

## Table of Contents for PG in Artificial Intelligence Engineer

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# COURSE 1 : Introduction to Artificial Intelligence

## Lesson 0 : Course Introduction

1. Introduction

## Lesson 1 : Decoding Artificial Intelligence

1. Decoding Artificial Intelligence
2. Meaning, Scope, and Stages of Artificial Intelligence
3. Three Stages of Artificial Intelligence
4. Applications of Artificial Intelligence
5. Image Recognition
6. Applications of Artificial Intelligence - Examples
7. Effects of Artificial Intelligence on Society
8. Supervises Learning for Telemedicine
9. Solves Complex Social Problems
10. Benefits Multiple Industries

## Lesson 2 : Fundamentals of Machine Learning and Deep Learning

1. Fundamentals of Machine Learning and Deep Learning
2. Meaning of Machine Learning
3. Relationship Between Machine Learning and Statistical Analysis
4. Process of Machine Learning
5. Types of Machine Learning
6. Meaning of Unsupervised Learning
7. Meaning of Semi-supervised Learning
8. Algorithms of Machine Learning
9. Regression
10. Naive Bayes
11. Naive Bayes Classification
12. Machine Learning Algorithms
13. Deep Learning
14. Artificial Neural Network Definition
15. Definition of Perceptron
16. Online and Batch Learning

## Lesson 3 : Machine Learning Workflow

1. Learning Objective
2. Machine Learning Workflow
3. Get More Data
4. Ask a Sharp Question

5. Add Data to the Table
6. Check for Quality
7. Transform Features
8. Answer the Questions
9. Use the Answer

## Lesson 4 : Performance Metrics

1. Performance Metrics
2. Need for Performance Metrics
3. Key Methods of Performance Metrics
4. Confusion Matrix Example
5. Terms of Confusion Matrix
6. Minimize False Cases
7. Minimize False Positive Example
8. Accuracy
9. Precision
10. Recall or Sensitivity
11. Specificity
12. F1 Score

# COURSE 2 : Data Science with Python

## Lesson 0 : Course Overview

1. Course Overview

## Lesson 1 : Data Science Overview

1. Introduction to Data Science
2. Different Sectors Using Data Science
3. Purpose and Components of Python

## Lesson 2 : Data Analytics Overview

1. Data Analytics Process
2. Knowledge Check
3. Exploratory Data Analysis(eda)
4. Eda-quantitative Technique
5. Eda - Graphical Technique
6. Data Analytics Conclusion or Predictions
7. Data Analytics Communication
8. Data Types and Plotting

## Lesson 3 : Statistical Analysis and Business Applications

1. Introduction to Statistics
2. Statistical and Non-statistical Analysis
3. Major Categories of Statistics
4. Statistical Analysis Considerations
5. Population and Sample
6. Statistical Analysis Process
7. Data Distribution
8. Dispersion
9. Knowledge Check
10. Histogram
11. Knowledge Check
12. Testing
13. Knowledge Check
14. Correlation and Inferential Statistics

## Lesson 4 : Python Environment Setup and Essentials

1. Anaconda
2. Installation of Anaconda Python Distribution (contd )
3. Data Types With Python

4. Basic Operators and Functions

## Lesson 5 : Mathematical Computing with Python (NumPy)

1. Introduction to Numpy
2. Activity-sequence It Right
3. Demo -creating and Printing an Nddarray
4. Knowledge Check
5. Class and Attributes of Nddarray
6. Basic Operations
7. Activity-slice It
8. Copy and Views
9. Mathematical Functions of Numpy
10. Practice Project: Analyse Gdp of Countries
11. Assignment Demo

## Lesson 6 : Scientific computing with Python (Scipy)

1. Introducton to Scipy
2. Scipy Sub Package - Integration and Optimization
3. Knowledge Check
4. Scipy Sub Package
5. Demo - Calculate Eigenvalues and Eigenvector
6. Knowledge Check
7. Scipy Sub Package - Statistics, Weave and Io
8. Practice Project: Solving Linear Algebra Problem Using Scipy
9. Assignment Demo
10. Practice Project: Perform Cdf and Pdf Using Scipy
11. Assignment Demo

## Lesson 7 : Data Manipulation with Pandas

1. Introduction to Pandas
2. Knowledge Check
3. Understanding Dataframe
4. View and Select Data Demo
5. Missing Values
6. Data Operations
7. Knowledge Check
8. File Read and Write Support
9. Knowledge Check-sequence It Right
10. Pandas Sql Operation
11. Practice Project: Analyse the Federal Aviation Authority Dataset Using Pandas
12. Assignment Demo

