DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING - DATA SCIENCE

COURSE MODULE FOR THE SESSION 2025-26(Even SEMESTER)

Course Syllabi with CO's

Academic Year: 2025 - 2026							
Department: Computer Science & Engineering (Data science)							
Cours eCode	Course Title	Core/Electi ve	Prerequisite	Contact Hours			Total Hrs/ Sessions
				L	T	P	
BDS602	**Artificial Intelligence and Machine Learning**	Core	**Linear Algebra, Probability and Statistics**	4	0	0	40

Objectives:

CLO 1. Define machine learning and understand the basic theory underlying machine learning.

CLO 2. Differentiate supervised, unsupervised and reinforcement learning

CLO 3. Understand the basic concepts of learning and decision trees.

CLO 4. Understand Bayesian techniques for problems appear in machine learning

CLO 5. Perform statistical analysis of machine learning techniques.

Topics Covered as per Syllabus

Module -1

  Introduction: What is AI, The foundation of Artificial Intelligence, The history of Artificial Intelligence, Intelligent Agents: Agents and Environments, Good Behaviour: The concept of rationality, the nature of Environments, the structure of Agents.

 Textbook 1: Chapter: 1 and 2

 Module -2

  Problem solving by searching: Problem solving agents, Example problems, Searching for solutions, Uniformed search strategies, Informed search strategies, Heuristic functions

  Textbook 1: Chapter: 3

Module -3

  Introduction to machine learning: Need for Machine Learning, Machine Learning Explained, and Machine Learning in relation to other fields, Types of Machine Learning. Challenges of Machine Learning, Machine Learning process, Machine Learning applications.

  Understanding Data: What is data, types of data, Big data analytics and types of analytics, Big data analytics framework, Descriptive statistics, univariate data analysis and visualization

Textbook 2: Chapter: 1 and 2.1 to 2.5

 Module -4

  Understanding Data Bivariate and Multivariate data, Multivariate statistics , Essential mathematics for Multivariate data, Overview hypothesis, Feature engineering and dimensionality reduction techniques.

  Basics of Learning Theory: Introduction to learning and its types, Introduction computation learning theory, Design of learning system, Introduction concept learning.

  Similarity-based learning: Introduction to Similarity or instance based learning, Nearest-

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neighbour learning, weighted k- Nearest - Neighbour algorithm.
Textbook 2: Chapter: 2.6 to 2.10, 3.1 to 3.4, 4.1 to 4.3

Module -5
  Artificial Neural Network: Introduction, Biological neurons, Artificial neurons, Perceptron and learning theory, types of Artificial neural Network, learning in multilayer Perceptron, Radial basis function neural network, self-organizing feature map,
  Textbook 2: Chapter: 10

TextBooks:
1. Stuart Russel, Peter Norvig: "Artificial Intelligence A Modern Approach", 3rd Edition, Pearson Education, 2015.   2. S. Sridhar, M Vijayalakshmi "Machine Learning". Oxford University Press, 2021
Reference Books
1. Elaine Rich, Kevin Knight: "Artificial Intelligence", 3rd Edition, Tata McGraw Hill, 2009, ISBN-10: 0070087709   2. Nils J. Nilsson: "Principles of Artificial Intelligence", Elsevier, 1980, ISBN: 978-3-540-11340-9   3. Murty, M. N., and V. S. Ananthanarayana. Machine Learning: Theory and Practice, Universities Press, 2024.
List of URL's
1. Problem solving agent:https://www.youtube.com/watch?v=KTPmo-KsOis   2.https://www.youtube.com/watch?v=X_Qt0U66aH0&list=PLwdnzlV3ogoXaceHrrFVZCJKbm_laSH cH   3. https://www.javatpoint.com/history-of-artificial-intelligence   4. https://www.tutorialandexample.com/problem-solving-in-artificial-intelligence   5. https://techvidvan.com/tutorials/ai-heuristic-search/   6. https://www.analyticsvidhya.com/machine-learning/   7. https://www.hackerearth.com/practice/machine-learning/machine-learningalgorithms/mldecision-tree/tutorial/   8. https://www.javatpoint.com/unsupervised-artificial-neural-networks
Course outcomes: The students should be able to:
At the end of the course, the student will be able to :   1. Explain Basics of Artificial Intelligence.   2. Apply the suitable search strategy to solve problems.   3. Develop similarity-based learning models and regression models for solving classification and prediction tasks.   4. Utilize probabilistic learning models & clustering algorithms to identify patterns in data and implement reinforcement learning techniques.   5. Build neural network models using perceptrons and multilayer architectures.
Continuous Internal Evaluation (CIE): The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

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The Correlation of Course Outcomes (CO's) and Program Outcomes (PO's)

Subject Code	BDS602		Title: Artificial Intelligence and Machine Learning									
List of Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	Total
CO-1	2	2	1	1	-	-	-	1	-	1	-	2	10
CO-2	2	2	1	1	-	-	-	1	-	-	-	2	09
	3	2	1	2	-	-	-	1	-	-	-	2	11
CO-4	3	2	1	2	-	-	-	1	-	-	-	2	11
CO-5	3	2	1	2	-	-	-	1	-	-	-	2	11
Total	**12**	**10**	**05**	**08**		**-**	**-**	**5**	**-**	**1**	**-**	**10**	**51**

The Correlation of Program Specific Outcome's (PS0's) and Course Outcome (CO's)

Subject Code	BDS602	Title: Artificial Intelligence andMachine Learning	
List of Course Outcome's	PSO1	PSO2	Total
CO-1	3	-	3
CO-2	3	-	3
CO-3	3	-	3
CO-4	3	-	3
CO-5	3	-	3
Total	**15**	**-**	**15**

Note: 3 = Strong Contribution   2 = Average Contribution   1= Weak Contribution   - = No Contribution

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