Master

DATA SCIENCE With GENERATIVE AI COURSE

EMPOWERING YOUR FUTURE THROUGH
DATA-DRIVEN INSIGHTS

ABOUT DATA SCIENCE WITH GENERATIVE AI COURSE

Discover your potential by learning the latest skills, using powerful tools, and gaining practical experience to succeed in the ever-evolving field of data science with a focus on Generative AI.

WHY CHOOSE THIS COURSE?

- CUTTING-EDGE KNOWLEDGE
- HANDS-ON EXPERIENCE
- CAREER-FOCUSED APPROACH

COURSE HIGHLIGHTS

- INDUSTRY EXPERT-LED SESSIONS
- INDUSTRY ORIENTED CURRICULUM
- MASTER IN-DEMAND SKILLS
- LIVE DOUBT RESOLUTION SESSIONS
- ASSIGNMENTS AND QUIZZES
- COMPREHENSIVE LEARNING CONTENT
- DEDICATED PEER NETWORK
- PROJECT PORTFOLIO
- MOCK INTERVIEWS
- CAREER ASSISTANCE

WHO IS THIS COURSE FOR?

- **Students** seeking a strong foundation in Data science and AI for **career growth.**
- **Software developers** aiming to **master** Generative AI tools like GPT.
- **Career switchers** transitioning into **high-demand data science roles.**
- **Aspiring data scientists** eager to work on **advanced AI projects.**
- **Business analysts** looking to enhance **decision-making** with **AI-driven insights.**
- **AI enthusiasts** and **innovators** exploring **Generative AI** for smarter solutions.

MASTER THESE TECHNOLOGIES

Python
NumPy
Pandas
matplotlib
plotly
seaborn
TensorFlow
scikit learn
ChatGPT
GitHub
git
jupyter
Hugging Face
Excel
MySQL
Power Bi

WHAT MAKES US DIFFERENT

- LEARN ANYTIME ANYWHERE
- CAREER- CENTRIC CURRICULUM
- EXPERT GUIDANCE
- DOUBT CLEARING SESSIONS
- WEEKLY ASSESSMENTS
- ONLINE TRAINING
- PERSONALIZED PROJECTS
- HANDS-ON PROJECTS
- MOCK INTERVIEWS
- RESUME PREPARATION

OUR CURRICULUM GUIDE

Basics of Mathematics for Data Science

1. Linear Algebra for Data Science

1.1 Introduction to Linear Algebra
- Vectors, Matrices, and Tensors
- Scalars and their importance
- Matrix Representation of Data

1.2 Matrix Operations
- Matrix Multiplication and Transpose
- Inversion and Determinants
- Identity Matrix, Diagonal Matrix

1.3 Vector Operations
- Dot Product, Cross Product
- Vector Magnitude and Direction

1.4 Applications in Data Science
- Principal Component Analysis (PCA) for Dimensionality Reduction
- Singular Value Decomposition (SVD)
- Matrix Factorization in Recommender Systems

2. Calculus for Data Science

2.1 Basic Concepts of Calculus
- Functions and Limits
- Derivatives and Gradients
- Integration Basics

2.2 Differentiation and Optimization
- Finding the Gradient: Gradient Descent Algorithm
- Optimization in Machine Learning: Minimizing Loss Functions

2.3 Multivariable Calculus
- Partial Derivatives
- Optimization in Multidimensional Space
- Chain Rule in Backpropagation (Deep Learning)

3. Discrete Mathematics for Data Science

3.1 Set Theory
- Basic Set Operations: Union, Intersection, Difference
- Venn Diagrams and Applications

3.2 Graph Theory
- Graph Basics: Vertices, Edges, Directed vs. Undirected
- Algorithms: BFS, DFS, Dijkstra's Algorithm

3.3 Combinatorics
- Permutations, Combinations
- Counting Principles: Pigeonhole Principle

3.4 Mathematical Logic
- Propositional Logic, Predicate Logic
- Logical Operators

OUR CURRICULUM GUIDE

Python

Introduction to Python

- History
- Features
- Setting up path
- Working with Python
- Basic Syntax
- Variable and Data Types
- Operator

