



TIME TO LEARN

Data Science & Machine Learning with Python

সম্পূর্ণ মেশিন লার্নিং কোর্স
(NEW Module)

Total Class: 23; **Total Hours:** ~50 hours

Class time: 9:00 PM, **Class Per Week:** 2

Total Fees: 7,000 BDT

Course Instructor:

Rashedul Alam Shakil

M. Sc. in Data Science

Friedrich Alexander University, Germany

Contact:

Cell: +880 1704265972

www.aiquest.org



Course Plan: Approx Duration: 50 Hours, Total Live Class: 23, Watch [Demo Class!](#)

Facilities: Live Class, Separate Classroom, Recording Class Access for Lifetime, Certificate

Any Questions? +8801704265972 (Call/WhatsApp)

Course Instructor:

[Rashedul Alam Shakil](#)

Founder of aiQuest Intelligence & [Study Mart](#)

M. Sc. In Data Science (Major Machine Learning)

FAU Erlangen Nuremburg, Germany

AiQuest.org – ML Module Summary

Module 01: Introduction to Data Science & AI

Module 02: Basics Python

Module 03: Regression Algorithms

Module 04: Feature Engineering

Module 05: Basics of Linear Algebra

Module 06: Statistics for Data Science

Module 07: Classification Algorithms

Module 08: ML Model Evaluation

Module 09: Unsupervised Learning [**Demo Class**]

Module 10: Hyperparameter Optimization

Module 11: Deep Learning & Neural Networks

Let's get into the details.....

Module 01: Introduction to Data Science & Artificial Intelligence (01 - Class & 2.0 hours plan)

- Introduction to Data Science & Artificial Intelligence
- Details Explanation & the Definition of –
 - Data, Information, Database, Data Warehouse
 - Machine Learning
 - Neural Networks
 - Supervised & Unsupervised Learning
 - Regression, Classification, Clustering
 - NLP, LLMs & Generative AI
- Future of AI
- Job Market Research
- Data Science Tools

Questions & Answer Session!

Module 02: Basic Python (02 - Class & 5.0 hours plan)

- IDE Installation
- Variables & Data Types
- Loops & Control Flow
- Functions
- Data Structures
- Intro to -
 - Pandas
 - Numpy
 - Matplotlib & Seaborn
- Discussion on –
 - Scikit-learn
 - Keras, TensorFlow & Pytorch

***Assignment on 100 Basic Python Problem Solving**

Questions & Answer Session!

Module 03: Regression Algorithms (04 - Class & 8.0 hours plan)

1. Linear Regression:

- Linear Equations
- Lines: Straight, Curve
- Terminologies: Slope/Gradient, Intercept
- Regularizations:
 - L1 Regularization / Lasso
 - L2 Regularization / Ridge
- Loss & Cost Functions:
 - MSE
 - MAE
 - RMSE
- In-depth Mathematical Intuition of Least Square Method
- Polynomial Regression
- Implementing Everything with Python, Pandas, Numpy & Sklearn
- **Complete the Assignment within the Deadline!**

2. Gradient Decent:

- Differential Calculus Basics
- Convex Vs. Non-convex Functions
- In-depth Mathematical Intuition of Gradient Decent for Regression
- Implementing Regression with Gradient Decent with Python & Numpy
- **Complete the Assignment within the Deadline!**

***Project on: Time Series Forecasting using Linear Regression, ARIMA & Prophet**

3. K-Nearest Neighbors Regressor (KNN):

- Distance Algorithms & Norms
 - Manhattan Distance / L1 Norm
 - Euclidean Distance / L2 Norm
 - Minkowski Distance
- In-depth Mathematical Intuition of KNN Regressor
- Implementing Everything with Python & Sklearn
 - Project
- **Complete the Assignment within the Deadline!**

4. Bayesian Interface in Neural Networks (BNNs):

- Bayesian Interface
- Typical Neural Networks
- BNNs
- Typical Neural Networks Vs. BNNs
- Uncertainty Estimation
- Mathematical Foundation of BNNs:
 - Variational Distribution
 - Variational Posterior
 - True Posterior
 - KL-Divergence
 - Monte-Carlo approximation
 - Local Reparameterization Trick
- Python Implementations of BNNs for Regression
- *We will Learn it in Module no 09: Deep Learning*
- **I will Suggest some Playlists. Which are Important for Deep Learning & Bayesian NNs.**

