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GENERATIVE AI

INDEX

- Python Scripting Certification Course (Self-paced)
- Data Science with Python
- Artificial Intelligence Course
- ChatGPT Complete Course: Beginners to Advanced
- Prompt Engineering with Generative AI
- Generative AI Industry Application (Self-paced)

Python Scripting

Module 1: Introduction to Python

Topics

- Overview of Python
- The Companies using Python
- Other applications in which Python is used
- Discuss Python Scripts on UNIX/Windows
- Variables
- Operands and Expressions
- Conditional Statements
- Loops
- Command Line Arguments
- Writing to the screen

Module 2: Sequences and File Operations

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Topics:

- Python files I/O Functions
- Lists and related operations
- Tuples and related operations
- Strings and related operations
- Sets and related operations
- Dictionaries and related operations

Module 3: Deep Dive – Functions, OOPs, Modules, Errors and Exception

Topics:

- Functions
- Function Parameters
- Global variables
- Variable scope and Returning Values
- Lambda Functions
- Object Oriented Concepts
- Standard Libraries
- Modules Used in Python (OS, Sys, Date and Time etc.)
- The Import statements
- Module search path
- Package installation ways
- Errors and Exception Handling
- Handling multiple exceptions

Module 4: Introduction to NumPy & Pandas

Topics:

- NumPy – arrays
- Operations on arrays
- Indexing slicing and iterating
- Reading and writing arrays on files

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- Pandas - data structures & index operations
- Reading and Writing data from Excel/CSV formats into Pandas

Module 5: Data visualization

Topics:

- Matplotlib library
- Grids, axes, plots
- Markers, colours, fonts and styling
- Types of plots - bar graphs, pie charts, histograms
- Contour plots

Data Science with Python

Module 1: Introduction to Data Science and ML using Python

Topics:

- Overview of Python
- The Companies using Python
- Different Applications where Python Is Used
- Discuss Python Scripts on UNIX/Windows
- Values, Types, Variables
- Operands and Expressions
- Conditional Statements
- Loops
- Command Line Arguments
- Writing to the Screen
- What is Data Science?
- What does Data Science involve?
- Era of Data Science
- Business Intelligence vs Data Science

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- Life cycle of Data Science
- Tools of Data Science

Module 2: Data Handling, Sequences and File Operations

Topics:

- Data Analysis Pipeline
- What is Data Extraction?
- Types of Data
- Raw and Processed Data
- Data Wrangling
- Python files I/O Functions
- Numbers
- Strings and related operations
- Tuples and related operations
- Lists and related operations
- Dictionaries and related operations
- Sets and related operations

Module 3: Deep Dive – Functions, OOPs, Modules, Errors, and Exceptions

Topics:

- Functions
- Function Parameters
- Global Variables
- Variable Scope and Returning Values
- Lambda Functions
- Object Oriented Concepts
- Standard Libraries
- Modules Used in Python
- The Import Statements
- Module Search Path
- Package Installation Ways

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- Errors and Exception Handling
- Handling Multiple Exceptions

Module 4: Introduction to NumPy, Pandas, and Matplotlib

Topics:

- Data Analysis
- NumPy – arrays
- Operations on arrays
- Indexing, slicing, and iterating
- Reading and writing arrays on files
- Pandas - data structures & index operations
- Reading and Writing data from Excel/CSV formats into Pandas
- Metadata for imported Datasets
- Matplotlib library
- Grids, axes, plots
- Markers, colors, fonts, and styling
- Types of plots - bar graphs, pie charts, histograms
- Contour plots

Module 5: Data Manipulation

Topics:

- Basic Functionalities of a data object
- Merging of Data objects
- Concatenation of data objects
- Types of Joins on data objects
- Exploring and analyzing datasets
- Analyzing a dataset

Module 6: Introduction to Machine Learning with Python

Topics:

- What is Machine Learning?
- Machine Learning Use-Cases
- Machine Learning Process Flow

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- Machine Learning Categories
- Linear regression
- Gradient descent

Module 7: Supervised Learning – I

Topics:

- What are Classification and its use cases?
- What is a Decision Tree?
- Algorithm for Decision Tree Induction
- Creating a Perfect Decision Tree
- Confusion Matrix
- What is Random Forest?