13. Practice Project: Analyse Newyork City Fire Department Dataset
14. Assignment Demo

## Lesson 8 : Machine Learning with Scikit–Learn

1. Machine Learning Approach
2. Steps One and Two
3. Steps Three and Four
4. How It Works
5. Steps Five and Six
6. Supervised Learning Model Considerations
7. Knowledge Check
8. Scikitlearn
9. Knowledge Check
10. Supervised Learning Models - Linear Regression
11. Supervised Learning Models - Logistic Regression
12. Unsupervised Learning Models
13. Pipeline
14. Model Persistence and Evaluation
15. Knowledge Check
16. Practice Project: Analysing Ad Budgets for Different Media Channels
17. Assignment One
18. Practice Project: Building a Model to Predict Diabetes
19. Assignment Two

## Lesson 9 : Natural Language Processing with Scikit Learn

1. Nlp Overview
2. Nlp Applications
3. Knowledge Check
4. Nlp Libraries-scikit
5. Extraction Considerations
6. Scikit Learn-model Training and Grid Search
7. Practice Project: Analysing Spam Collection Data
8. Demo Assignment
9. Practice Project: Sentiment Analysis Using Nlp
10. Demo Assignment

## Lesson 10 : Data Visualization in Python using matplotlib

1. Introduction to Data Visualization
2. Knowledge Check

3. Line Properties
4. (x,y) Plot and Subplots
5. Knowledge Check
6. Types of Plots
7. Practice Project: Draw a Pair Plot Using Seaborn Library
8. Assignment Demo
9. Practice Project: Analysing Cause of Death
10. Assignment Demo

## Lesson 11 : Web Scraping with BeautifulSoup

1. Web Scraping and Parsing
2. Knowledge Check
3. Understanding and Searching the Tree
4. Navigating Options
5. Demo3 Navigating a Tree
6. Knowledge Check
7. Modifying the Tree
8. Parsing and Printing the Document
9. Practice Project: Web Scraping of Simplilearn Website
10. Assignment Demo
11. Practice Project: Web Scraping of Simplilearn Website Resource Page
12. Assignment Demo

## Lesson 12 : Python integration with Hadoop MapReduce and Spark

1. Why Big Data Solutions are Provided for Python
2. Hadoop Core Components
3. Python Integration With Hdfs Using Hadoop Streaming
4. Demo - Using Hadoop Streaming for Calculating Word Count
5. Knowledge Check
6. Python Integration With Spark Using Pyspark
7. Demo - Using Pyspark to Determine Word Count
8. Knowledge Check
9. Practice Project: Determine the Wordcount
10. Assignment Demo
11. Practice Project: Display All the Airports Based in New York Using Pyspark
12. Assignment Demo



# COURSE 3 : Machine Learning

## Lesson 1 : Course Introduction

1. Course Introduction
2. Accessing Practice Lab

## Lesson 2 : Introduction to AI and Machine Learning

1. Learning Objectives
2. Emergence of Artificial Intelligence
3. Artificial Intelligence in Practice
4. Sci-fi Movies With the Concept of Ai
5. Recommender Systems
6. Relationship Between Artificial Intelligence, Machine Learning, and Data Science: Part a
7. Relationship Between Artificial Intelligence, Machine Learning, and Data Science: Part B
8. Definition and Features of Machine Learning
9. Machine Learning Approaches
10. Machine Learning Techniques
11. Applications of Machine Learning: Part a
12. Applications of Machine Learning: Part B
13. Key Takeaways
14. Knowledge Check

## Lesson 3 : Data Preprocessing

1. Learning Objectives
2. Data Exploration Loading Files: Part a
3. Data Exploration Loading Files: Part B
4. Demo: Importing and Storing Data
5. Practice Project: Practice: Automobile Data Exploration - a
6. Data Exploration Techniques: Part a
7. Data Exploration Techniques: Part B
8. Seaborn
9. Demo: Correlation Analysis
10. Practice Project: Practice: Automobile Data Exploration - B
11. Data Wrangling
12. Missing Values in a Dataset
13. Outlier Values in a Dataset
14. Demo: Outlier and Missing Value Treatment
15. Practice Project: Practice: Data Exploration - C
16. Data Manipulation
17. Functionalities of Data Object in Python: Part a
18. Functionalities of Data Object in Python: Part B

19. Different Types of Joins
20. Typecasting
21. Demo: Labor Hours Comparison
22. Key Takeaways
23. Knowledge Check
24. Practice Project: Storing Test Results

