

# Navigate the AI landscape

## Certified Artificial Intelligence Professional - Foundations

### COURSE OVERVIEW

Artificial intelligence (AI) and machine learning have long since found their way into large parts of the industry. Success has most recently been achieved in autonomous driving, medical image processing or material testing. In the future, AI will play an even greater role in numerous industries and scenarios. To remain fit for this future, companies need to deal with the basics of AI and machine learning.

These basics are imparted in our training on machine learning, which bundles the sheer flood of information and offers you a compact overview of theory and practice in machine learning. You receive the hands-on knowledge you need to integrate the enormous potential of artificial intelligence into your product portfolio and value chain.

This training is very practice-oriented. Half of it consists of applied exercises on a consistent topic. You will learn the relevant methods and practices around machine learning while focusing on artificial neural networks, the basis for deep learning.

### TRAINING TOPICS

#### Day 1

##### Basics

- Introduction and definition of terms.
- Use-cases and shortcomings of AI.
- Presentation of technologies used in the workshop, e.g., TensorFlow and Keras.
- Example architectures.

##### Landscape of AI Methods

- Machine Learning methods, e.g., supervised, unsupervised and reinforcement learning.
- Traditional AI methods, e.g., heuristic-based techniques and symbolic AI.
- Advanced AI methods, e.g., self-supervised learning and transfer learning.

##### Single-layer neuronal networks (perceptrons)

- Biological motivation.
- From biological to artificial neurons.
- Learning: optimization and gradient descent.
- Classification of multiple classes.

#### Day 2

##### Basic terms and tools

- Loss functions.
- Performance metrics.
- Data partitioning.
- Feature extraction, dimensionality reduction
- Overfitting and countermeasures.

##### Multi-layer neural networks

- Backpropagation.
- Deep learning.

##### Convolutional neural networks

- Introduction to convolution.
- Convolutional neural networks for image-based problems.

## OBJECTIVES

Upon successful completion of this workshop, you will be able to:

- Describe the terms and concepts used when creating and maintaining artificial intelligence systems.
- Understand the use-cases, drawbacks and underlying techniques of different artificial intelligence methods.
- Design, train and validate neural networks from scratch using state-of-the-art frameworks.
- Take the UL Certified Artificial Intelligence Professional – Foundations exam, which is a prerequisite for advanced certifications, e.g., on UL Certified Autonomy Safety Professional – Machine Learning.



## TARGET AUDIENCE

- Software engineers, developers, data scientists, project leaders, quality managers and testing personnel who are developing artificial intelligence systems.
- Engineers working with advanced driver assistance systems (ADAS) and autonomous vehicle (AV) verification.

## PREREQUISITES

- Basic programming skills.
- PC (Windows, Linux, or Mac) with developer privileges (required for exercises).

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