

Advanced Certification in Data Science and Artificial Intelligence (AI)

Duration: 70-75 days/140-150 Hours

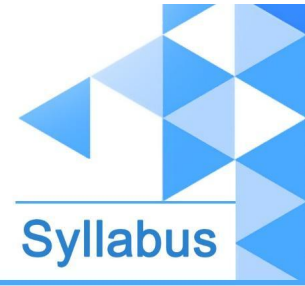
Course Syllabus

INTRODUCTION

This industry oriented course is developed by both the Software development division & Training division of **ipsr solutions limited**. IPSR is a **public limited IT company** with 22+ years of expertise in [Software product development](#), [Training services](#), [Placement services](#) & [Digital Marketing services](#). During the past 2 decades, IPSR has trained candidates from **60+ countries** and helped **more than One lakh candidates** to build their IT career. Our IT services division is a pioneer in development of **Academic solution products**, incorporating cutting edge technologies like Artificial Intelligence, Data Analytics and Machine learning. Live industry experts from this IT division contribute a major role in delivering this course. Our placement division is having **1600+ placement tie-up companies** and we are conducting [recruitment on all days](#).

The Course curriculum is designed and developed by a team of expertise panel lead by following academicians

- ❑ **Dr. Mendus Jacob, M.Sc., M.Phil., Ph.D., MloD**
 - ❑ M.D & C.E.O - IPSR & Valin Technologies, U.K.
 - ❑ Director - MCA, Marian College, Kuttikkanam (Autonomous)
 - ❑ Former Director of School of Applicable Mathematics, M.G. University.
 - ❑ Academician and Entrepreneur with 30+ years experience
- ❑ **Dr. Sunil Job K.A, M.Sc, M.Ed, M.Phil, Ph.D., RHCE**
 - ❑ Chief of Academic Solutions - IPSR
 - ❑ Former college Principal and a Specialist in Data Analytics & Machine Learning
 - ❑ Blogger and a Resource person for National conferences
 - ❑ Academician with 25+ years experience



What you'll learn

- Python Language Basics, Sequences, Functions, OOPS, RegEx, Database
- Programming using Python and MySql
- Python Packages for Basic Data Analytics - numpy, pandas, matplotlib, seaborn
- Exploratory and Explanatory data analysis using Python packages.
- data processing and post processing using python
- Machine Learning using Python packages.
- Explain the concepts of Deep Learning and AI
- Prediction using real world data using Machine Learning.

Description

This course covers the Python Language basics and upto database programming using MySql. It even covers important data analytics packages as numpy, pandas, matplotlib and seaborn and also covers data pre-processing for machine learning and prediction using real world datasets. Finally covered by the deep learning and Artificial intelligence projects using python packages.



Course Outcome (CO)

While successfully completing this course, the learner will be able to:

- Data analysis using Python packages.
- Data processing and post processing in structured and unstructured data using python
- Machine Learning using Python packages.
- Prediction using real world data using Machine Learning and Deep learning.
- Unstructured data processing and post processing using python
- Artificial Intelligence using Python packages.

What does this course give you?

1. Python skills needed for basic Data Analytics and the skill required to do Data Analytics using Python packages in real world data
2. Skill required to implement Deep learning and Machine Learning in real world.
3. Skill required to develop Artificial Intelligence projects using Python



packages

SECTION 1:

Course content

1. Python Basics

- Language Structure
- Control & Loop Constructs
- Sequences
- Functions
- OOPS
- Database programming with MySQL

2. Python Data Analytics packages

1. Numpy

- Ndimensional array
- Datatypes
- Random numbers
- Matrix operations

2. Pandas

- Series, Dataframe
- Importing csv, Exporting csv



- Groupby
- Describe, Info
- Iloc, loc
- Filtering
- Slicing

3. Matplotlib

- Line plot
- Scatter plot
- Histogram
- Box plot

4. Seaborn

- Heatmap

5. Mini Project

- a. Mini Project Using Data Visualization Tools.
- b. Mini Project Using Python Data Analytics Package

SECTION 2:

1. What is Data Analytics

- Data Analytics vs Data Analysis
- What is a dataset



- Need for Dataset structure

2. Data Analytics Workflow Theory

- Data Requirement Specification
- Data Collection
- Optional Data Integration
- Data Selection

3. Exploratory Data Analysis with Descriptive statistics

- Central tendency
- Standard deviation
- Interquartile range
- Histograms
- Distributions
- Skew
- Kurtosis
- Correlation

4. Pattern Processing from Data

- Data Pre-processing
- Data Processing



- Data Post-processing

5. Code running environment

- Introduction to google colab
- connecting google colab to local data and drive data

6. Data Analytics Workflow Practical

1. Data Collection using Pycaret and Pandas
2. Exploratory Data analysis using Pandas profiling==2.8.0 library and seaborn heatmap(correlation)
 - Drill down in profile Report
 - Obtaining irregularities in dataset

Note:For more Dataset with columns more than 30 correlation checks in pandas profiling should be turned off or minimal mode should be turned on.

