

Course Name : **PCEI – CERTIFIED ENTRY LEVEL AI SPECIALIST WITH PYTHON**
Duration : 3 Days (Physical Classroom / Virtual Live Instructor)
Skill Level : Beginner

COURSE DESCRIPTION:

Build foundational Artificial Intelligence skills with Python through the PCEI – Certified Entry-Level AI Specialist with Python certification training. This course covers AI fundamentals, machine learning, data handling and visualization, neural networks, deep learning, generative AI, responsible AI, and AI project practices.

Participants will learn how AI systems work, how machine learning uses data, how to prepare and visualize datasets, how neural networks and generative AI work at a high level, how to apply basic prompt engineering, and how to evaluate AI outputs responsibly.

WHAT WILL YOU LEARN?

In this course, participants will develop the foundational knowledge and practical skills required for the PCEI-30-01 certification, including AI concepts, machine learning, Python-based data handling, neural networks, NLP, computer vision, generative AI, responsible AI, small AI projects, collaboration, and communication.

PREREQUISITE:

No formal prerequisites. Recommended experience includes basic Python, basic data analysis, and general digital literacy. PCEP or PCED equivalent knowledge is suitable preparation for the PCEI certification.

METHODOLOGY:

This program will be conducted with interactive lectures, PowerPoint presentations, discussions, demonstrations, and practical exercises. This course can be conducted as instructor-led (ILT) or virtual instructor-led training (VILT).

JOB SCOPE:

- Junior AI / AI Support Specialist
- Entry-Level AI Specialist
- AI Operations Assistant
- Junior Python AI Developer
- AI Data Support Analyst
- AI Project Assistant
- AI Solutions Support Executive
- Generative AI / AI Tools Assistant

MODULE 1: ARTIFICIAL INTELLIGENCE FUNDAMENTALS

- Define Artificial Intelligence, agent, environment, and inference.
- Distinguish Narrow AI from General AI.
- Identify AI system components: data, algorithms, conceptual models, and input → processing → output.
- Recognize everyday AI applications such as search, recommendations, assistants, navigation, image and text processing.
- Describe major AI subfields including Machine Learning, Deep Learning, NLP, Computer Vision, and Robotics.
- Match problems to appropriate AI subfields and understand the role of generative AI.
- Explain training, inference, features, labels, feedback loops, and the effect of data quality.
- Recognize AI capabilities and limitations including prediction, classification, hallucinations, and misclassification.
- Identify requirements and success metrics for AI-driven solutions.

MODULE 2: MACHINE LEARNING FUNDAMENTALS

- Distinguish supervised, unsupervised, and reinforcement learning.
- Match learning types to common tasks and real-world examples.
- Understand reinforcement learning concepts including agent, reward, and environment.
- Describe the ML workflow: data collection, cleaning, training, evaluation, and inference.
- Understand training vs. testing data and common data issues.
- Recognize linear models, decision trees, k-nearest neighbors, clustering, and Naive Bayes.
- Implement simple classification, distance, grouping, and ML-like logic using Python.
- Calculate and interpret accuracy, precision, recall, and basic confusion matrices.
- Recognize false positives, false negatives, overfitting, and underfitting.

MODULE 3: DATA HANDLING, ANALYSIS, AND VISUALIZATION

- Read and write CSV, text, and JSON data.
- Use Python lists, dictionaries, and lists of dictionaries to organize datasets.
- Clean missing values, type mismatches, formatting errors, and duplicate records.
- Calculate mean, median, minimum, maximum, frequency counts, and other basic statistics.
- Group, summarize, sort, and identify patterns or trends in small datasets.
- Calculate Euclidean and Manhattan distance and use simple similarity measures.
- Normalize numeric values and prepare basic feature sets for AI tasks.
- Use basic pandas operations to load, filter, select, and restructure data.
- Distinguish feature selection from feature extraction.
- Create basic Matplotlib visualizations including line charts, bar charts, and histograms.
- Explain how data quality affects AI model reliability and outcomes.

MODULE 4: NEURAL NETWORKS, DEEP LEARNING, AND GENERATIVE AI

- Identify neurons, weights, biases, layers, and activation functions.
- Explain feedforward processing and the basic concept of backpropagation.
- Distinguish classical machine learning from deep learning.
- Understand NLP concepts including tokens, sequences, embeddings, sentiment analysis, translation, and summarization.
- Understand computer vision concepts including pixels, arrays, classification, detection and CNNs.

- Explain generative AI and distinguish it from predictive/classical models.
- Understand LLMs at a high level, including next-token prediction and context.
- Recognize text, image, audio, and code generation modalities.
- Identify LLM strengths and limitations including hallucinations, bias, and context limits.
- Construct and refine simple prompts and recognize prompt injection and unsafe requests.
- Recognize verification, human oversight, pre-trained models, transfer learning, training, inference, and deployment.

MODULE 5: RESPONSIBLE AI, ETHICS, AND CRITICAL THINKING

- Identify bias, discrimination, unfair outcomes, harmful stereotypes, privacy concerns, and safety risks.
- Recognize information that should not be shared with AI systems.
- Apply basic AI safety and security practices including data minimization and responsible input handling.
- Understand the social and economic impact of AI, workforce transformation, reskilling, and the digital divide.
- Explain fairness, transparency, accountability, explainability, and human-in-the-loop principles.
- Verify AI outputs and critically evaluate hallucinations, unsupported claims, contradictions, accuracy, and reliability.

MODULE 6: AI PROJECTS, COLLABORATION, AND COMMUNICATION

- Identify realistic AI opportunities involving classification, prediction, summarization, and recommendation.
- Distinguish AI-suitable problems from those requiring traditional programming or human judgment.
- Define project goals, inputs, outputs, constraints, feasibility, cost, and resource considerations.
- Apply basic AI development steps using a small dataset and a simple Python solution.
- Evaluate results using simple metrics and identify limitations and improvements.
- Recognize AI project roles and apply version control, peer feedback, code review, documentation, and reproducibility.
- Communicate AI findings using charts, summaries, explanations, and audience-appropriate reporting.

PCEI-30-01 EXAM PREPARATION

- Review the six PCEI examination blocks and their key competencies.
- Practice AI fundamentals, machine learning, Python data handling, visualization, prompt engineering, and responsible AI concepts.
- Practice interpreting AI outputs, model limitations, data quality, safety, and project feasibility.
- Revise key terminology and scenario-based applications.

EXAM STRUCTURE

- Block 1: Artificial Intelligence Fundamentals – 5 items (14.0%).
- Block 2: Machine Learning Fundamentals – 6 items (16.5%).
- Block 3: Data Handling, Analysis, and Visualization – 6 items (16.5%).
- Block 4: Neural Networks, Deep Learning, and Generative AI – 8 items (22.5%).
- Block 5: Responsible AI, Ethics, and Critical Thinking – 6 items (16.5%).
- Block 6: AI Projects, Collaboration, and Communication – 5 items (14.0%).
- Total: 36 single-select, multiple-select, interactive and scenario-based items.
- Passing requirement: cumulative average score of at least 75% across all exam blocks.