Conditional Statements

- If
- If- else
- Nested if-else

Looping

- For
- While
- Nested loops

Control Statements

- Break
- Continue
- Pass

String Manipulation

- Accessing Strings
- Basic Operations
- String slices
- Function and Methods

Lists

- Introduction
- Accessing list
- Operations
- Working with lists
- Function and Methods

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Python

Tuple

- Introduction
- Accessing tuples
- Operations
- Working
- Functions and Methods

Dictionaries

- Introduction
- Accessing values in dictionaries
- Working with dictionaries
- Properties
- Functions

Functions

- Defining a function
- Calling a function
- Types of functions
- Function Arguments
- Anonymous functions
- Global and local variables

Lambda Operator, Filter, Reduce and Map

- Lambda function
- Filter function
- Reduce function
- Map function

List Comprehension:

- Introduction
- Generator Comprehension
- Set Comprehension

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Python

Modules

- Importing module
- Math module
- Random module
- Packages
- Composition

Input-Output

- Printing on screen
- Reading data from keyboard
- Opening and closing file
- Reading and writing files
- Functions

Exception Handling

- Exception
- Exception Handling
- Except clause
- Try ??? finally clause
- User Defined Exceptions

Regular expressions

- Match function
- Search function
- Matching VS Searching
- Modifiers
- Patterns

Packages

- Predefined Packages
- User Defined packages

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Python

File Handling

- Text Files
- Binary Files
- Zip and Unzip Files
- Pickling
- Unpickling
- Reading Program from another Program In Command Prompt

OOPS

- Class and object
- Attributes
- Methods
- Overloading
- Overriding
- Data hiding

Inheritance

- Single Inheritance
- Multilevel Inheritance
- Multiple Inheritance
- Hybrid Inheritance
- Hierarchical Inheritance
- IS-A Relationship and HAS-A Relationship

Polymorphism

- Duck Type Philosophy
- Method Overloading
- Operator Overloading
- Constructor Overloading
- Method Overriding
- Constructor Overirding

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Python

Pandas for Data Science

- **Introduction to Pandas**
  - Overview of Pandas Library
  - Installing and Importing Pandas
  - Pandas Data Structures: Series and DataFrame
  - Creating DataFrames from Lists, Dictionaries, and CSV Files
- **Data Selection and Indexing**
  - Selecting Data: loc, iloc, at, iat
  - Indexing and Slicing DataFrames
  - Filtering Data Based on Conditions
  - Working with Multi-Index DataFrames
- **Data Cleaning and Preprocessing**
  - Handling Missing Data: isnull(), dropna(), fillna()
  - Removing Duplicates: drop_duplicates()
  - Data Transformation: apply(), map(), replace()
  - Data Type Conversion: astype()
- **Data Aggregation and Grouping**
  - GroupBy Functionality: Grouping by Columns
  - Aggregating Data: sum(), mean(), count(), agg()
  - Pivot Tables and Cross-Tabulation
  - Applying Custom Functions with apply() and transform()
- **Merging, Joining, and Concatenating**
  - Merging DataFrames: merge(), join()
  - Concatenating DataFrames: concat()
  - Handling Duplicate Indexes during Merge and Join
- **Handling Time Series Data**
  - Working with Date and Time: to_datetime(), date_range()
  - Time Series Indexing and Resampling
  - Rolling and Expanding Windows
  - Time-based Grouping and Aggregation
- **Advanced Pandas Features**
  - Window Functions: rolling(), expanding()
  - Working with Categorical Data
  - String Manipulation in Pandas: str functions
  - Efficient DataFrame Operations with applymap(), map(), pipe()