Module 04: Feature Engineering (04 - Class & 8.0 hours plan)

1. Categorical Data Encoding:

- Type of Variables
- Measure of Central Tendency
- NaN Handling
- Label Encoder
- One Hot Encoder
 - Dummy Variable Trap
 - Multicollinearity Problem
- Binary Encoding
- Ordinal Encoding
- Implementing with Python & Pandas
- **Complete the Assignment within the Deadline!**

2. Feature Transformation / Data Scaling:

- Concepts of Scaling
- Standardization
 - Mean
 - Standard Deviation
 - Variance
- Normalization
- MaxAbsScaler
- Robust Scaler
 - Q1
 - Q2
 - Q3
 - IQR
- Power Transformation
- Log Transformation
- Implementing with Python & Pandas
- **Complete the Assignment within the Deadline!**

3. Text Data Preprocessing & Feature Extraction / Vectorizer:

- Tokenization:
 - Word tokens
 - Character tokens
 - Sentence tokens
 - Named entity tokens.
 - Part-of-speech (POS) tags
 - Sub-word tokens
- Text Normalization:
 - Stemming
 - Lemmatization
- Vectorizer:
 - Bag of Words / Count Vectorizer
 - TF Idf Vectorizer:
 - Term Frequency
 - Inverse Document Frequency

- Word2Vec
- Implementation of Text Normalization with Python & NLTK
- Implementation of Vectorizer with Python & NLTK
- **Complete the Assignment within the Deadline!**

4. Feature Selection for High Dimensionality Reduction:

- Filter Methods
- Wrapper Methods
- Embedded Methods
- Implementation of Everything with Python
- We will also Learn PCA Concepts
- **Complete the Assignment within the Deadline!**

Module 05: Basics of Linear Algebra (01 Class & 2.50 Hour Plan)

- Vectors
- Matrix
- Matrix Operation
- System of Linear Equations
- Determinants
- Gaussian Elimination
- Crammers Rules
- Eigenvalues and Eigenvectors
- Calculation Principal Component Analysis Step by Step
- Implementation of Everything with Python
- I will Suggest One Video Series for Linear Algebra
- **Complete the Assignment within the Deadline!**

Module 06: Statistics for Data Science (01 Class & 2 Hour Plan)

- Various Data Distributions
- Probability Theory
- Hypothesis Testing
- Z Scores
- P Value
- Analysis of Variance – ANOVA
- When to use / Where to use?

- Boxplot Concepts
- Outlier Detection
- Implementation of Everything with Python
- **Complete the Assignment within the Deadline!**

Module 07: Classification Algorithms (07 Class & 14 Hours Plan)

1. Decision Tree:

- Entropy
- Information Gain
- Tree Pruning
- Gini
- In-depth Mathematical Intuition of Decision Tree
- Implementing Decision Tree with Python, Tree & Sklearn
- **Complete the Assignment within the Deadline!**

2. Logistic Regression:

- Concept of Sigmoid
- In-depth Mathematical Intuition of Logistic Regression
- Implementing Logistic Regression with Python & Sklearn
- **Complete the Assignment within the Deadline!**

3. Ensemble Learning:

- Random Forest
- ExtraTreesClassifier
- Gradient Boosting
- Extreme Gradient Boosting (XGBoost)
- Adaptive Boosting (AdaBoost)
- Implementing Everything with Python
 - Project
- **Complete the Assignment within the Deadline!**

4. KNN Classifier:

- We will learn KNN Classifier and KNN Regressor in the Same Class.
- Implementing Everything with Python
- **Complete the Assignment within the Deadline!**

5. Naïve Bayes:

- Bayes Theorem
- In-depth Mathematical Intuition of Naïve Bayes
- Implementing Everything with Python
- Project on NLP
- **Complete the Assignment within the Deadline!**

6. Support Vector Machine (SVM):

- Hyperplane
- Support Vectors
- Hard Margin
- Soft Margin
- SVM Kernel Tricks
 - Radial Basis Function (RBF) Kernel
 - Linear Kernel
 - Sigmoid Kernel
 - Polynomial Kernel
- In-depth Mathematical Intuition of SVM
- Implementing Everything with Python
 - Project
- **Complete the Assignment within the Deadline!**