Module 8: Dimensionality Reduction

Topics:

- Introduction to Dimensionality
- Why Dimensionality Reduction
- PCA
- Factor Analysis
- Scaling dimensional model
- LDA

Module 9: Supervised Learning – I

Topics:

- What is Naïve Bayes?
- How Naïve Bayes works?
- Implementing Naïve Bayes Classifier
- What is a Support Vector Machine?
- Illustrate how Support Vector Machine works
- Hyperparameter Optimization

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- Grid Search vs. Random Search
- Implementation of Support Vector Machine for Classification

Module 10: Unsupervised Learning

Topics:

- What is Clustering & its Use Cases?
- What is K-means Clustering?
- How does the K-means algorithm works?
- How to do optimal clustering
- What is C-means Clustering?
- What is Hierarchical Clustering?
- How does Hierarchical Clustering work?

Module 11: Association Rules Mining and Recommendation Systems

Topics:

- What are Association Rules?
- Association Rule Parameters
- Calculating Association Rule Parameters
- Recommendation Engines
- How do Recommendation Engines work?
- Collaborative Filtering
- Content-Based Filtering

Module 12: Reinforcement Learning (Self-Paced)

Topics:

- What is Reinforcement Learning?
- Why Reinforcement Learning?
- Elements of Reinforcement Learning

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- Exploration vs. Exploitation dilemma
- Epsilon Greedy Algorithm
- Markov Decision Process (MDP)
- Q values and V values
- Q – Learning
- Values

Module 13: Time Series Analysis (Self-Paced)

Topics:

- What is Time Series Analysis?
- Importance of TSA
- Components of TSA
- White Noise
- AR model
- MA model
- ARMA model
- ARIMA model
- Stationarity
- ACF & PACF

Module 14: Model Selection and Boosting

Topics:

- What is Model Selection?
- Need for Model Selection
- Cross Validation
- What is Boosting?
- How do Boosting Algorithms work?
- Types of Boosting Algorithms
- Adaptive Boosting

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Module 15: Statistical Foundations (Self-Paced)

Topics:

- What is Exploratory Data Analysis?
- EDA Techniques
- EDA Classification
- Univariate Non-graphical EDA
- Univariate Graphical EDA
- Multivariate Non-graphical EDA
- Multivariate Graphical EDA
- Heat Maps

Module 16: Database Integration with Python (Self-Paced)

Topics:

- Basics of database management
- Python MySql
- Create database
- Create a table
- Insert into table
- Select query
- Where clause
- OrderBy clause
- Delete query
- Drop table
- Update query
- Limit clause
- Join and Self-Join
- MongoDB (Unstructured)
- Insert_one query
- Insert_many query
- Update_one query
- Update_many query

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- Create_index query
- Drop_index query
- Delete and drop collections
- Limit query

Module 17: Data Connection and Visualization in Tableau (Self-Paced)

Topics:

- Data Visualization
- Business Intelligence tools
- VizQL Technology
- Connect to data from the File
- Connect to data from the Database
- Basic Charts
- Chart Operations
- Combining Data
- Calculations

Module 18: Advanced Visualizations (Self-Paced)

Topics:

- Trend lines
- Reference lines
- Forecasting
- Clustering
- Geographic Maps
- Using charts effectively
- Dashboards
- Story Points
- Visual best practices
- Publish to Tableau Online

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Module 19: In-Class Project (Self-Paced)

Topics:

- Predict the species of Plant

Artificial Intelligence

Module 1: Introduction to Text Mining and NLP

Topics:

- Overview of Text Mining
- Need of Text Mining
- Natural Language Processing (NLP) in Text Mining
- Applications of Text Mining
- OS Module
- Reading, Writing to text and word files
- Setting the NLTK Environment
- Accessing the NLTK Corpora

Module 2: Extracting, Cleaning and Preprocessing Text

Topics:

- Tokenization
- Frequency Distribution
- Different Types of Tokenizers
- Bigrams, Trigrams & Ngrams
- Stemming
- Lemmatization

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- Stopwords
- POS Tagging
- Named Entity Recognition

Module 3: Analyzing Sentence Structure

Topics:

- Syntax Trees
- Chunking
- Chinking
- Context Free Grammars (CFG)
- Automating Text Paraphrasing

Module 4: Text Classification – I

Topics:

