



# Proposal

for Diploma and Advanced Diploma  
in AI and Machine Learning

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## 1. Program Overview

### Program Structure:

- **Diploma Program:**
  - Duration: 6 months
  - Format: Full-time or part-time options
  - Total Learning Hours: 480 hours (Instructor-led and self-paced)
- **Advanced Diploma Program:**
  - Duration: 9 months
  - Format: Full-time or part-time options
  - Total Learning Hours: 720 hours (Instructor-led and self-paced)

### Entry Requirements:

- WASSCE holders with a Science or Technical stream background.
- Holders of a Diploma or Certificate in Computer Science (CS), Information Technology (IT), or Engineering.
- Individuals with a Bachelor's degree in CS, IT, Mathematics, or a related field.

### Target Audience:

- Fresh graduates in Computer Science, IT, Mathematics, Engineering, or related fields.
- Working professionals seeking to transition into AI/ML roles.
- Software developers looking to upgrade their skills with AI/ML expertise.
- Data analysts and business intelligence professionals aiming to leverage AI/ML techniques.

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## 2. Curriculum Scope

### Foundation Phase (Common to Both Programs):

#### 1. Mathematics and Statistics Fundamentals:

- Linear Algebra
- Probability
- Discrete Mathematics

#### 2. Programming Essentials:

- Python Programming
- Data Structures
- Software Engineering principles

#### 3. Data Science Fundamentals:

- Data Cleaning
- Data Visualization
- Exploratory Data Analysis (EDA)
- Feature Engineering

## Core AI/ML Phase:

### 1. Machine Learning Foundations:

- Supervised Learning (Regression, Classification)
- Unsupervised Learning (Clustering, Dimensionality Reduction)
- Model Evaluation and Validation
- Ensemble Methods (Bagging, Boosting)
- Dimensionality Reduction Techniques (PCA, t-SNE)

### 2. Deep Learning:

- Artificial Neural Networks (ANNs)
- Convolutional Neural Networks (CNNs)
- Recurrent Neural Networks (RNNs)
- Transformer Networks

### 3. Specializations (Students can explore or focus on):

- Natural Language Processing (NLP)
- Computer Vision
- Image Processing
- Reinforcement Learning
- Generative AI

## Advanced Diploma Topics (Beyond the Diploma Curriculum):

### 1. Advanced AI:

- Large Language Models (LLMs)
- Graph Neural Networks (GNNs)
- Automated Machine Learning (AutoML)

### 2. Applications of AI/ML:

- AI in Healthcare
- AI in Finance
- AI in Industry and Manufacturing
- AI in Robotics

### 3. Professional Skills:

- Machine Learning Operations (MLOps)
- AI Ethics and Governance
- Project Management for AI/ML projects
- Research Methods in AI/ML

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## 3. Detailed Deliverables

### Learning Materials:

#### 1. Course Documentation:

- Detailed syllabus with learning outcomes for each module.
- Module-wise study guides and notes.
- Comprehensive reading lists and references to academic papers and industry resources.
- Real-world industry case studies and examples.

## 2. Interactive Content:

- High-quality video lectures (15-45 minutes per topic).
- Interactive presentations and simulations.
- Live coding demonstrations and walkthroughs.
- Virtual lab environments for hands-on practice.

## 3. Practical Resources:

- Jupyter notebooks with well-commented code examples and exercises.
- Version-controlled source code repositories (e.g., on GitHub).
- Curated dataset collections for various learning tasks.
- Step-by-step guides for setting up the development environment.

## Assessment Framework:

- **Quizzes:** Regular online quizzes to assess understanding of key concepts (20% of final grade).
- **Assignments:** Practical coding and problem-solving assignments to reinforce learning (30% of final grade).
- **Milestone Projects:** Intermediate project submissions to track progress and provide feedback (20% of final grade).
- **Final Project:** A comprehensive project demonstrating the application of learned AI/ML skills (30% of final grade), including:
  - **Report:** Detailed documentation of the project methodology, implementation, and results (10% of the final project grade).
  - **Demo:** A live demonstration of the project's functionality (10% of the final project grade).
  - **Presentation:** A presentation summarizing the project goals, approach, and findings (10% of the final project grade).

## Faculty Support:

### 1. Training Materials for Instructors:

- Comprehensive instructor guides for each module.
- Solution manuals for all assignments and assessments.
- Pedagogical guidelines for effective teaching of AI/ML concepts.
- Assessment rubrics for consistent and fair grading.

### 2. Technical Support:

- Detailed setup documentation for all required tools and infrastructure.
- Troubleshooting guides for common technical issues.
- Regular update documentation for curriculum and software changes.
- Dedicated office hours (virtual or in-person) for student support.

## 4. Tools & Infrastructure

### Frameworks:

- TensorFlow
- PyTorch

### Cloud Services:

- Google Colaboratory (Colab)
- Amazon Web Services (AWS) SageMaker
- Microsoft Azure for Students

### Deployment:

- Docker
- Flask
- FastAPI

### Development Environment:

- Jupyter Notebooks / JupyterLab
- GitHub for version control and collaboration
- Visual Studio Code (VSCode) with relevant extensions
- Simulators (as required for Robotics specializations)