3.Data pre-processing Using Python ml libraries(Pycaret setup function and pandas drop duplicates function)

- Missing value treatment
- Normalization
- transformation



- multicollinearity issue
- outliers issue

- Low variance issue
- Dimensionality Reduction for large column datasets
- setting for GPU usage
- Using EDA Report for deciding must do data cleaning steps
- Application of pre-processing steps totally

SECTION 3:

1. What is Machine Learning

- Machine Learning relation with Data Analytics
- What is Prediction
- Need for Prediction Task

2. Supervised Learning

- What is Training and Testing?
- Accuracy



- Data splitting as Training and Testing
- Independent Columns and Dependent Target/Label column
- Cross -Validation splitting
- Target Data Imbalance
- Data Sampling

4. Introduction To Github account

- Creating Github Account
- Repository creation, Push Pull, commit using Github onlinetools
- Creating streamlit sharing account
- Requesting for streamlit sharing invite

5. Machine Learning Prediction Algorithms

1. Regression

- Linear Regression
- Parameters
- Mean Absolute Error, MSE, RMSE
- OLS Regression
- Decision Tree Regression
- Random Forest Regression

2. Classification



- Decision Boundary
- Logistic Regression
- Hyper Parameters
- Accuracy, AUC, Recall, Precision, F1-score
- Decision Tree (CART)
- Random Forest Classification
- KNN
- Linear SVM
- Radial SVM
- Naïve Bayes

6. Data Processing -code working

- Data Collection, Task setting as Regression/Prediction
- Separating Data for unseen data prediction
- Data Pre-processing
- Model comparison study
- Selecting Best model
- Tuning Hyperparameters -optimizing for Accuracy measures
- Finalizing model
- Pickling model



- Loading model and testing in new notebook

7. Data Post Processing -code working

- What is a Webapp?
- Introduction to streamlit
- Streamlit template file for webapp
- Testing webapp in colab with pyngrok hosting

8. Permanent deployment of tested webapp

- creating Requirements.txt file
- Uploading project to Github
- Streamlit sharing invite mail for web hosting
- Deployment of webapp

9. Mini Projects

SECTION 4:

1.Introduction to Deep Learning (Theory)

- Human Cognitive Abilities
- Neural Networks & similarity to human brain



- Real life applications

2. Artificial Neural network working

- Artificial Neural network architecture
- Artificial Neural network working

3. Working of neural network using mathematical visualization

- Gradient descent
- Activation – ReLu, Sigmoid, Tan h
- Backward propagation
- Feed Forward Network
- Weight and bias

1.Keras using TensorFlow

- Tensorflow introduction
- Keras introduction

4. Customer Churn Prediction Code using Deep Learning

5. Deep neural network

- Multi-layer perceptron
- Architecture
- Working

6.Convolutional Neural Network



- Architecture & Working

7. Recurrent Neural Network

- Architecture & Working

8. Long short memory network

- Architecture & Working

SECTION 5:

1. Mathematics Required for Deep Learning

- Linear Algebra
- Statistics

2. Deep Learning Concepts in detail

- Working of neural network using mathematical visualization
- Loss function
- Gradient descent based optimizers-Adam,SGD
- Activation – ReLu, Leaky Relu,Softmax,Sigmoid, Tan h

3. Deep Learning Architectures

- Convolutional Neural Network
- Recurrent Neural Network
- LSTM Neural Network



4. ARTIFICIAL INTELLIGENCE

1. Visual AI

- OpenCV
- Image preprocessing
- Image Augmentation
- Image Recognition
- Yolo
- Object detection
- Object Annotation
- Real time project example
- Mini Projects

2. Analytical AI

1. Time series Analysis using LSTM

- Stock Market Prediction
- Currency exchange rate prediction
- Forecast
- Real time project example
- Mini Projects



2. Text AI

- Natural Language
- Processing
- Sentimental analysis
- Text recognition
- Real time project example
- Mini Projects

3. Transfer Learning

- Pretrained models
- Image processing with Transfer learning
- Natural Language processing with Language models
- Real time project examples
- Mini Projects

4. Interactive AI

- Chatbots
- Rasa NLU
- Real time project examples
- Mini Projects



5. ADVANCED MACHINE LEARNING TOPICS

1. Web scraping

- Auto scraper
- Scraped data and Database
- Scraped data - Exploratory Data
- Analysis
- Real time project examples
- Mini Projects

2. Unsupervised Learning

Clustering

Autoencoders

Association

Recommendation

Scraped data for unsupervised
learning

Real time project examples

Mini Projects



3. Generative AI

- Generative Adversarial Networks
- Types of GAN
- Real time project examples
- Mini Projects

6. Main Project

PLUS--Free Internship for selected candidates based on overall performance

Recommended Learning Path

1. Certification on Professional Data Analytics with Python -----> Data Analytics Professional

2. Certification on Advanced Data Science and Machine Learning (ML)-----> Advanced Certification in Data Science and Machine Learning (ML)



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