

Artificial Intelligence (AI) has taken the world by storm, increasing the productivity of workers in a wide range of industries, especially software. But, it's also understandably led to uncertainty and fear about the personal and professional implications for disciplines such as software testing.

If you're interested in cutting through the hype and understanding how AI affects the testing profession, then this course is for you. In this class, you will gain a solid understanding of AI and Machine Learning (ML), how to test systems with AI components, and how to apply AI to the process of testing itself.

## Key takeaways from this class include:

- Understanding what AI is in its current state along with expected upcoming trends.
- Leveraging AI to support testing activities like planning, test analysis, test design, implementation, execution, and completion.
- Effectively testing a system that includes AI components
- Introducing AI testing tools

## Who Should Attend

This course is ideal for those who test AI-based systems or use (or wish to use) AI to support their testing activities. This includes those in hands-on testing roles or test managers, as well as software developers and development managers. In addition, those who want a basic familiarity with these critical topics, such as those in project management, leadership, and consulting roles, will derive value from this course.

## Laptop and RDP Required

This class involves hands-on activities using sample software to better facilitate learning. Each student should bring a laptop with a remote desktop protocol (RDP) client pre-installed. Connection specifics and credentials will be supplied during class. Please work with your IT Admin before class to verify that your RDP client can be used to access a virtual machine running in the Amazon Web Services (AWS) environment. If you or your Admin have questions about the specific applications involved, contact our Client Support team.

## Course Outline

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### Session 1: Introduction to AI

- Definition of AI and AI Effect
- Narrow, General, and Super AI
- AI-Based and Conventional Systems
- AI Technologies
- AI Development Frameworks
- Hardware for AI-Based Systems
- AI as a Service (AlaaS)
  - Contracts for AI as a Service
  - AlaaS Examples
- Pre-Trained Models
  - Introduction to Pre-Trained Models
  - Transfer Learning
  - Risks of Using Pre-Trained Models and Transfer Learning
- Standards, Regulations, and AI

- Overfitting and Underfitting
  - Overfitting
  - Underfitting
  - Hands-On Exercise: Demonstrate Overfitting and Underfitting

### Session 4: Testing AI-Based Systems Overview

- Specification of AI-Based Systems
- Test Levels for AI-Based Systems
  - Input Data Testing
  - ML Model Testing
  - Component Testing
  - Component Integration Testing
  - System Testing
  - Acceptance Testing
- Test Data for Testing AI-based Systems

## Session 2: Quality Characteristics for AI-Based Systems

- Flexibility and Adaptability
- Autonomy
- Evolution
- Bias
- Ethics
- Side Effects and Reward Hacking
- Transparency, Interpretability, and Explainability
- Safety and AI

## Session 3: Machine Learning (ML) – Overview

- Forms of ML
  - Supervised Learning
  - Unsupervised Learning
  - Reinforcement Learning
- ML Workflow
- Selecting a Form of ML
  - Hands-On Exercise: Selecting a Form of ML
- Factors Involved in ML Algorithm Selection

- Testing for Automation Bias in AI-Based Systems
- Documenting an AI Component
- Testing for Concept Drift
- Selecting a Test Approach for an ML System
  - Hands-On Exercise: Selecting a Test Approach for an ML System

## Session 5: Using AI for Testing

- AI Technologies for Testing
  - Hands-On Exercise: The Use of AI in Testing
- Using AI to Analyze Reported Defects
- Using AI for Test Case Generation
- Using AI for Healing or to Create Self-Healing Test Automation
- Using AI for the Optimization of Regression Test Suites
- Using AI for Defect Prediction
  - Hands-On Exercise: Build a Defect Prediction System
- Using AI for Testing User Interfaces
  - Using AI to Test Through the Graphical User Interface (GUI)
  - Using AI to Test the GUI