

**NIRMA UNIVERSITY**

<b>Institute:</b>	Institute of Technology
<b>Name of Programme:</b>	B.Tech.(All Programmes), Integrated B.Tech. (CSE)-MBA
<b>Course Code:</b>	XXXX
<b>Course Title:</b>	Introduction to AI & ML
<b>Course Type:</b>	Common
<b>Year of Introduction:</b>	2022-23

L	T	Practical Component				C
		LPW	PW	W	S	
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**Course Learning Outcomes (CLOs):**

At the end of the course, the student will be able to –

1. define the need of artificial intelligence and machine learning (BL1)
2. explain working of artificial intelligence and machine learning algorithms (BL2)
3. make use of machine learning techniques to solve problems in different domains using scientific programming (BL2)
4. identify the patterns in the data using scientific programming language (BL3)

**Syllabus:**

**Total Teaching hours: 30**

Unit	Syllabus	Teaching hours
Unit-I	<b>Foundational Concepts in Artificial Intelligence</b> Introduction to Computational Systems, Problem Formulation and Problem Solving, Intelligence vs Artificial Intelligence (AI), History of AI, Data vs Information vs Knowledge, Rule-based and Structural Knowledge Representation, Jargons of AI, Importance and Applications of AI in different domains	05
Unit-II	<b>Data Exploration</b> Types of Data, Data Collection Methods, Data Characteristics, Handling Missing Values, Introduction to Data Visualization, Data Exploration, Data Analysis and Data Engineering	06
Unit-III	<b>Introduction to State Space and State Space Search</b> State, State Space, State Space Search, Hill Climbing, Steepest Ascent Hill Climbing, Solving Problems using State Space Search	05
Unit-IV	<b>Introduction to Machine Learning</b> Role of Machine Learning (ML) in AI, Applications of Machine Learning in different Domains, Jargons of ML, Supervised Learning – Classification vs Regression, KNN for classification and regression, Unsupervised Learning – K means algorithm, Biological Neural Networks to Artificial Neural Networks, Perceptron Learning, Reinforcement Learning – Q Learning	10
Unit-V	<b>Introduction to Deep Learning</b> Role of DL in AI, Machine Learning vs Deep Learning, Applications of Deep Learning in Different Domains, Types of Deep Networks	04

Self-Study: The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents

- Suggested Readings/References:
1. Artificial Intelligence, Kevin Knight, Elaine Rich, and Shivashankar B. Nair, McGraw Hill Education
  2. Data Mining-Concepts and Techniques, Jiawei Han, Micheline Kamber and Jian Pei, Morgan Kaufmann
  3. Elements of Artificial Neural Networks, Kishan Mehrotra, MIT Press
  4. Machine Learning: A Multistrategy Approach, Tom M. Mitchell, McGraw Hill Education India
  5. Artificial Intelligence - A Modern Approach, Russell, S. and Norvig, P, Prentice Hall

Suggested List of Experiments:	Sr.	Title	Hours
	1	Introduction to Python language, libraries and basic constructs using Virtual Lab. ( <a href="https://python-iitk.vlabs.ac.in/List%20of%20experiments.html">https://python-iitk.vlabs.ac.in/List%20of%20experiments.html</a> )	02
	2	Write a program to calculate and report various descriptive statistics measures.	02
	3	Write a program to handle missing values in data.	02
	4	Write a program for a 6-city symmetric TSP using a brute-force approach.	02
	5	Write a program for a 6-city symmetric TSP using a nearest neighbor heuristic.	02
	6	Write a program that can read Boston house price data and divide these data in training and test set as per the user choice	02
	7	Write a program for classifying iris images using a KNN classifier.	02
	8	Implement accuracy, precision, recall and f1-measure for Practical 7.	02
	9	Write a program for predicting selling price of houses in Boston dataset.	02
	10	Implement MAE, MSE, RMSE and MAPE for Practical 9.	02
	11	Write a program to cluster data in iris flower dataset using k-means algorithm.	02
	12	Evaluate the outcome of Practical 11 against various performance metrics.	02
	13	Implement the Perceptron Learning Algorithm.	02
	14	Implement AND gate using perceptron learning algorithm	02
	15	Can you implement XOR gate using a perceptron learning algorithm? Write a code and justify your answer through reasoning and demonstration.	02

Suggested Case List: -NA-