Module 08: ML Model Evaluation (01 Class & 02 Hours Plan)

- Confusion Matrix
- Accuracy
- Precision
- Recall

- F1-Score
- Area Under the Curve (AUC)
- Receiver Operating Characteristics (ROC)
- Calculating R Squared Value for Regression
- Implementing Everything with Python
 - Project
- **Complete the Assignment within the Deadline!**

Module 09: Unsupervised Learning (01 Class & 02 Hours Plan) [Watch Class]

- Unsupervised Learning Concepts
- Market Basket Analysis
- K-Means Cluster Algorithm
- Elbow Method for Optimal Cluster
- In-depth Mathematical Intuition of K-Means
- Implementing Everything with Python
 - Project
- **Complete the Assignment within the Deadline!**

Module 10: Hyperparameter Optimization (01 Class & 02 Hours Plan)

- Concept of ML Model Optimization
- Pre-Pruning
- Post-Pruning
- Grid Search
- Random Search
- Bayesian Optimization
- Implementing Everything with Python
 - Project
- **Complete the Assignment within the Deadline!**

Module 11: Deep Learning & Neural Networks (02 Classes & 04 Hour Plan)

- Concepts of Perceptron
- Perceptron Vs. MLPs
- Neural Network Architecture
- Activation Functions
- Optimizer
- ANNs Architecture
- Convolutional Neural Network – CNNs
- In-depth Discussion
- Python Implementations and projects
- Bayesian Neural Network (Module: 03.04)

Guidelines for Future Research / Jobs / Study Abroad:

- Qualification Testing
- Job Searching
- CV Making Formats
- Resource Sharing for Further Learning

Note: We will increase the number of classes if required. After Completing this course, you will be able to understand everything that is mentioned in the module. You must submit all the assignments & projects to get a course certificate.

How to Enroll?

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Course Instructor:
Mr. Mejbah Ahammad
Tableau Certified Data Scientist



Quest
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মাতৃভাষায়...

DEEP LEARNING & AI Specialization

সম্পূর্ণ কোর্সে যা থাকছে:

- ২৫ টি লাইভ ক্লাস।
- ১৫ টি সম্পূর্ণ ডিপ লার্নিং প্রজেক্ট।
- লাইভ ক্লাস এবং রেকর্ড প্রদান।
- রিসার্চ করার সুযোগ।
- জবের জন্য মক ইন্টারভিউ।

Fees: 6000 Taka



www.aiquest.org

Course Overview: Deep Learning Specializations

This specialization focuses on equipping participants with advanced knowledge and practical skills in Deep Learning, with a particular emphasis on Computer Vision and Natural Language Processing (NLP). The course will utilize both TensorFlow and PyTorch for implementation, providing a comprehensive understanding of deep learning frameworks.

Module 1: Introduction to Deep Learning

Module 1 introduces Deep Learning, a transformative technology in AI. It covers foundational concepts, key terminology, and an overview of TensorFlow and Py-Torch, setting the stage for understanding complex neural network architectures and their applications in various fields, and serving as a gateway to the advanced topics in the subsequent modules.

1. Overview of Deep Learning
2. Key Concepts and Terminology
3. Introduction to TensorFlow and PyTorch

Module 2: Fundamentals of Python for Deep Learning

"Module 2: Fundamentals of Python for Deep Learning" provides a foundational understanding of Python, essential for deep learning applications. It covers Python basics, key libraries and frameworks used in deep learning, and techniques for data analysis. This module equips learners with the necessary skills to effectively utilize Python in subsequent deep learning module.

1. Python Basics
2. Libraries and Frameworks
3. Python for Data Analysis

Module 3: Neural Networks Basics

Module 3, "Neural Networks Basics," delves into the foundational elements of neural networks. It covers the structure and functioning of neural networks, including various activation functions, and explores different network architectures. This module serves as a crucial building block for understanding deeper concepts in deep learning.