## Lesson 4 : Supervised Learning

1. Learning Objectives
2. Supervised Learning
3. Supervised Learning- Real-life Scenario
4. Understanding the Algorithm
5. Supervised Learning Flow
6. Types of Supervised Learning: Part a
7. Types of Supervised Learning: Part B
8. Types of Classification Algorithms
9. Types of Regression Algorithms: Part a
10. Regression Use Case
11. Accuracy Metrics
12. Cost Function
13. Evaluating Coefficients
14. Demo: Linear Regression
15. Practice Project: Practice: Boston Homes - a
16. Challenges in Prediction
17. Types of Regression Algorithms: Part B
18. Demo: Bigmart
19. Practice Project: Practice: Boston Homes - B
20. 4.20 Logistic Regression: Part a
21. Logistic Regression: Part B
22. Sigmoid Probability
23. Accuracy Matrix
24. Demo: Survival of Titanic Passengers
25. Practice Project: Practice: Iris Species
26. Key Takeaways
27. Knowledge Check
28. Practice Project: Health Insurance Cost

## Lesson 5 : Feature Engineering

1. Learning Objectives
2. Feature Selection
3. Regression
4. Factor Analysis

5. Factor Analysis Process
6. Principal Component Analysis (pca)
7. First Principal Component
8. Eigenvalues and Pca
9. Demo: Feature Reduction
10. Practice Project: Practice: Pca Transformation
11. Linear Discriminant Analysis
12. Maximum Separable Line
13. Find Maximum Separable Line
14. Demo: Labeled Feature Reduction
15. Practice Project: Practice: Lda Transformation
16. Key Takeaways
17. Knowledge Check
18. Practice Project: Simplifying Cancer Treatment

## Lesson 6 : Supervised Learning Classification

1. Learning Objectives
2. Overview of Classification
3. Classification: a Supervised Learning Algorithm
4. Use Cases of Classification
5. Classification Algorithms
6. Decision Tree Classifier
7. Decision Tree Examples
8. Decision Tree Formation
9. Choosing the Classifier
10. Overfitting of Decision Trees
11. Random Forest Classifier- Bagging and Bootstrapping
12. Decision Tree and Random Forest Classifier
13. Performance Measures: Confusion Matrix
14. Performance Measures: Cost Matrix
15. Demo: Horse Survival
16. Practice Project: Practice: Loan Risk Analysis
17. Naive Bayes Classifier
18. Steps to Calculate Posterior Probability: Part a
19. Steps to Calculate Posterior Probability: Part B
20. Support Vector Machines : Linear Separability
21. Support Vector Machines : Classification Margin
22. Linear Svm : Mathematical Representation
23. Non-linear Svms
24. The Kernel Trick
25. Demo: Voice Classification
26. Practice Project: Practice: College Classification
27. Key Takeaways
28. Knowledge Check

## Lesson 7 : Unsupervised Learning

1. Learning Objectives
2. Overview
3. Example and Applications of Unsupervised Learning
4. Clustering
5. Hierarchical Clustering
6. Hierarchical Clustering Example
7. Demo: Clustering Animals
8. Practice Project: Practice: Customer Segmentation
9. K-means Clustering
10. Optimal Number of Clusters
11. Demo: Cluster Based Incentivization
12. Practice Project: Practice: Image Segmentation
13. Key Takeaways
14. Knowledge Check
15. Practice Project: Clustering Image Data

## Lesson 8 : Time Series Modeling

1. Learning Objectives
2. Overview of Time Series Modeling
3. Time Series Pattern Types: Part a
4. Time Series Pattern Types: Part B
5. White Noise
6. Stationarity
7. Removal of Non-stationarity
8. Demo: Air Passengers - a
9. Practice Project: Practice: Beer Production - a
10. Time Series Models: Part a
11. Time Series Models: Part B
12. Time Series Models: Part C
13. Steps in Time Series Forecasting
14. Demo: Air Passengers - B
15. Practice Project: Practice: Beer Production - B
16. Key Takeaways
17. Knowledge Check
18. Practice Project: Imf Commodity Price Forecast

## Lesson 9 : Ensemble Learning

1. Ensemble Learning
2. Overview
3. Ensemble Learning Methods: Part a
4. Ensemble Learning Methods: Part B
5. Working of Adaboost
6. Adaboost Algorithm and Flowchart
7. Gradient Boosting
8. Xgboost
9. Xgboost Parameters: Part a
10. Xgboost Parameters: Part B
11. Demo: Pima Indians Diabetes
12. Practice Project: Practice: Linearly Separable Species
13. Model Selection
14. Demo: Cross Validation
15. Practice Project: Practice: Model Selection
16. Key Takeaways
17. Knowledge Check
18. Practice Project: Tuning Classifier Model With Xgboost

