

## Hands-on Deep Learning Deep Dive:

### Getting Started with Mathematical Concepts, Algorithms, Neural Networks & More

Explore Machine Learning Core Skills, Algorithms, Probability, Algorithms, SVM, Neural Networks, GPU and More

[www.triveratech.com](http://www.triveratech.com)

#### Course Snapshot

- **Course:** Hands-On Deep Learning Deep Dive | Getting Started with Mathematical Concepts, Algorithms, Neural Networks & More (TTML6604)
- **Duration:** 4 days
- **Audience:** This intermediate-level course is geared for experienced developers, analysts or others (with Python or R experience) new to Deep Learning who are intending to start working with algorithms, machine learning, deep learning fundamentals and concepts. Attending students should be proficient in 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

Hands-On Deep Learning Deep Dive is a fast-paced, hands-on four day course that teaches students the modern skills and concepts that reside in the mathematical side of ML / DL, providing attendees with a solid platform for next-level, continued learning in this space based on role or goal.

Working in a hands-on learning environment led by our expert Machine Learning practitioner, students will explore the fundamentals of Machine Learning, Neural Networks, Deep Learning and Recurrent Neural Networks. Attendees will learn about various applications within this space. This course emphasizes mathematical machine learning algorithms and deep learning concepts. Hands-on labs leverage Python programming as the language of choice.

#### 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. Our engaging instructors and mentors are highly-experienced practitioners who bring years of current, **modern "on-the-job" modern machine learning experience** into every classroom and hands-on project.

Students will learn about and work with:

- Mathematical Concepts
- Machine Learning Concepts
- Machine Learning Algorithms Overview
- Deep Learning
- Deep Neural Networks

**Need different skills or topics?** If your team requires different topics or tools, additional skills or custom approach, this course may be easily adjusted to accommodate. We offer additional related Machine Learning, AI, Deep Learning, data science, programming (Python, R, Java, Scala etc.) and development courses which may be blended with this course for a track that best suits your learning objectives. 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 & Pre-Requisites

This in an **intermediate-level** course is geared for experienced developers or others (with prior Python experience) intending to start using learning about and working with machine learning algorithms, machine learning, deep learning fundamentals and concepts. Attendees should be experienced developers who are comfortable with Python programming. Students should also be able to navigate Linux command line, and who have basic knowledge of Linux editors (such as VI / nano) for editing code.

Some of the related useful skills

- **Strong** foundational mathematics in Linear Algebra and Probability
- Strong basic Python Skills and basic data science knowledge.
- Basic Linux skills, including familiarity with command-line options such as ls, cd, cp, and su

### Take Before:

- TTPS4873 Python for Data Science

**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.

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## 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.*

### 1. Mathematical Concepts (Theoretical)

- Linear Algebra Basics
- Vectors
- Matrices
- Matrix Operations
  - Addition
  - Multiplication
  - Identity
  - Inverse
  - Transpose
  - Dot Product
- Probability & Statistics
- Mean
- Mode
- Median
- Conditional Probability
- Standard Deviation
- Variance

### 2. Set up/Test Drive with Python/Jupyter

- Python Installation
- Installing Packages with Pip
- Jupyter Installation

- Tools Overview
- Pandas
- Numpy
- Scikit-learn
- Matplotlib
- Summary

### 3. Machine Learning

- K-Nearest Neighbors Overview
- Voronoi Diagrams
- K-Nearest Neighbors Labs
- 3 Labs
- kNN Assumptions
- kNN Applications
- Data Scaling and Normalization
- Outliers
- Normalization & Standardization
- Cross Validation
- Clustering vs Classification
- Summary

### 4. ML Decision Trees

- Decision Tree Overview
- Decision Tree Examples
- Splitting of Data

- Attributes of Decision Tree
- Use of Cross Validation in Decision Tree
- Ensemble Learning
- Random Forest
- Parameters in Decision Trees
- Overfitting
- Variance
- Underfitting
- Bias
- Trimming/Pruning
- Information Gain
- Gini Impurity
- Entropy

### 5. Machine Learning Probability & Naïve Bayes Classifier

- Bayesian Decision Theory
- Bayes Theorem
- Probability Overview
- Naïve Bayes Classifier Overview
- Naïve Bayes Lab
- Summary

### 6. ML Linear Regression

- Linear Models

- Linear Regression Overview
  - Linear Regression Lab
  - Summary
- 7. ML Gradient Descent Algorithm**
- Definition of Gradient
  - Definition of Gradient Descent
  - Derivatives
  - Partial Derivatives
  - GD Applications
  - Stochastic Gradient Descent
  - Summary
- 8. ML SVM Classifier**
- SVM Classifier Overview
  - Classifier Margin
  - SVM Drawbacks
  - SVM Examples
  - SVM Classifier Lab
  - SVM Kernels
  - Summary
- 9. ML Summary**
- Data Preprocessing
  - Model Evaluation
  - Summary
- 10. Deep Learning – AI Overview**
- AI vs ML vs DL Overview
  - State of AI
  - Narrow AI or Weak AI
  - Winograd Schemas
  - Major Break through
  - What does it take?
  - Biological Neural Networks vs Artificial
  - Future
  - Summary
- 11. Deep Learning – Overview & Basics (Theoretical)**
- Deep Learning Overview
  - Use cases & Key Applications
  - Artificial Intelligence VS Machine Learning VS Deep Learning
  - Deep Learning vs Neural Networks
  - Deep Learning Algorithm Overview
  - Deep Learning Applications
  - GPU vs CPU
  - Deep Learning Libraries
- 12. Deep Neural Networks**
- Fundamentals of Deep Networks
  - Neural Networks – Basics and Overview
  - Artificial Neural Networks - Overview
- Major Architectures of Deep Networks
  - Building Deep Networks
  - Regressions Overview
  - Models and Overview
  - Perceptron
  - Single Hidden Layer
  - Multiple Hidden Layer
  - Convolutional Neural Network Overview
  - CNN Architecture
  - Recurrent Neural Network Overview
  - RNN Architecture
- 13. GPU Programming Overview (Theoretical)**
- GPUs, Memory and Other Advanced Topics
  - GPU Programming Overview
  - Thread Organization
  - Inside a GPU
  - Parallelization
  - GPU Memory Breakdown
  - Overview of GPU Accelerated Algorithms

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**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](http://www.triveratech.com), email [Info@triveratech.com](mailto:Info@triveratech.com) or call us toll free at **844-475-4559**. Our pricing and services are always satisfaction guaranteed.

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