- 4. Understanding Neural Networks
- 5. Activation Functions
- 6. Network Architectures

Module 4: Deep Learning with TensorFlow

Module 4 delves into TensorFlow, a pivotal tool in deep learning. It begins with TensorFlow basics, guiding through model construction and intricacies. The focus is on practical skills, including debugging and optimization techniques, equipping learners to build, refine, and deploy TensorFlow-based deep learning models effectively.

- 7. TensorFlow Basics
- 8. Building Models in TensorFlow
- 9. Debugging and Optimization

Module 5: Deep Learning with PyTorch

Module 5, "Deep Learning with PyTorch," guides learners through the essentials of PyTorch, a popular deep learning framework. It covers the basics of PyTorch, model building, and optimization techniques. The focus is on practical implementation, ensuring students gain hands-on experience in developing and troubleshooting deep learning models using PyTorch.

- 10. PyTorch Basics
- 11. Building Models in PyTorch
- 12. Debugging and Optimization

Module 6: Computer Vision Fundamentals

Module 6, titled "Computer Vision Fundamentals," introduces the basics of computer vision. It covers essential image processing techniques and explores foundational computer vision models. This module is designed to provide a solid groundwork in understanding how computers interpret and process visual data, laying the foundation for more advanced studies.

13. Introduction to Computer Vision
14. Image Processing Techniques
15. Basic Computer Vision Models

Module 7: Advanced Computer Vision with TensorFlow

Module 7, titled "Advanced Computer Vision with TensorFlow," delves into complex CNN architectures, focusing on object detection and recognition. It emphasizes practical applications and advanced techniques, equipping learners with the skills to implement cutting-edge computer vision solutions using TensorFlow, a leading deep learning framework widely used in the industry.

16. CNN Architectures
17. Object Detection and Recognition
18. Advanced Techniques and Practices

Module 8: Advanced Computer Vision with PyTorch

Module 8 delves into advanced computer vision concepts using PyTorch, covering the implementation of complex Convolutional Neural Networks (CNNs), progressive image processing techniques, and practical applications. It emphasizes hands-on learning, equipping learners with skills to tackle real-world vision tasks using PyTorch's robust framework.

19. Implementing CNNs in PyTorch
20. Advanced Image Processing
21. Real-World Applications

Module 9: Fundamentals of NLP

Module 9, "Fundamentals of NLP," introduces Natural Language Processing, exploring its core concepts and techniques. It covers foundational aspects of text processing and basic NLP models, laying the groundwork for understanding how machines interpret, analyze, and generate human language, essential for advanced studies in this dynamic field of AI.

- 22. Introduction to NLP
- 23. Text Processing
- 24. Basic NLP Models

Module 10: Advanced NLP with TensorFlow

Module 10, "Advanced NLP with TensorFlow," delves into sophisticated Natural Language Processing techniques using TensorFlow. It covers Recurrent Neural Networks (RNNs), Long Short-Term Memory (LSTM) networks, and sequence models, emphasizing the implementation of advanced NLP models. This module equips students with the skills to handle complex NLP tasks effectively.

- 25. RNNs and LSTMs
- 26. Sequence Models
- 27. Implementing Advanced NLP Models

Module 11: Advanced NLP with PyTorch

Module 11 delves into advanced NLP techniques using PyTorch. It covers sophisticated text processing methods, explores the transformative potential of Transformer models, and applies these concepts in real-world NLP applications. This module equips learners with the skills to implement cutting-edge NLP solutions leveraging PyTorch's dynamic features.

- 28. Advanced Text Processing
- 29. Transformer Models
- 30. Real-World NLP Applications

Module 12: Capstone Projects

Module 12, "Capstone Projects," is the culmination of the Deep Learning Specializations Course. It enables students to apply their learning to real-world scenarios, involving project planning, dataset collection, and implementing complete deep learning solutions. This module emphasizes practical skills, evaluation, and presentation of results, bridging the gap between theory and practice.

31. Project Planning and Dataset Collection
32. Implementing a Complete Deep Learning Solution
33. Evaluation and Presentation of Result

Module 13: LLMs, LangChain & Huggingface Transformers

1. Intro to Large Language Model
2. Intro to LangChain
3. How to use LangChain in LLMs
4. Importance of HuggingFace

Module 14: Career Paths and Industry Trends

Module 13, "Career Paths and Industry Trends," explores the various career opportunities available in the field of deep learning. It focuses on current industry trends, essential skills for professionals, and strategies for building a strong portfolio. Networking and staying updated with evolving technologies are also emphasized in this module.