## Lesson 10 : Recommender Systems

1. Learning Objectives
2. Introduction
3. Purposes of Recommender Systems
4. Paradigms of Recommender Systems
5. Collaborative Filtering: Part a
6. Collaborative Filtering: Part B
7. Association Rule Mining
8. Association Rule Mining: Market Basket Analysis
9. Association Rule Generation: Apriori Algorithm
10. Apriori Algorithm Example: Part a
11. Apriori Algorithm Example: Part B
12. Apriori Algorithm: Rule Selection
13. Demo: User-movie Recommendation Model
14. Practice Project: Practice: Movie-movie Recommendation
15. Key Takeaways
16. Knowledge Check
17. Practice Project: Book Rental Recommendation

## Lesson 11 : Text Mining

1. Learning Objectives
2. Overview of Text Mining
3. Significance of Text Mining
4. Applications of Text Mining
5. Natural Language Toolkit Library
6. Text Extraction and Preprocessing: Tokenization
7. Text Extraction and Preprocessing: N-grams
8. Text Extraction and Preprocessing: Stop Word Removal
9. Text Extraction and Preprocessing: Stemming
10. Text Extraction and Preprocessing: Lemmatization
11. Text Extraction and Preprocessing: Pos Tagging
12. Text Extraction and Preprocessing: Named Entity Recognition
13. Nlp Process Workflow
14. Demo: Processing Brown Corpus
15. Practice Project: Practice: Wiki Corpus
16. Structuring Sentences: Syntax
17. Rendering Syntax Trees
18. Structuring Sentences: Chunking and Chunk Parsing
19. Np and Vp Chunk and Parser
20. Structuring Sentences: Chinking
21. Context-free Grammar (cfg)
22. Demo: Structuring Sentences
23. Practice Project: Practice: Airline Sentiment
24. Key Takeaways
25. Knowledge Check
26. Practice Project: Fifa World Cup

## Lesson 12 : Project Highlights

1. Project Highlights
2. Practice Project: Uber Fare Prediction
3. Practice Project: Amazon - Employee Access

## Lesson 13 : Practice Projects

1. Practice Project: California Housing Price Prediction
2. Practice Project: Phishing Detector With Lr

# COURSE 4 : Deep Learning Fundamentals

## Lesson 1 : Learning Objectives

1. Learning Objectives

## Lesson 2 : Introduction to Deep Learning

1. Learning Objectives
2. Deep Learning: the Series Introduction
3. What is a Neural Network
4. Three Reasons to Go Deep
5. Your Choice of Deep Net
6. An Old Problem

## Lesson 3 : Deep Learning Models

1. Learning Objectives
2. Restricted Boltzmann Machines
3. Deep Belief Nets
4. Convolutional Nets
5. Recurrent Nets

## Lesson 4 : Additional Deep Learning Models

1. Learning Objectives
2. Autoencoders
3. Recursive Neural Tensor Nets
4. Use Cases

## Lesson 5 : Deep Learning Platforms & Libraries

1. Learning Objectives
2. What is a Deep Net Platform?
3. H2o Ai
4. Dato Graphlab
5. What is a Deep Learning Library?
6. Theano
7. Caffe
8. Tensorflow
9. Unlocking Ibm Certificate

# COURSE 5 : Deep Learning with Keras and Tensorflow

## Section 1 : Deep Learning with Tensor Flow (Self Learning)

### Lesson 1 : Introduction to Tensorflow

1. Learning Objectives
2. Introduction to Tensorflow
3. Tensorflow's Hello World
4. Practice Project: Tensorflow Hello World
5. Practice Project: Linear Regression With Tensorflow
6. Practice Project: Logistic Regression With Tensorflow
7. Practice Project: Activation Functions
8. Intro to Deep Learning
9. Deep Neural Networks

### Lesson 2 : Convolutional Networks

1. Learning Objectives
2. Intro to Convolutional Networks
3. Cnn for Classifications
4. Cnn Architecture
5. Practice Project: Understanding Convolutions
6. Practice Project: Cnn With Mnist Dataset

### Lesson 3 : Recurrent Neural Network

1. Learning Objectives
2. The Sequential Problem
3. The Rnn Model
4. The Lstm Model
5. Applying Rnns to Language Modeling
6. Practice Project: Ltsm Basics
7. Practice Project: Mnist Data Classification With Rnn/lstm
8. Practice Project: Applying Rnn/lstm to Language Modelling
9. Practice Project: Applying Rnn/lstm to Character Modelling

