

ARTIFICIAL INTELLIGENCE & MACHINE LEARNING – SYLLABUS – 120 HRS

Module 1: Foundations of AI & Python Programming (25 hours)

1.1 Introduction to AI & ML (5 hours)

- What is AI? Scope and real-world applications
- Supervised, Unsupervised, and Reinforcement Learning
- Types of AI (Narrow, General, Super)
- AI vs. ML vs. Deep Learning

1.2 Mathematical Foundations (5 hours)

- Linear algebra basics: vectors, matrices
- Statistics & probability for ML
- Introduction to optimization

1.3 Python Basics for AI/ML (15 hours)

- Python syntax, variables, data types
- Control structures: loops, conditionals
- Functions, modules, file handling
- Working with libraries:
 - **NumPy** (arrays, operations)
 - **Pandas** (DataFrames, reading files, manipulation)
 - **Matplotlib / Seaborn** (data visualization)
- Hands-on coding and practice exercises

Module 2: Data Preprocessing & Exploratory Analysis (25 hours)

2.1 Data Collection & Cleaning

- Handling missing values, outliers
- Encoding, scaling, normalization

2.2 Exploratory Data Analysis (EDA)

- Visual and statistical summaries
- Correlation analysis, feature importance

2.3 Feature Engineering

- One-hot encoding, binning, feature transformation
- Dimensionality reduction (PCA)

2.4 Hands-on EDA Projects

- Real datasets (e.g., Titanic, Iris, Loan prediction)

Module 3: Machine Learning Algorithms & Model Evaluation (25 hours)

3.1 Supervised Learning Algorithms

- Linear & Logistic Regression
- Decision Trees, Random Forest
- K-Nearest Neighbors
- SVM, Naïve Bayes

3.2 Unsupervised Learning

- K-Means Clustering, Hierarchical Clustering

3.3 Model Evaluation Techniques

- Accuracy, Precision, Recall, F1 Score
- Confusion Matrix, ROC, AUC
- Cross-validation

3.4 Practical Model Building

- End-to-end mini projects using scikit-learn

Module 4: Deep Learning with TensorFlow/Keras (25 hours)

4.1 Neural Network Foundations

- Perceptron, activation functions
- Forward/backward propagation
- Optimizers and loss functions

4.2 Deep Learning with TensorFlow & Keras

- Building sequential models
- Training, evaluation, and tuning
- Overfitting, dropout, regularization

4.3 Hands-On Projects

- Image classification (e.g., MNIST)
- Text sentiment analysis

Module 5: Advanced Topics, Capstone & Career Readiness (20 hours)

5.1 Specialized Topics in AI

- Introduction to NLP
- Basics of Computer Vision
- Overview of Generative AI (ChatGPT, etc.)

5.2 Ethical AI & Industry Trends

- Bias in models, explainability
- AI applications across industries

5.3 Capstone Project (10 hours)

- Real-world project: problem-solving, dataset handling, model deployment
- Team collaboration and presentations

5.4 Career Guidance & GitHub Portfolio (5 hours)

- Setting up a professional GitHub profile
- Uploading and documenting ML projects
- Hosting demos using Django
- Showcasing AI/ML work with clear structure

Key Job Roles in AI & Machine Learning:

1. AI/ML Engineer
2. Data Analyst
3. Junior Data Scientist
4. Computer Vision Engineer
5. NLP Developer
6. MLOps Engineer
7. Business Intelligence Analyst
8. AI Research Assistant
9. Data Engineer
10. AI Product Analyst

MODEL CERTIFICATE – STED COUNCIL





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The Academic Board of Sted Council hereby makes known that
..... **Alan** *has successfully completed the course on*
Artificial Intelligence & Machine Learning Course
of 120 hours duration at **Grapesgenix Technical Solutions**
Thrissur, Kerala *and has been placed in -A- Grade*
at the examination held in the **20th** *day of* **May** *year* **2024**

Given under the stamp of Sted Council dated **06-06-2024**

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Grade A+ 30% above
Grade A 60% above
Grade B 80% above
Grade C 40% above

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