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Python

NumPy for Data Science

- **Introduction to NumPy**
  - Overview of NumPy and its Importance in Data Science
  - Installing and Importing NumPy
  - NumPy Arrays: Creation and Initialization
  - Array Data Types and Conversion
- **Array Operations and Manipulation**
  - Array Indexing, Slicing, and Iteration
  - Reshaping Arrays: reshape(), flatten(), resize()
  - Stacking and Splitting Arrays: hstack(), vstack(), split()
  - Array Concatenation and Aggregation
- **Mathematical Operations with NumPy**
  - Element-wise Operations: Addition, Subtraction, Multiplication
  - Universal Functions (ufuncs) in NumPy
  - Linear Algebra with NumPy: Matrix Multiplication, Eigenvalues
  - Statistical Functions: Mean, Median, Standard Deviation, Variance
- **Advanced NumPy Operations**
  - Broadcasting: Operations on Arrays of Different Shapes
  - Random Number Generation: random()
  - NumPy and Multidimensional Arrays (ndarrays)
  - Optimization with NumPy: Efficient Array Operations
- **NumPy for Data Manipulation**
  - Sorting and Searching Arrays
  - Indexing with Boolean Arrays
  - Advanced Indexing: Integer and Fancy Indexing
  - Handling Missing Data in NumPy Arrays

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Python

Matplotlib for Data Visualization

- **Introduction to Matplotlib**
  - Overview of Matplotlib Library
  - Installing and Importing Matplotlib
  - Basic Plotting: Line Plot, Scatter Plot, Histogram
  - Customizing Plots: Titles, Labels, Legends, Gridlines
- **Plotting Various Types of Data**
  - Line Plots and Scatter Plots
  - Bar Plots, Histograms, and Box Plots
  - Pie Charts and Area Charts
  - Subplots and Axes
- **Customizing Plots**
  - Customizing Axes: Scaling, Ticks, Limits
  - Adding Text, Annotations, and Shapes to Plots
  - Plot Styles and Themes
  - Colors and Color Maps
- **Working with Multiple Plots**
  - Creating Subplots and Grid Layouts
  - Sharing Axes in Subplots
  - Creating Legends and Labels
  - Adjusting Plot Layout with tight_layout()
- **3D Plotting**
  - Introduction to 3D Plotting in Matplotlib
  - 3D Line Plots, Scatter Plots, and Surface Plots
  - Customizing 3D Axes and Views

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Python

Seaborn for Advanced Data Visualization

- **Introduction to Seaborn**
  - Overview of Seaborn and its Relationship with Matplotlib
  - Installing and Importing Seaborn
  - Seaborn vs. Matplotlib: High-Level Interface for Statistical Plots
  - Default Aesthetics and Themes in Seaborn
- **Basic Plots in Seaborn**
  - Bar Plots, Count Plots, and Box Plots
  - Violin Plots and Strip Plots
  - Scatter Plots, Pair Plots, and Heatmaps
  - KDE (Kernel Density Estimation) Plots
- **Statistical Plotting with Seaborn**
  - Plotting Distribution: distplot(), kdeplot()
  - Regression Plots: regplot(), lmplot()
  - Categorical Data Visualization: catplot(), boxplot(), swarmplot()
- **Advanced Visualization Techniques**
  - Creating Multi-plot Grids: FacetGrid()
  - Handling Complex Datasets with pairplot()
  - Heatmap and Clustermap for Correlation Visualization
  - Customizing Plot Elements in Seaborn
- **Seaborn for Time Series and Categorical Plots**
  - Time Series Plotting: lineplot(), tsplot()
  - Categorical Plots with Seaborn: boxplot(), pointplot()
  - Customizing Legends, Axes, and Titles in Seaborn Plots

OUR CURRICULUM GUIDE

Statistics and Probability for Data Science

1. Introduction to Probability

1.1 Basic Probability Concepts

- Probability Rules: Addition and Multiplication Theorem
- Conditional Probability and Bayes' Theorem
- Types of Random Variables: Discrete and Continuous

1.2 Common Probability Distributions

- Binomial Distribution, Poisson Distribution
- Normal Distribution, Exponential Distribution
- Central Limit Theorem

1.3 Expected Value and Variance

- Mean, Median, Mode
- Variance, Standard Deviation
- Covariance and Correlation

2. Inferential Statistics

2.1 Sampling and Estimation

- Sampling Techniques: Random, Stratified, Systematic
- Sampling Distribution and Law of Large Numbers
- Point Estimation, Interval Estimation