- Machine Learning: Brush Up
- Bag of Words
- Count Vectorizer
- Term Frequency (TF)
- Inverse Document Frequency (IDF)

Module 5: Introduction to Deep Learning

Topics:

- What is Deep Learning?
- Curse of Dimensionality
- Machine Learning vs. Deep Learning
- Use cases of Deep Learning
- Human Brain vs. Neural Network
- What is Perceptron?
- Learning Rate

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- Epoch
- Batch Size
- Activation Function
- Single Layer Perceptron

Module 6: Getting Started with TensorFlow 2.0

Topics:

- Introduction to TensorFlow 2.x
- Installing TensorFlow 2.x
- Defining Sequence model layers
- Activation Function
- Layer Types
- Model Compilation
- Model Optimizer
- Model Loss Function
- Model Training
- Digit Classification using Simple Neural Network in TensorFlow 2.x
- Improving the model
- Adding Hidden Layer
- Adding Dropout
- Using Adam Optimizer

Module 7: Convolution Neural Network

Topics:

- Image Classification Example
- What is Convolution
- Convolutional Layer Network
- Convolutional Layer
- Filtering
- ReLU Layer

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- Pooling
- Data Flattening
- Fully Connected Layer
- Predicting a cat or a dog
- Saving and Loading a Model
- Face Detection using OpenCV

Module 8: Regional CNN

Topics:

- Regional-CNN
- Selective Search Algorithm
- Bounding Box Regression
- SVM in RCNN
- Pre-trained Model
- Model Accuracy
- Model Inference Time
- Model Size Comparison
- Transfer Learning
- Object Detection – Evaluation
- mAP
- IoU
- RCNN – Speed Bottleneck
- Fast R-CNN
- RoI Pooling
- Fast R-CNN – Speed Bottleneck
- Faster R-CNN
- Feature Pyramid Network (FPN)
- Regional Proposal Network (RPN)
- Mask R-CNN

Module 9: Boltzmann Machine & Autoencoder

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Topics:

- What is Boltzmann Machine (BM)?
- Identify the issues with BM
- Why did RBM come into the picture?
- Step-by-step implementation of RBM
- Distribution of Boltzmann Machine
- Understanding Autoencoders
- Architecture of Autoencoders
- Brief on types of Autoencoders
- Applications of Autoencoders

Module 10: Generative Adversarial Network (GAN)

Topics:

- Which Face is Fake?
- Understanding GAN
- What is Generative Adversarial Network?
- How does GAN work?
- Step by step Generative Adversarial Network implementation
- Types of GAN
- Recent Advances: GAN

Module 11: Emotion and Gender Detection (Self-paced)

Topics:

- Where do we use Emotion and Gender Detection?
- How does it work?
- Emotion Detection architecture
- Face/Emotion detection using Haar Cascade
- Implementation on Colab

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Module 12: Introduction to RNN and GRU (Self-paced)

Topics:

- Issues with Feed Forward Network
- Recurrent Neural Network (RNN)
- Architecture of RNN
- Calculation in RNN
- Backpropagation and Loss calculation
- Applications of RNN
- Vanishing Gradient
- Exploding Gradient
- What is GRU?
- Components of GRU
- Update gate
- Reset gate
- Current memory content
- Final memory at current time step

Module 13: LSTM (Self-paced)

Topics:

- What is LSTM?
- Structure of LSTM
- Forget Gate
- Input Gate
- Output Gate
- LSTM architecture
- Types of Sequence-Based Model
- Sequence Prediction
- Sequence Classification
- Sequence Generation
- Types of LSTM
- Vanilla LSTM

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- Stacked LSTM
- CNN LSTM
- Bidirectional LSTM
- How to increase the efficiency of the model?
- Backpropagation through time
- Workflow of BPTT

Module 14: Auto Image Captioning Using CNN LSTM (Self-paced)

Topics:

- Auto Image Captioning
- COCO dataset
- Pre-trained model
- Inception V3 model
- The architecture of Inception V3
- Modify the last layer of a pre-trained model
- Freeze model
- CNN for image processing
- LSTM or text processing

Module 15: Developing a Criminal Identification and Detection Application Using OpenCV (Self-paced)

Topics:

- Why is OpenCV used?
- What is OpenCV
- Applications
- Demo: Build a Criminal Identification and Detection App

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Module 16: TensorFlow for Deployment (Self-paced)

Topics:

- Use Case: Amazon's Virtual Try-Out Room.
- Why Deploy models?
- Model Deployment: Intuit AI models
- Model Deployment: Instagram's Image Classification Models
- What is Model Deployment
- Types of Model Deployment Techniques
- TensorFlow Serving
- Browser-based Models
- What is TensorFlow Serving?
- What are Servable?
- Demo: Deploy the Model in Practice using TensorFlow Serving
- Introduction to Browser based Models
- Demo: Deploy a Deep Learning Model in your Browser.

