GUJARAT TECHNOLOGICAL UNIVERSITY

Design Innovation Centre (DIC)

MHRD funded Project - Hub & Spoke Model

DESIGN INNOVATION CENTRE

Certificate Course in

Artificial Intelligence (AI)

(Understanding Basics of Artificial Intelligence)

Course Abstract

Course name: ***Artificial Intelligence (AI) Level 1 of 3 (Online)***

(Total of 3 courses in AI starting sequentially)

Apply Now

Type of Course: ***Certificate***/Specialization/Diploma

Course category: ***Basic level 1***/Intermediate/Advance level

Beneficiaries: ***From Any discipline; Students, Faculty members, researchers, Industry Personnel, Innovators/Start-ups or any aspirants who wish to learn about AI***

Duration: ***Four (4) months***

Usual time of occurrence: ***Quarterly***

Tuition Fees: ***Rs. 1,180 only*** **(Massive Discount)**

Timing:

- Sessions: ***Total 24 session of 3 hrs. / Session (Weekly once, ideally Weekend)***
- ***Instruction - 40 hours and Self Study - 80-100 hours***
- ***The instruction will roughly be split 2:1 in the number of hours of theory session to the number of hours of practical training.***
- ***Lab hours for practice by students are included in the hours for self-study.***
- Doubt Clearing Session: ***1 hour every 2 weeks.***

Evaluation Pattern: ***Continuous evaluation based on Practical learning, MCQ, Final Project at the end of semester***

Prerequisites: ***Optimistic & Un-learning mind-set, Enthusiasm of learning new things***

Relevance

This course is meant for beginners who have interest in Artificial Intelligence and want to pursue their career in this emerging area. The course is designed to understand the basics of Artificial Intelligence with theory, practice, projects on real issues, case studies etc.

Objective: Understanding Artificial Intelligence

The course aims to provide an understanding about the human decision making where many cognitive tasks that people can do easily and almost unconsciously but that are extremely difficult to program on a computer. Artificial intelligence is the problem of developing computer systems that can carry out such tasks (or at least mimic the human decision making process). This course will cover the basics of AI so that further skill buildings are based on the fundamentals learnt in this course.

About the Course

The India, with its 65% population as youth (18-35 years) has tremendous potential to develop into the hub of expert workforce for the world. This can be fulfilled through skill development for everyone in that age bracket across the region. But, the access of various sections of population to such skill development activities limits the potential of the youth. Another intriguing choice for such population cross-section is the lack of guidance on the type of skills to be developed so that they can be relevant and competent in the global market.

The solution to this tricky problem lies in the intelligent usage of Information and Communication Technology (ICT) to deliver quality skill education opportunity to this population. The main purpose of such intervention is to provide the fundamental knowledge (know-how) to the participants so that they can understand relevant concepts for further development of their Skills in it (do-how). However, mere skill development will not suffice because to be industry relevant; one should be able to demonstrate their ability to put the skills into practice (show-how). In this regard, Indian Institute of Technology Kanpur (IITK) propose the development and delivery of cutting edge skill oriented courses, e.g. (i) analytics for business decisions, and (ii) artificial intelligence for business applications.

Artificial intelligence (AI) focuses on realizing intelligent human behaviors on a computer, where the ultimate goal is to make a computer that can learn, plan, and solve problems

autonomously. The main purpose of this course is to provide the fundamental knowledge (know-how) to the participants so that they can understand the concept of AI and further develop their Skills in it (do-how). Since the course content is vast, theoretic proofs and formal notations are eliminated (or minimized) as far as possible, so that participants can develop skills and put their skills into practice (show-how). This course is the first course of the series, which has minimal pre-requisites. However, exposure to computer programming in the form of a formal course, understanding of basic probability & statistics in the form of a formal course, and some exposure to business decision making are the pre-requisites.

Course Outline

Course: Artificial Intelligence (AI) Level 1 of 3 (Online) (3 lecture hours + 3 lab hours per week)		
Module	**Topic**	**Content**
I: Terminology	The AI Landscape	Busting the AI jargon bubble, clarify differences between AI, ML, DL, CV, NLP. Distinguish between the classical/textbook version of AI and the more contemporary/widely accepted definition of AI. Seeing ML, SL, DS through a single lens.
	Types of Learning	Supervised, Unsupervised, Semi-supervised, Reinforcement Learning
	The Elements of Supervised ML	Defining the 6 elements of ML and showing how they interact with various branches of AI, DL and DS
II: Foundations	Linear Algebra Basics	Vectors, Dot product of vectors, unit vectors, projection of one vector onto another, angle between two vectors, Haddamard product, vectors in machine learning, matrices, matrix-vector multiplication, matrix-matrix multiplication, outer product of two vectors, eigen vectors
	Calculus Basics	Derivatives, Product Rule, Quotient Rule, Chain rule, chain rule along multiple paths, finding minima and maxima of a function
	Probability Basics	Random variable, continuous and discrete random variables, probability distribution, true and predicted distribution, distributions in machine learning,