2.2 Hypothesis Testing

- Null and Alternative Hypotheses
- p-Values, Significance Levels
- t-tests, Chi-Square Tests, ANOVA

2.3 Confidence Intervals

- Concept of Confidence Intervals
- Calculating Confidence Intervals for Means and Proportions

3. Advanced Probability and Bayesian Statistics

3.1 Bayesian Inference

- Bayes' Theorem and Posterior Distributions
- Markov Chain Monte Carlo (MCMC) Methods
- Applications of Bayesian Inference in Data Science

3.2 Markov Chains and Hidden Markov Models

- Transition Matrices and State Space
- Applications in Time Series Analysis and Reinforcement Learning

3.3 Advanced Probability Distributions

- Gamma Distribution, Beta Distribution
- Multivariate Normal Distribution

4. Regression and Correlation

4.1 Linear Regression

- Simple and Multiple Linear Regression
- Loss Functions and Optimization
- Model Evaluation: R-squared, Adjusted R-squared

4.2 Logistic Regression and Classification

- Logistic Function and Sigmoid Curve
- Cross-Entropy Loss Function
- Binary and Multiclass Classification

4.3 Correlation and Causality

- Pearson’s Correlation Coefficient
- Causality vs. Correlation

OUR CURRICULUM GUIDE

Machine Learning

Introduction to Machine Learning

- Overview of Machine Learning in Data Science
- Types of Machine Learning: Supervised, Unsupervised, Reinforcement Learning
- Machine Learning Workflow

Supervised Learning

- Regression Algorithms:
  - Linear Regression, Polynomial Regression
- Classification Algorithms:
  - Logistic Regression,
  - K-Nearest Neighbors (KNN),
  - Support Vector Machines (SVM),
  - Decision Trees,
  - Random Forests
- Model Evaluation:
  - Accuracy,
  - Precision,
  - Recall,
  - F1-Score,
  - ROC Curve,
  - Confusion Matrix
- Cross-Validation and Hyperparameter Tuning

Unsupervised Learning

- **Clustering Algorithms:**
  - K-Means,
  - Hierarchical Clustering,
  - DBSCAN
- **Dimensionality Reduction:**
  - Principal Component Analysis (PCA),t-SNE, LDA

Ensemble Methods

- **Bagging and Boosting:**
  - Random Forests,
  - AdaBoost,
  - Gradient Boosting,
  - XGBoost,
  - LightGBM
- **Stacking and Voting Classifiers**

Reinforcement Learning

- Basics of Reinforcement Learning:
  - Markov Decision Process,
  - Bellman Equation
- Q-Learning and Deep Q-Networks (DQN)
- Policy Gradient Methods

OUR CURRICULUM GUIDE

Deep Learning

Introduction to Deep Learning

- Overview of Deep Learning and Neural Networks
- Difference Between Machine Learning and Deep Learning
- Artificial Neurons and Activation Functions

Fundamentals of Neural Networks

- Architecture of Neural Networks: Layers, Neurons, Activation Functions
- Backpropagation and Gradient Descent
- Loss Functions: Mean Squared Error, Cross-Entropy

Convolutional Neural Networks (CNNs)

- Overview of CNNs and Convolution Operations
- Pooling Layers: Max Pooling, Average Pooling
- Applications of CNNs: Image Classification, Object Detection
- Transfer Learning and Pretrained Models

Recurrent Neural Networks (RNNs)

- Understanding RNNs: Sequence Modeling, Time Series
- Long Short-Term Memory (LSTM) Networks
- Gated Recurrent Units (GRUs)
- Applications: Language Modeling, Sentiment Analysis

Generative Models

- Generative Adversarial Networks (GANs): Overview and Architecture
- Applications of GANs: Image Generation, Style Transfer
- Variational Autoencoders (VAEs)

Deep Reinforcement Learning

- Q-Learning with Neural Networks
- Policy Gradient Methods
- Actor-Critic Algorithms

