Masters Program in Artificial Intelligence, Generative AI & Emerging Technologies (6 Months)

Program Overview:

This industry-relevant program is structured to help learners build solid foundations and advanced competencies in Machine Learning, Deep Learning, Generative AI, Cloud Computing using AWS, and Quantum Computing. Participants will explore how modern AI models are built, optimized, and deployed in real-world scenarios, while also getting hands-on with AWS services and understanding the future of computing with quantum technologies.

Course Structure:

- Duration: 6 Months (24-26 Weeks)
- Format: 3 sessions per week (2 theory + 1 lab/practical)
- Outcome: Capstone Project + Certification Prep

Module 1: Foundations of AI & Machine Learning (Weeks 1-3)

- Overview of AI, ML, and Deep Learning
- Supervised, Unsupervised & Reinforcement Learning
- Key algorithms: Linear Regression, Decision Trees, KNN, SVM
- Model evaluation metrics
- Tools: Python, Scikit-learn, Google Colab

Module 2: Deep Learning & Neural Networks (Weeks 4-6)

- Perceptrons and Feedforward Neural Networks
- Activation functions and backpropagation
- CNNs for image processing
- RNNs, LSTMs for sequential data
- Frameworks: TensorFlow, Keras, PyTorch

Module 3: Generative AI & LLMs (Weeks 7-9)

- Introduction to Generative AI and GANs
- Transformer models: BERT, GPT, T5

- Fine-tuning pre-trained LLMs
- Prompt engineering & Responsible AI
- Building apps using OpenAI/GPT APIs

Module 4: Natural Language Processing (Weeks 10-12)
- Text preprocessing and vectorization
- Named Entity Recognition (NER), POS tagging
- Sentiment Analysis, Topic Modeling
- Chatbot development using Rasa/Dialogflow

Module 5: Cloud Computing with AWS (Weeks 13-15)
- AWS Core Services (EC2, S3, IAM, Lambda)
- AI/ML on AWS: SageMaker, Comprehend, Rekognition
- Deploying ML models on AWS
- Serverless architectures for AI workloads

Module 6: MLOps & Model Deployment (Weeks 16-18)
- CI/CD pipelines for ML
- Model versioning and lifecycle management
- Docker & Kubernetes for model deployment
- Monitoring and retraining models

Module 7: Quantum Computing Foundations (Weeks 19-20)
- Basics of Quantum Mechanics for computing
- Qubits, Superposition, Entanglement
- Quantum algorithms: Grover's, Shor's
- Platforms: IBM Qiskit, Google Cirq, AWS Braket

Module 8: Quantum Machine Learning (Weeks 21-22)
- Hybrid classical-quantum models
- Quantum neural networks
- Applications in optimization and drug discovery
- Hands-on: Qiskit & AWS Braket demos

Module 9: Capstone Project & Certification Prep (Weeks 23-26)

- End-to-end solution using ML/GenAI/AWS
- Model documentation, testing, and deployment
- Project presentation & review
- Certification Prep:
  - AWS Certified Machine Learning
  - TensorFlow Developer Certificate
  - IBM Qiskit Developer

Labs & Tools Required:

- Python, Jupyter, Google Colab
- TensorFlow, PyTorch, Scikit-learn
- OpenAI API, Hugging Face Transformers
- AWS Free Tier (SageMaker, Lambda, S3)
- Docker, GitHub Actions, Kubernetes
- Qiskit, AWS Braket, IBM Quantum Experience

Assessment & Assignments Structure:

- Weekly Quizzes: Topic-based objective assessments
- Lab Assignments: Practical implementation exercises
- Mini Projects: After key modules
- Capstone Project: Team-based solution on real use case
- Final Evaluation: Project Demo + Viva
- Mock Exams: AWS & TensorFlow Certification prep

This program prepares students for in-demand roles in AI, ML engineering, and quantum computing, while also equipping them for industry-recognized certifications.