### Lesson 4 : Restricted Boltzmann Machines (RBM)



1. Learning Objectives
2. Intro to Rbms
3. Training Rbms
4. Practice Project: Rbm Mnist
5. Practice Project: Collaborative Filtering With Rbm

## Lesson 5 : Autoencoders

1. Learning Objectives
2. Intro to Autoencoders
3. Applying Rnns to Language Modelling
4. Practice Project: Autoencoders
5. Practice Project: Dbn Mnist

## Lesson 6 : Welcome!

1. Welcome!
2. Learning Objectives

## Lesson 7 : Course Summary

1. Course Summary
2. Unlocking Ibm Certificate

# Section 2 : Deep Learning with Keras and Tensor Flow (Live Classes)

## Lesson 1 : Course introduction

1. Introduction

## Lesson 2 : AI and Deep learning introduction

1. What is Ai and Deep Learning
2. Brief History of Ai
3. Recap: SI, UI and RI
4. Deep Learning : Successes Last Decade
5. Demo & Discussion: Self Driving Car Object Detection
6. Applications of Deep Learning
7. Challenges of Deep Learning
8. Demo & Discussion: Sentiment Analysis Using Lstm
9. Fullcycle of a Deep Learning Project

10. Key Takeaways
11. Knowledge Check

## Lesson 3 : Artificial Neural Network

1. Biological Neuron vs Perceptron
2. Shallow Neural Network
3. Training a Perceptron
4. Practice Project: Demo Code: Perceptron ( Linear Classification) (assisted)
5. Backpropagation
6. Role of Activation Functions & Backpropagation
7. Practice Project: Demo Code: Backpropagation (assisted)\
8. Practice Project: Demo Code: Activation Function (unassisted)
9. Optimization
10. Regularization
11. Dropout Layer
12. Key Takeaways
13. Knowledge Check
14. Practice Project: Lesson-end Project (mnist Image Classification)

## Lesson 4 : Deep Neural Network & Tools

1. Deep Neural Network : Why and Applications
2. Designing a Deep Neural Network
3. How to Choose Your Loss Function?
4. Tools for Deep Learning Models
5. Keras and Its Elements
6. Practice Project: Demo Code: Build a Deep Learning Model Using Keras (assisted)
7. Tensorflow and Its Ecosystem
8. Practice Project: Demo Code: Build a Deep Learning Model Using Tensorflow (assisted)
9. Tflern
10. Pytorch and Its Elements
11. Key Takeaways
12. Knowledge Check
13. Practice Project: Lesson-end Project: Build a Deep Learning Model Using Pytorch With Cifar10 Dataset

## Lesson 5 : Deep Neural Net optimization tuning interpretability

1. Optimization Algorithms
2. Sgd, Momentum, Nag, Adagrad, Adadelata , Rmsprop, Adam
3. Batch Normalization
4. Practice Project: Demo Code: Batch Normalization (assisted)

5. Exploding and Vanishing Gradients
6. Hyperparameter Tuning
7. Interpretability
8. Key Takeaways
9. Knowledge Check
10. Practice Project: Lesson-end Project: Hyperparameter Tunning With Keras Tuner

## Lesson 6 : Convolutional Neural Network

1. Success and History
2. Cnn Network Design and Architecture
3. Practice Project: Demo Code: Cnn Image Classification (assisted)
4. Deep Convolutional Models
5. Key Takeaways
6. Knowledge Check
7. Practice Project: Lesson-end Project: Image Classification

## Lesson 7 : Recurrent Neural Networks

1. Sequence Data
2. Sense of Time
3. Rnn Introduction
4. Lstm ( Retail Sales Dataset Kaggle)
5. Practice Project: Demo Code: Stock Price Prediction With Lstm (assisted)
6. Practice Project: Demo Code: Multiclass Classification Using Lstm (unassisted)
7. Practice Project: Demo Code: Sentiment Analysis Using Lstm (assisted)
8. Grus
9. Lstm vs Grus
10. Key Takeaways
11. Knowledge Check
12. Practice Project: Lesson-end Project: Stock Price Forecasting

## Lesson 8 : Autoencoders

1. Introduction to Autoencoders
2. Applications of Autoencoders
3. Autoencoder for Anomaly Detection
4. Practice Project: Demo Code: Autoencoder Model for Mnist Data (assisted)
5. Key Takeaways
6. Knowledge Check
7. Practice Project: Lesson-end Project: Anomaly Detection With Keras

# COURSE 6 : AI Capstone Project - Live Classes

Lesson 0 : Exploratory Data Analysis

Lesson 1 : Model Building and fitting

Lesson 2 : Unsupervised learning

Lesson 3 : Representing results