34. Career Opportunities in Deep Learning
35. Keeping Up with Industry Trends
36. Building a Portfolio and Networking

Complete 15 AI Projects:

Presented below are 15 projects from the fields of computer vision and natural language processing (NLP) that we will, hopefully, cover in class. Each project has its own description, potential datasets, and use case

2 Computer Vision Projects

14.1 Facial Recognition System

1. **Details:** Develop a system that identifies or verifies a person from a digital image or video frame.
2. **Dataset:** Labeled Faces in the Wild, CelebA.
3. **Use Case:** Security systems, user authentication.

14.2 Object Detection in Aerial Images

1. **Details:** Create a model to detect objects such as buildings, vehicles, or landmarks in aerial imagery.
2. **Dataset:** DOTA (Dataset for Object Detection in Aerial Images).
3. **Use Case:** Urban planning, military reconnaissance

14.3 Traffic Sign Recognition for Autonomous Vehicles

1. **Details:** Develop a model to recognize and interpret traffic signs.
2. **Dataset:** German Traffic Sign Recognition Benchmark.
3. **Use Case:** Self-driving car systems.

14.4 Image Colorization

1. **Details:** Automatically colorize black and white images.
2. **Dataset:** ImageNet, CIFAR-10.
3. **Use Case:** Restoration of old photographs, artistic purposes.

14.5 Emotion Recognition from Facial Expressions

1. **Details:** Analyze facial expressions to detect emotions.
2. **Dataset:** FER2013, AffectNet.
3. **Use Case:** Customer feedback analysis, mental health assessment.

14.6 Medical Image Analysis for Disease Diagnosis

1. **Details:** Use deep learning to detect diseases like cancer from medical scans.

2. **Dataset:** ISIC Skin Cancer Dataset, ChestX-ray8.
3. **Use Case:** Assisting radiologists and doctors in diagnosis.

14.7 Scene Recognition

1. **Details:** Classify and understand different scenes from images.
2. **Dataset:** Places dataset.
3. **Use Case:** Context-aware computing, virtual reality.

3 Natural Language Processing Projects

15.1 Sentiment Analysis of Social Media

1. **Details:** Analyze the sentiment of posts or comments on social media platforms.
2. **Dataset:** Twitter Sentiment Analysis Dataset, IMDB Reviews.
3. **Use Case:** Brand monitoring, public opinion analysis.

16 Chatbot for Customer Service

- 16.1 **Details:** Build a conversational agent to handle customer inquiries.
- 16.2 **Dataset:** Customer support datasets from companies, Cornell Movie- Dialogs Corpus.
- 16.3 **Use Case:** Online customer support, virtual assistance.

17 Named Entity Recognition (NER)

- 17.1 **Details:** Develop a model to identify names, organizations, locations in text.
- 17.2 **Dataset:** CoNLL-2003, OntoNotes 5.0.
- 17.3 **Use Case:** Information extraction, content classification.

18 Automatic Text Summarization

- 18.1 **Details:** Create a system that generates a concise and coherent summary of a longer text document.
- 18.2 **Dataset:** CNN/Daily Mail dataset, XSum Dataset.

18.3 **Use Case:** News aggregation, academic research.

19 Language Translation System

19.1 **Details:** Develop a model to translate text from one language to another.

19.2 **Dataset:** WMT (Conference on Machine Translation), IWSLT.

19.3 **Use Case:** International communication, content localization.

20 Fake News Detection

20.1 **Details:** Build a model to identify and flag fake news articles.

20.2 **Dataset:** LIAR dataset, Fake News Challenge dataset.

20.3 **Use Case:** Media verification, combating misinformation.

21 Speech Recognition System

21.1 **Details:** Transcribe spoken words into text.

21.2 **Dataset:** LibriSpeech, TIMIT.

21.3 **Use Case:** Voice user interfaces, accessibility tools

To Enroll in Course

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[Sohan Khan](#), Course Coordinator at aiQuest Intelligence

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