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: 31/10/2024

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: Friday & Saturday 10 am to 1 pm
Batch - 02: 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
Chair, IEEE Bangladesh Section

Trainers

MD. Asif Iqbal
Sr. Assessment developer, Workera.ai
Head of R&D, Diligite Ltd
Trainer, BDSET Project (AI & ML), BHTPA.

Dipon Talukder
Sr. Assessment Developer, Workera.ai
Lecturer, Dept. of CSE, East Delta University
Trainer, EDGE IICT CUET DST

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.

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.

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.

Frequently Asked Questions (FAQ)

1. Who Can Enroll in This Course?

This course is designed for individuals interested in pursuing a career in Artificial Intelligence and Machine Learning. Ideal participants should have:
- Basic knowledge of probability and statistics
- A foundation in linear algebra
- Basic programming knowledge in Python

2. Who are the trainers for the course?

Our courses will be conducted by a combination of faculty from CUET and industry experts, ensuring a comprehensive and practical learning experience.

3. Is the course offered online or offline?

We offer the course in both formats. You can enroll in either an online or offline batch, depending on your convenience.

4. Are there any specific qualifications required to enroll in the course?

No specific qualifications are required to enroll. However, having a basic understanding of mathematics and statistics will make it easier to grasp machine learning concepts.

5. Are there any lab facilities?

Yes, students in the offline batch will have the opportunity to work in our specialized lab for sessions.

6. Will class recordings be available?

Yes, recordings of each class along with additional educational materials will be accessible on your dashboard within 24 hours after the class concludes.

7. What type of certificate will be awarded upon course completion?

Upon successfully completing the course and passing the assessment, you will receive a certificate issued by CUET. This certificate will serve as proof of your skills and knowledge.

8. Is a waiver available, and how can I apply ? What percentage can I expect?

Yes, waivers are available. To apply, accurately fill Waiver Application form and submit it. After submission, you will need to take an online assessment test. Based on your application, CV, and assessment results, waivers ranging from 20% to 30% may be granted.

9. How can I enroll?

You can enroll either online through our website (www.itbi-cuet.com) or by visiting the office directly.register on our website and select your desired course by clicking the 'Add to Cart' button. If you have a waiver coupon, apply it before confirming your cart. Then, proceed to checkout and complete your payment using the SSLCommerz gateway. For detailed instructions, please refer to the file: Enrollment Process.

10. Can I enroll in multiple courses?

Yes, you can enroll in multiple courses. However, please ensure that the schedules of the courses do not overlap.

11. Can I switch from online to offline batches or vice versa?

Generally, batch changes are not permitted. However, you may contact the authorities for special circumstances to discuss your request.

12. I live far from CUET; is there accommodation available for offline batch students?

Yes, there is accommodation available at the IT Business Incubator's dormitory, with a cost of 600 BDT per night.