Deep Learning Frameworks

- TensorFlow, Keras, PyTorch
- Building and Training Models in Keras/PyTorch
- Model Optimization Techniques: Dropout, Batch Normalization

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Natural Language Processing (NLP)

Introduction to NLP

- Overview of NLP in Data Science
- Text Preprocessing: Tokenization, Lemmatization, Stop-word Removal, Stemming
- Text Representation: Bag-of-Words, TF-IDF

Text Classification and Sentiment Analysis

- Text Classification Algorithms: Naive Bayes, Logistic Regression, SVM
- Sentiment Analysis: Binary and Multiclass Classification
- Model Evaluation for NLP Tasks

Word Embeddings

- Introduction to Word Embeddings
- Word2Vec: Skip-gram and CBOW Models
- GloVe (Global Vectors for Word Representation)
- FastText and ELMo

Recurrent Neural Networks (RNNs) for NLP

- Sequence Modeling with RNNs
- LSTM and GRU for Text Generation
- Named Entity Recognition (NER)

Transformer Models

- Attention Mechanism and Self-Attention
- Transformer Architecture: Encoder and Decoder
- BERT (Bidirectional Encoder Representations from Transformers)
- GPT (Generative Pretrained Transformer)

Sequence-to-Sequence Models

- Encoder-Decoder Architecture
- Applications: Machine Translation, Text Summarization
- Attention Mechanisms in Seq2Seq Models

Question Answering and Conversational AI

- Building Question Answering Systems
- Chatbots with NLP
- Dialog Systems: Seq2Seq Models, Transformer-based Models

Topic Modeling and Text Clustering

- Latent Dirichlet Allocation (LDA)
- K-Means Clustering for Text
- Topic Coherence Measures

NLP Tools and Libraries

- NLTK, spaCy, Hugging Face Transformers
- Named Entity Recognition (NER) with spaCy
- Text Preprocessing and Feature Engineering Techniques

Deep Learning for NLP

- Deep Learning Models for NLP Tasks
- Fine-tuning Pretrained Models (BERT, GPT) for Specific Tasks
- Transfer Learning in NLP

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Generative AI in Data Science

Introduction to Generative AI

- Definition and applications in Data Science
- Key types of generative models: GANs, VAEs, and Transformers

Generative Adversarial Networks (GANs)

- Overview and architecture (Generator vs. Discriminator)
- Common types: DCGAN, WGAN, cGAN, StyleGAN
- Applications in image, video, and data synthesis
- GANs for data augmentation and anomaly detection

Variational Autoencoders (VAEs)

- Overview of encoder-decoder architecture
- Applications in data compression, anomaly detection, and generative modeling

Transformer Models (GPT, BERT, T5)

- Understanding the Transformer architecture and attention mechanisms
- Applications of GPT (Generative Pretrained Transformers) for text generation, summarization, translation
- Fine-tuning models for domain-specific tasks

Diffusion Models

- Overview of diffusion processes in generative modeling
- Examples: DALL·E, Stable Diffusion for text-to-image generation
- Applications in creative industries (art, design, etc.)

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Prompt Engineering in Data Science

Introduction to Prompt Engineering

- Definition and role of prompts in controlling generative models
- Techniques for creating structured vs. unstructured prompts
- Zero-shot, one-shot, and few-shot learning with prompts

Prompt Engineering for Text Generation

- Best practices for crafting prompts for GPT-based models
- Fine-tuning and adjusting prompts for content generation tasks (summarization, conversation, etc.)

