

# Neural Networks

## Course Overview:

Neural networks are a family of ML models that achieve state of the art performance on a variety of tasks. They specifically excel in working with complex “Unstructured Data” where currently they outperform all other known model types.

This class covers only the most basic version of Neural Network, the “Artificial Neural Network.” We’ll describe how and why a neural network is called a “universal function approximator,” the specific mathematics used to build and train one, and then build a few neural networks using Tensorflow in Python.

**Course Duration:** This course will be delivered in 1 day

## Prerequisites:

*List the background/skill requirements students should have prior to taking this course*

- Experience programming in Python.
- Comfort with algebraic formula notation.
- Familiar with test/train splits in ML.
- Familiar with basic metrics for measuring classification and regression performance.
- Understanding of calculus (especially the derivative and gradient).
- Bonus points: Understanding of gradient descent.

## Course Objectives:

### After this course, you will be able to:

- Describe a “universal function approximator” and explain why this is a useful feature for a machine learning model to have.
- Describe an Artificial Neural Network in detail.
- Build and train an Artificial Neural Network in Python with Tensorflow.

**This course does include:**

- Conceptual descriptions of neural networks and their key components.
- Hands-on experience working with Neural Networks.

**This course does NOT include:**

- More advanced neural network architectures such as Recurrent Neural Networks, Convolutional Neural Networks, Generative Adversarial Networks, or Transformers.

**Course Outline:**

- What is a neural network?
  - Computational graphs
  - Neural Network Architecture
  - Activation functions
  - Universal function approximation
- Building simple neural networks in Tensorflow.
  - Training data setup
  - Defining network architecture
  - Training
  - Evaluation
- Network architecture guidelines and details.
- Regularization with dropout.