Module 17: Text Classification-II (Self-paced)

Topics:

- Converting text to features and labels
- Multinomial Naive Bayes Classifier
- Leveraging Confusion Matrix

Module 18: In Class Project (Self-paced)

Topics:

- Sentiment Classification on Movie Rating Dataset

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ChatGPT Complete Course: Beginners to Advanced

Module 1: Unveiling ChatGPT: Conversing with Superintelligence

Topics:

- Introduction to Generative AI
- Introduction to ChatGPT and OpenAI
- Unleashing the Power of ChatGPT
- The Applications of ChatGPT
- Human-AI Collaboration and the Future
- Engaging with ChatGPT
- Wrapping Up and Looking Ahead

Module 2: Prompt Engineering and ChatGPT Plugins

Topics:

- Introduction to Prompt Engineering
- Why Prompt Engineering?
- What is Prompt Engineering?
- Applications of Prompt Engineering
- Types of Prompting

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- Priming Prompts
- Prompt Decomposition
- How to Get Better Responses from ChatGPT
- ChatGPT Plugins

Module 3: ChatGPT for Productivity

Topics:

- Leveraging ChatGPT for Productivity
- Mastering Excel through ChatGPT
- Becoming a Data Scientist using ChatGPT
- Data Analysis in PowerBI with ChatGPT
- Creating a Content Marketing Plan
- Social Media Marketing using ChatGPT
- Keyword Search and SEO using ChatGPT
- Generating Content using ChatGPT
- Implementing ChatGPT for Customer Service
- Email Marketing using ChatGPT
- Developing a Project Management Plan using ChatGPT

Module 4: ChatGPT for Developers and Exploring ChatGPT API

Topics:

- ChatGPT for Creating Programs
- ChatGPT for Debugging
- ChatGPT for Integrating New Features
- ChatGPT for Testing
- Documenting Your Code with ChatGPT

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- Essential Application Programming Interface (API) Concepts
- Introducing OpenAI and ChatGPT API

Module 5: GPT Models, Pre-processing and Fine-tuning ChatGPT

Topics:

- Overview of language models
- Understanding the architecture of the GPT model
- GPT models: advantages and disadvantages
- Overview of the pre-trained GPT models available for fine-tuning
- Training of ChatGPT
- Data preparation
- Model architecture
- Hyperparameter tuning
- Training process

Module 6: Building an AI Powered Chatbot

Topics:

- Creating a Chatbot using Chatterbot
- Building an Interactive Chatbot using Rasa
- Developing your own Chatbot using ChatGPT API

Module 7: Deploying and Integrating ChatGPT in Business Applications (Self-paced)

Topics:

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- Integrate ChatGPT with Power Automate
- Integrate ChatGPT with Power Apps
- Integrate ChatGPT with Excel
- Create a serverless Rest API with ChatGPT

Prompt Engineering with Generative AI

Module 1: Generative AI and its Industry Applications

Topics:

- Generative AI Principles
- Types of Generative Models
- Applications of Generative Models
- Machine Learning Algorithms with GenAI
- Applications of Generative AI
- Generative AI: Advantages and Disadvantages
- Ethical Considerations

Module 2: NLP and Deep Learning

Topics:

- Natural Language Processing (NLP) Essentials
- Text Classification
- Text Preprocessing
- Basic NLP Tasks
- Deep Learning for NLP
- Neural Networks
- Backpropagation
- RNN
- Deep Learning Applications in NLP

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Module 3: Prompt Engineering

Topics:

- Prompt Engineering Principles
- What is Prompt Engineering?
- Importance and Applications
- Prompt Design Strategies
- Types of Prompting
- Crafting Effective Prompts
- Parameter Tuning