Multi-Modal Prompting

- Crafting prompts for generating multiple types of outputs (text-to-image, text-to-video)
- Integration of different data modalities using AI models

Refining Prompts for Optimization

- Iterative and feedback-based approaches to refining prompts
- Using temperature, top-k sampling, and beam search for controlling model outputs

Advanced Prompting Techniques

- Contextual prompts for long-form text generation
- Handling model biases and ethical considerations in prompts
- Dynamic prompting: Changing prompts based on model responses

Human-in-the-Loop Prompting

- Collaboration with humans to fine-tune and validate AI-generated content
- Continuous improvement of prompts based on user feedback

OUR CURRICULUM GUIDE

Excel for Data Science

Introduction to Excel for Data Science

- Overview of Excel and its relevance to Data Science
- Importance of Excel for data cleaning, analysis, and visualization
- Basic functions: SUM, AVERAGE, COUNT, MIN, MAX

Data Cleaning and Manipulation

- Sorting and Filtering Data
- Using Text Functions (LEFT, RIGHT, MID, FIND, CONCATENATE, TEXT)
- Handling Missing Data: Filtering, Removing, or Replacing Nulls
- Conditional Formatting for Visual Data Inspection

Advanced Excel Functions

- Lookup Functions: VLOOKUP, HLOOKUP, INDEX & MATCH
- Working with PivotTables and PivotCharts
- Data Validation for Ensuring Quality and Accuracy
- Applying Conditional Logic: IF, IFERROR, AND, OR

Data Visualization and Analysis

- Creating Basic Charts: Bar, Line, Pie, Scatter
- Advanced Charting Techniques: Combo Charts, Histogram, and Heatmaps
- Using Excel for Descriptive Statistics: Mean, Median, Standard Deviation
- Trendlines, Forecasting, and Regression Analysis in Excel

Excel for Reporting and Dashboards

- Designing Dashboards in Excel
- Using Slicers and Timeline Filters for Interactivity
- Summary and Data Insights with Power Query and Power Pivot

OUR CURRICULUM GUIDE

SQL for Data Science

Introduction to SQL

- Overview of Databases and SQL
- Basic SQL Syntax and Commands (SELECT, FROM, WHERE)
- Filtering and Sorting Data with WHERE and ORDER BY
- Using SQL Functions: COUNT, SUM, AVG, MIN, MAX

SQL Joins and Relationships

- Types of Joins: INNER JOIN, LEFT JOIN, RIGHT JOIN, FULL JOIN
- Using JOIN with Multiple Tables
- UNION vs. UNION ALL
- Working with Subqueries and Nested Queries

Aggregation and Grouping

- GROUP BY for Data Aggregation
- HAVING Clause for Filtering Aggregated Data
- Using SQL Window Functions: ROW_NUMBER, RANK, LEAD, LAG

SQL Data Manipulation

- Inserting, Updating, and Deleting Data with INSERT, UPDATE, DELETE
- Creating and Altering Tables
- Managing Data Integrity: Constraints and Indexes
- Transactions and Locking in SQL

Advanced SQL Techniques

- Data Normalization and Denormalization
- Optimizing SQL Queries for Performance
- SQL for Time Series Analysis and Windowing
- Using SQL for Data Transformation: CASE, COALESCE

OUR CURRICULUM GUIDE

Power BI for Data Science

Introduction to Power BI

- Overview of Power BI and its role in Data Science
- Power BI Desktop vs. Power BI Service
- Connecting to Data Sources (Excel, SQL Server, CSV, Web Data)
- Power BI Interface: Report View, Data View, and Relationships View

Data Cleaning and Transformation with Power Query

- Introduction to Power Query Editor
- Importing, Cleaning, and Shaping Data
- Removing Duplicates, Filtering Rows, and Data Type Conversion
- Merging and Appending Queries in Power Query

Building Visualizations in Power BI

- Creating Basic Visualizations: Tables, Charts, and Cards
- Customizing Visuals: Formatting, Titles, and Colors
- Advanced Visualizations: Tree Maps, Waterfall, Gauges, and Maps
- Using Slicers, Filters, and Drill-Through to Enhance Interactivity

Data Modeling in Power BI

- Creating Relationships between Tables
- Using Calculated Columns, Measures, and DAX Functions
- Time Intelligence Functions in DAX (e.g., YEAR, MONTH, TOTALYTD)
- Building Complex Data Models for Reporting

Power BI Dashboards and Reports

- Designing Interactive Dashboards
- Setting up Data Refresh and Scheduled Updates
- Sharing and Publishing Reports to Power BI Service
- Collaboration and Commenting in Power BI Service