		expectation, information content, entropy, number of bits, KL Divergence, Cross entropy
	Statistics Basics	Mean, variance, co-variance, correlation, co-variance matrix
	Python Basics	Basic data types, List, tuple, set, dictionary, packages, file handling, Numpy, matplotlib, pandas, vectors, matrices, Google Colaboratory
III: Data	Data Handling	Types of data: structured data, text, images, video and speech, one hot encoding, binning. standardization, normalization, dealing with missing features, experimenting with Kaggle datasets
	Dimensionality Reduction	Principal Component Analysis
	Data Visualization	t-SNE plots, histograms of features, deciding bins based on histograms, correlation between features and labels
IV: Models	Tasks	Classification (binary, multi-class, multi-label), Regression, Clustering
	Classification models	Perceptron, Logistic regression, K-nearest neighbours
	Regression models	Linear Regression (with geometric viewpoint)
	Clustering models	K-Means clustering
V: Evaluation	Data Splits	Train, test, validation splits
	Evaluating Classification Performance	Confusion Matrix, Precision/Recall/F1, Accuracy, Cost sensitive accuracy, Area under the ROC curve
	Evaluating Regression Performance	RMSE
	Evaluating Clustering Performance	Purity, Jaccard index, F-measure, Mutual Information

Teaching / Learning Methodology:

Communication Media used for delivery of Instruction:

I. The course shall be delivered in **Online mode**. The course content will be available in form of study material, presentations, video and pre-recorded lectures.
II. Student may also request for the online interaction/contact classes for interaction for resolving their doubts and learning difficulties as per concerned faculty/experts availability.
III. Other Media - Print Material, Assignments/Tutorials, Hands-on exercises, Face to face Counselling, Assignments, Audio / Video Programs, Online materials / resources, Video Conferencing, Recorded lectures on the website, Interactive sessions / Teleconferencing etc.

Evaluation System:

Method of Evaluation:

I. Continuous Evaluation Component (CEC) – Online/Offline Test (MCQs / Descriptive), Assignments etc.
II. Term End Evaluation (TEE) – Final project submission and/or viva voce.
III. The evaluation pattern may consist of a components of CEC (60%) and TEE (40%) weight towards the total marks obtained by the students.
IV. After adding Marks obtained from CEC and TEE, the marks will be converted to letter grading system as below.

Grading System*

Sr. No.	Obtained marks in CEC and TEE	Grade
1	85 – 100	AA
2	75 – 84	AB
3	65 – 74	BB
4	55 – 64	BC
5	45 – 54	CC
6	40 – 44	CD
7	35 – 39	DD
8	Less than 35	FF

*As per evaluation system of GTU

V. The passing criteria for any course is minimum 35% marks collectively of CEC and TEE.

VI. Process of Re-assessment / Re-checking -
   - Re-assessment / Re-checking can be done on request of students as per University norms.
   - If student is not able to complete the certificate course within 6 months, he/she can be given additional 6 months to earn the certificate (double than the actual course duration as per GTU norms). He /she will have to submit the project report and/or re-appear for Viva-Voce with the students of next batch.

Refund of Fees:

If student choose to withdraw from the E-course in which he/she enrolled, the institution shall follow the following four tier system for the refund of fees remitted by student.

Sr. No	Percentage of Refund of Aggregate Fees	Point of time to notify for the withdrawal of admission
1.	100 %	15 days before the commencement of course
2.	75 %	Not more than 15 days after starting of course
3.	50 %	More than 15 days but less than 30 days after starting of course
4.	00 %	More than 30 days after starting of course

Procedure for Application:

I. Fill in the online Application Form along with the required documents. *(For join more than one course, kindly fill the form course wise)*
   - **Link for Application form:** https://forms.gle/ojsDy2zBV11grJR56

II. After verifying the documents and scrutinize the application by GTU – DIC, the candidates will be informed through e-mail for submitting the respective fees through online mode.

III. The participants will be enrolled for the course after receiving the receipt of fees payment.

IV. GTU – DIC committee deserves all right to admit, cancel and alter the course content without any prior notice. The jurisdiction for any discrepancy will be Ahmedabad.

For any query related to the course, kindly contact:

Mr. Karmjitsinh Bihola, Course Coordinator, GTU.
Assistant Professor, Centre for Industrial Design, GTU.
Coordinator, DIC – HUB, GTU.

Call: 079 – 2326 7593 or +91-95128 22525
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