**Course Name:** Applied Artificial Intelligence (AI) and Machine Learning (ML)

**Intended Audience:** This introduction-level hands-on course explores the field of artificial intelligence (AI), programming, logic, search, machine learning (ML), and natural language understanding. You’ll learn current AI and ML methods, tools, techniques, and their application to computational problems.

In this course, we’ll cut through the math and you’ll learn exactly how machine learning algorithms work. We’ll focus on the algorithms used to create machine learning models. Using clear explanations, simple Python code (no libraries), and step-by-step labs, you’ll discover how to load and prepare data, evaluate your models, and implement a suite of linear and nonlinear algorithms along with assembling algorithms from scratch. You’ll also learn about algorithm applicability along with their limitations and practical use cases.

*Business Analysts, Data Analysts, Developers, Administrators, Architects, Managers, and others new to AI and ML who want to understand the core skills and how to put them into practice..*

**Audience Capacity:** 24 students

**Price:** Not included until the student amount is confirmed.

**Delivery Format:** Virtual Live Session; multiple sessions can be offered of this course

**Course Objectives:** *This course has a 50% hands-on labs to 50% lecture ratio with engaging instruction, demos, group discussions, labs, and project work.*

* Getting Started with Python and Jupyter
* Statistics and Probability Refresher and Python Practice
* Matplotlib and Advanced Probability Concepts
* Algorithm Overview
* Predictive Models
* Applied Machine Learning
* Recommender Systems
* Dealing with Data in the Real World
* Machine Learning on Big Data (with Apache Spark)
* Testing and Experimental Design
* GUIs and REST: Build a UI and REST API for your Models

**Course Outline:**

**Getting Started**

* Installing a Python Data Science Environment
* Using and understanding iPython (Jupyter) Notebooks
* Python basics: Part 1
* Understanding Python code
* Importing modules
* Python basics: Part 2
* Running Python scripts

**Statistics and Probability Refresher and Python Practice**

* Types of data
* Mean, median, and mode
* Using mean, median, and mode in Python
* Standard deviation and variance
* Probability density function and probability mass function
* Types of data distributions
* Percentiles and moments

**Matplotlib and Advanced Probability Concepts**

* A crash course in Matplotlib
* Covariance and correlation
* Conditional probability
* Bayes' theorem

**Algorithm Overview**

* Data Prep
* Linear Algorithms
* Non-Linear Algorithms
* Ensembles

**Predictive Models**

* Linear regression
* Polynomial regression
* Multivariate regression and predicting car prices
* Multi-level models

**Applied Machine Learning with Python**

* Machine learning and train/test
* Using train/test to prevent overfitting of a polynomial regression
* Bayesian methods: Concepts
* Implementing a spam classifier with Naïve Bayes
* K-Means clustering

**Recommender Systems**

* What are recommender systems?
* Item-based collaborative filtering
* How item-based collaborative filtering works?
* Finding movie similarities
* Improving the results of movie similarities
* Making movie recommendations to people
* Improving the recommendation results

**More Applied Machine Learning Techniques**

* K-nearest neighbors - concepts
* Using KNN to predict a rating for a movie
* Dimensionality reduction and principal component analysis
* A PCA example with the Iris dataset
* Data warehousing overview
* Reinforcement learning

**Dealing with Data in the Real World**

* Bias/variance trade-off
* K-fold cross-validation to avoid overfitting
* Data cleaning and normalization
* Cleaning web log data
* Normalizing numerical data
* Detecting outliers

**Apache Spark: Machine Learning on Big Data**

* Installing Spark
* Spark introduction
* Spark and Resilient Distributed Datasets (RDD)
* Introducing MLlib
* Decision Trees in Spark with MLlib
* K-Means Clustering in Spark
* TF-IDF
* Searching wikipedia with Spark MLlib
* Using the Spark 2.0 DataFrame API for MLlib

**Testing and Experimental Design**

* A/B testing concepts
* T-test and p-value
* Measuring t-statistics and p-values using Python
* Determining how long to run an experiment for
* A/B test gotchas

**GUIs and REST**

* Build a UI for your Models
* Build a REST API for your Models

**Machine Learning Risks**

1. Machine Learning Risks

* Risk relate to ML development and use
* Performance testing
* ETC