty level



CERTIFICATE:

The participants will obtain certificates signed by CompTIA (course completion). This course will help prepare you for the CompTIA DataAI certification exam, which is available through the Pearson VUE test centers.

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TRAINER:

Authorized CompTIA Trainer

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