

Machine Learning Foundation (Math Emphasis):

Working with Statistics, Algorithms and Neural Networks (TTML5504)

Explore the Math Behind the Magic | Deep Dive Popular Algorithms, Supervised vs Unsupervised Learning, Neural Networks & More

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Course Snapshot

- **Course: Machine Learning Foundation: Working with Statistics, Algorithms and Neural Networks (TTML5504)**
- **Duration:** 3 days
- **Skill-level:** Foundation-level machine learning skills for **Intermediate skilled** team members. This is not a basic class.
- **Audience:** This course is geared for experienced analysts, developers or others **newer to AI and machine learning** with strong applied math skills who are intending to learn about and work with machine learning algorithms and core concepts. This course leverages **Python**.
- **Hands-on Learning:** This course is approximately **50% hands-on lab to 50% lecture ratio**, combining engaging lecture, demos, group activities and discussions with machine-based student labs and exercises. Student machines are required.
- **Delivery Options:** This course is available for **onsite private classroom presentation, live online virtual presentation**, or can be presented in a **flexible blended learning format** for combined onsite and remote attendees. Please also ask about our **Self-Paced / Video** or **QuickSkills / Short Course** options.
- **Public Schedule:** This course is available on our **Public Open Enrollment Schedule**.
- **Customizable:** This course agenda, topics and labs can be further adjusted to target your specific training skills objectives, tools of choice and learning goals.

Overview

Machine Learning Foundation is a hands-on introduction to the mathematics and algorithms used in Data Science, as well as creating the foundation and building the intuition necessary for solving complex machine learning problems. The course provides a good kick start in several core areas with the intent on continued, deeper learning as a follow on.

Although this course is highly technical in nature, it is a foundation-level machine learning class for Intermediate skilled team members who are relatively new to AI and machine learning. This course as-is is not for advanced participants.

Learning Objectives

This “skills-centric” course is about **50% hands-on lab and 50% lecture**, with extensive practical exercises designed to reinforce fundamental skills, concepts and best practices taught throughout the course. Throughout the course students will learn about and explore popular machine learning algorithms, their applicability and limitations and practical application of these methods in a machine learning environment.

This course reviews key foundational mathematics and introduces students to the algorithms of Data Science. Working in a hands-on learning environment, students will explore:

- Popular machine learning algorithms, their applicability and limitations
- Practical application of these methods in a machine learning environment
- Practical use cases and limitations of algorithms
- Core machine learning mathematics and statistics
- Supervised Learning vs. Unsupervised Learning
- Classification Algorithms including Support Vector Machines, Discriminant Analysis, Naïve Bayes, and Nearest Neighbor
- Regression Algorithms including Linear and Logistic Regression, Generalized Linear Modeling, Support Vector Regression, Decision Trees, k-Nearest Neighbors (KNN)
- Clustering Algorithms including k-Means, Fuzzy clustering, Gaussian Mixture
- Neural Networks including Hidden Markov (HMM), Recurrent (RNN) and Long-Short Term Memory (LSTM)
- Dimensionality Reduction, Single Value Decomposition (SVD), Principle Component Analysis (PCA)
- How to choose an algorithm for a given problem
- How to choose parameters and activation functions
- Ensemble methods

Need different skills or topics? If your team requires different topics or tools, additional skills or custom approach, this course may be further adjusted to accommodate. We offer additional AI, machine learning, data science, programming, Python/R and other related topics that may be blended with this course for a track that best suits your needs. Our team will collaborate with you to understand your needs and will target the course to focus on your specific learning objectives and goals.

Audience

Although this course is highly technical in nature, it is a foundation-level machine learning class for Intermediate skilled team members who are relatively new to AI and machine learning. This course as-is is not for advanced participants.

This course is geared for Data Analysts, Programmers, Administrators, Architects, and Managers interested in a deeper exploration of common algorithms and best practices in machine learning. Attending students should have

- Strong foundational mathematics skills in Linear Algebra and Probability, to start learning about and using basic machine learning algorithms and concepts
- Basic Python Skills. Attendees without Python background may view labs as follow along exercises or team with others to complete them. (NOTE: This course is also offered in R or Scala – please inquire for details)
- Basic Linux skills, including familiarity with command-line options such as ls, cd, cp, and su

Pre-Requisites

Pre-Requisites: Students should have attended or have incoming skills equivalent to those in this course:

- Strong basic Python Skills. Attendees without Python background may view labs as follow along exercises or team with others to complete them.
- Good foundational mathematics in Linear Algebra and Probability
- Basic Linux skills, including familiarity with command-line options such as ls, cd, cp, and su

Take Before: Attending students should have incoming skills equivalent to those in the course(s) below:

