IT Business Incubator
Chittagong University of Engineering & Technology (CUET)

diligite

Course Outline: Artificial Intelligence (AI) & Machine Learning (ML) with Python

Course by:

IT Business Incubator, CUET
Chattogram-4349, Bangladesh.
Website: www.itbi-cuet.com

Last Updated: 27/07/2025

Course Summary

No.	Subject	Comments
1	Course Duration	78 Hours (26 Classes, 13 Weeks)
2	Pre-requisites	Yes - Basic knowledge of probability and statistics - A foundation in linear algebra - Basic programming knowledge in Python
3	Lab Facilities	ITBI, CUET will provide.

Schedule (Phase - 02)

Batch - 01 (Offline): Friday & Saturday 10 am to 1 pm
Batch - 02 (Online): Friday & Saturday 3 pm to 6 pm

Coordinator & Master Trainer

Professor Dr. M. Moshiul Hoque
Professor, Dept of CSE, CUET
Director, IT Business Incubator, CUET
Former Dean, Faculty of Electrical & Computer Engineering, CUET
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Trainers

MD. Asif Iqbal
Sr. Assessment developer, Workera.ai
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Fatima Jahara
Alpha Testing Consultant, DeepLearning.AI

Md. Al-Mamun Provath
Lecturer, Dept. of CSE, CUET

Learning Outcomes

By the end of this course, participants will:

- Gain proficiency in essential AI concepts, including machine learning, NLP, and computer vision, to enhance employability.
- Develop foundational skills in probability, statistics, basic linear algebra, and programming necessary for AI applications.
- Engage in in-depth sessions covering AI fundamentals, machine learning algorithms, NLP techniques, and computer vision principles.
- Apply acquired knowledge and skills to real-world problems through a capstone project, preparing for internships and job opportunities in the AI industry.

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Course Modules

This course is divided into the following six modules to address the concept of AI better.

1) AI & ML Essentials
2) Artificial Intelligence
3) Machine Learning
4) Natural Language Processing (NLP)
5) Computer Vision
6) Capstone Project

Module - 1: AI & ML Essentials

No.	Topic	Session Duration (Hours)	Resource Person
1.	Basics of Probability and Statistics	3	
2.	Basic Linear Algebra	3	
3.	Basic Programming Skills	8	

Module - 2: Artificial Intelligence

Artificial Intelligence (AI) refers to the simulation of human intelligence processes by machines, especially computer systems. It involves the development of computer systems that can perform tasks that typically require human intelligence, such as understanding natural language, recognizing patterns, solving complex problems, learning from experience, and making decisions. AI aims to create systems that can mimic human cognitive functions and automate tasks that would normally require human intelligence.
AI is based on four fundamental concepts: Machine Learning, Deep Learning, Natural Language Processing (NLP), and Computer vision. Artificial Intelligence short courses should be focused on these subjects.

No.	Topic	Session Duration (Hours)	Resource Person
1.	Introduction of AI and background: What is AI? Related fields	1	
2.	Preparatory Classes on Python for AI & ML	3	
3	Data Preprocessing with Python (Lab)	3	
4.	Data Visualization with Python Library (Lab)	3	

Module - 3: Machine Learning

Machine learning is concerned with the question of how to make computers learn from experience. The ability to learn is not only central to most aspects of intelligent behavior, but machine learning techniques have become key components of many software systems. For example, machine learning techniques are used to create spam filters, analyze customer purchase data, or detect fraud in credit card transactions. The field of Machine Learning, which addresses the challenge of producing machines that can learn, has become an extremely active, and exciting area, with an ever-expanding inventory of practical (and profitable) results, many enabled by recent advances in the underlying theory. This course will introduce the fundamental set of techniques and algorithms that constitute machine learning.

No.	Topic	Session Duration (Hours)	Resource Person
1.	Introduction, Learning Paradigms	3	
2.	Concept Learning		
3.	Bayes Classifier	3	
4.	k-Nearest Neighbor (Lab)		
5.	Regression Model (Lab)	3	

6.	Decision Tree (Lab)	3	
7.	Ensemble Learning, Boosting (Lab)		
8.	Support Vector Machines with kernels (Lab)	3	
9.	Dimensionality Reduction (Lab)		
10.	Unsupervised Learning, Clustering (Lab)	3	
11.	Classifier Evaluation (Lab)		
12	Neural Networks, Perceptron (Lab)	6	

Module - 4: Natural Language Processing (NLP)

No.	Topic	Session Duration (Hours)	Resource Person
1.	Fundamentals of NLP	3	
2.	Tokenization and text preprocessing (Lab)		
3.	Language modeling (Lab)	3	
4.	Text classification (Lab)	3	
5.	Named entity recognition (Lab)		
6.	NLP applications		

Module - 5: Computer Vision

No.	Topic	Session Duration (Hours)	Resource Person
1.	Introduction to Computer Vision	3	
2.	Image preprocessing and augmentation (Lab)		
3.	Deep Learning Model with TensorFlow (Lab)	3	
4.	Detection and Recognition Concepts (Lab)	3	
5.	Image classification (Lab)		
6.	Convolutional neural networks (Lab)	3	

Module - 6: Capstone Project

No.	Topic	Session Duration (Hour)	Resource Person
1.	Breast Cancer Classification	3	
2.	Binary, Multi-class, and Multi-label Image Classification		
3.	Semantic Similarity	3	
4.	Object Detection and Recognition	3	

AI Tools and Libraries:

- Introduction to AI frameworks (TensorFlow, PyTorch, etc.)
- Using pre-trained models
- Hands-on programming and implementation

Book Recommendation:

1) **The Hundred-Page Machine Learning Book** by Andriy Burkov
2) **Hands-On Computer Vision with TensorFlow 2: Leverage deep learning to create powerful image processing apps with TensorFlow 2.0 and Keras**, by Benjamin Planche, Eliot Andres.