Module 4: Generative AI with LLMs

Topics:

- LLMs and Generative AI Project Lifecycle
- LLM Pre-Training and Scaling
- Fine-Tuning LLMs with Specific Instructions
- Efficient Fine-Tuning of Parameters
- Reinforcement Learning from Human Response

Module 5: LLMs for Search, Prediction, and Generation

Topics:

- Search Query Completion
- Next Word Prediction
- Word Embeddings
- Transformers

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- Generating Text
- Stacking Attention Layers

Module 6: LangChain for LLM Application Development

Topics:

- LangChain Foundations
- Benefits of using LangChain
- Using LangChain to Develop LLM Applications
- Value Propositions of LangChain
- Components of LangChain
- Off-the-Shelf Chains in LangChain
- Build and Deploy LLM-Powered Applications using LangChain

Module 7: Generative AI on Cloud

Topics:

- Cloud Computing Foundations
- AWS S3
- Amazon EC2 Trn1n
- Amazon EC2 Inf2
- Amazon Sagemaker
- Amazon CodeWhisperer
- Amazon Bedrock
- Azure OpenAI

Module 8: Working with ChatGPT (Self-paced)

Topics:

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- Introduction to ChatGPT
- Leveraging ChatGPT for Productivity
- Mastering Excel through ChatGPT
- Becoming a Data Scientist using ChatGPT
- Data Analysis in PowerBI with ChatGPT
- Creating a Content Marketing Plan
- Social Media Marketing using ChatGPT
- Keyword Search and SEO using ChatGPT
- Generating Content using ChatGPT
- Implementing ChatGPT for Customer Service
- ChatGPT for Developers
- ChatGPT for Creating Programs
- ChatGPT for Debugging
- ChatGPT for Integrating New Features
- ChatGPT for Testing
- Documenting the Code with ChatGPT

Module 9: Python with Generative AI (Self-paced)

Topics:

- Python Code Generation with Generative AI
- Gen AI Tools for Coding
- Advanced Code Optimization with ChatGPT Gen AI Tool
- Coding with ChatGPT
- Building an Application in Python with ChatGPT

Module 10: Evaluating LLM Performance (Self-paced)

Topics:

- LLM Performance Comparison
- Perplexity
- BLEU Score

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- Human Evaluation
- Choosing the Right Metrics
- Interpreting the Results

Module 15: Bonus Module - Machine Learning with Generative AI (Self-paced)

Topics:

- Artificial Intelligence Essentials
- Disciplines of AI
- Types of AI
- Machine Learning Fundamentals
- Predictive ML Models
- ML Algorithms: Deep Dive
- Supervised Learning
- Unsupervised Learning
- Semi-Supervised Learning
- Reinforcement Learning

Module 16: Bonus Module - Generative AI Tools (Self-paced)

Topics:

- Hugging Face Transformers
- OpenAI GPT3 API
- Google Cloud AI Platform
- MidJourney
- DALL E- 2
- Google Bard

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Generative AI Industry Applications

Module 1: Leveraging Generative AI for Fraud Detection

Topics:

- Overview of Gen AI in Fraud Detection
- Email Fraud Detection using GAN model
- Best Practices

Module 2: Using Midjourney for Generative AI Art

Topics:

- Artistic Exploration with Gen AI MidJourney
- Getting Started with MidJourney
- MidJourney User Interface
- Crafting Visuals using MidJourney

Module 3: GitHub Copilot for Developers

Topics:

- GitHub Copilot: Introduction, Installation, and Configuration
- GitHub Copilot: Improving Developer Efficiency
- Application Scenarios, Problem Solving, and Summary

Module 4: Generative AI: Privacy and Protection Perspectives

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Topics:

- Introduction to Data Privacy
- Privacy Challenges and Regulations in Generative AI
- Safeguarding Data Privacy at Your Workplace
- Legal and Ethical Considerations

Module 5: Generative AI for Cyber Security

Topics:

- Overview of Cybersecurity
- Essentials of Cybersecurity
- Gen AI Applications in Cybersecurity
- Gen AI for Intrusion Detection Systems
- Automating Security Operations using Gen AI
- Enhancing Network and Endpoint Security with Gen AI
- Anticipated Trends and Challenges in the Future
- Components, Strongly Connected Components, Label Propagation

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