- TTPS4800 Introduction to Python (3 days)

Related Courses: We offer courses with similar topics coverage that offer an alternative focus or depth:

- TTML5502 Introduction to AI & Machine Learning for the Enterprise - Hands-on Overview (light, very basic labs – 2 days)
- TTML5503 AI / ML JumpStart | introduction to AI, AI Programming & Machine Learning (3 days)
- TTML5504 Machine Learning Foundation (Math Emphasis) | Working with Statistics, Algorithms & Neural Networks (3 days)
- TTML5506-P Machine Learning Essentials with Python (3 days)

Take Next / Follow-on Courses: This course is a core component of our **AI & Machine Learning Skills Path**, designed to trainer participants of all skill levels in modern AI, Machine Learning and Analytics skills across the enterprise. We offer courses in next level AI and Machine Learning, Deep Learning, Natural Language Processing, Applied Machine Learning (Chatbots, Intelligent Web) and many more related titles. Please contact us for details and next step recommendations based on your specific roles and goals.

Enhanced Learning Support: Please ask about our **Pre-Training Class Prep & Primer** offerings, **Skills Gap Assessment Services**, **Case Studies**, **Knowledge Check Quizzes**, **Skills Immersion Programs & Camps**, **Collaborative Mentoring Services** and **Extended Learning Support** services.

Course Topics / Agenda

Please note that this list of topics is based on our standard course offering, evolved from typical industry uses and trends. We will work with you to tune this course and level of coverage to target the skills you need most. Course agenda, topics and labs are subject to adjust during live delivery in response to student skill level, interests and participation.

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| 1. Core Machine Learning Mathematics Review <ul style="list-style-type: none"> • Statistics Overview and Review • Mean, Median, Variance, and deviation | <ul style="list-style-type: none"> • Normal / Gaussian Distribution | <ul style="list-style-type: none"> • Continuous Probability Distributions |
| | 2. Probability Review <ul style="list-style-type: none"> • Probability Theory • Discrete Probability Distributions | <ul style="list-style-type: none"> • Measure-Theoretic Probability Theory • Central Limit and Normal |

- Distribution
- Probability Density Function
- Probability in Machine Learning

3. Supervised Learning

- Supervised Learning Explained
- Classification vs. Regression
- Examples of Supervised Learning
- Key supervised algorithms

4. Unsupervised Learning

- Unsupervised Learning
- Clustering
- Examples of Unsupervised Learning
- Key unsupervised algorithms (overview)

5. Regression Algorithms

- Linear Regression
- Logistic Regression
- Support Vector Regression
- Decision Trees
- Random Forests

6. Classification Algorithms

- Bayes Theorem and the Naïve Bayes classifier
- Support Vector Machines
- Discriminant Analysis
- k-Nearest Neighbor (KNN)

7. Clustering Algorithms

- k-Means Clustering
- Fuzzy Clustering
- Gaussian Mixture Models

8. Neural Networks

- Neural Network Basics
- Hidden Markov Models (HMM)
- Recurrent Neural Networks (RNN)
- Long-Short Term Memory Networks (LSTM)

9. Choosing Algorithms

- Choosing between Supervised and Unsupervised algorithms
- Choosing between Classification Algorithms

- Choosing between Regressions
- Choosing Neural Networks
- Choosing Activation Functions

10. Ensemble Methods

- Ensemble Theory and Methods
- Ensemble Classifiers
- Bucket of Models
- Boosting
- Stacking

11. *Optional: Topics Survey*

- Machine Learning in Python: NumPy, Pandas, SciKit-ML, and Matplotlib; NLTK, Keras
- Machine Learning in R
- Machine Learning in Java
- Machine Learning with Apache Madlib
- Hadoop, MapReduce, and Mahout
- Spark and MLLib TensorFlow

Student Materials: Each student will receive a **Student Guide** with course notes, code samples, setp-by-step written lab instructions, software tutorials, diagrams and related reference materials and links (as applicable). Students will also receive related (as applicable) project files, code files, data sets and solutions required for any hands-on work.

Lab Setup Made Simple. All course labs and solutions, data sets, software, detailed courseware, lab guides and resources (as applicable) are provided for attendees in our easy access, no installation required, remote lab environment. Our tech team will help set up, test and verify lab access for each attendee prior to the course start date, ensuring a smooth start to class and successful hands-on course experience for all participants.

For More Information

For more information about our dedicated training services, collaborative mentoring services, courseware licensing options, courseware development services, public course schedule, training management services, partner and reseller programs, or to see our complete list of course offerings and special offers please visit us at www.triveratech.com, email Info@triveratech.com or call us toll free at **844-475-4559**. Our pricing and services are always satisfaction guaranteed.

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