

CSE11060	Subject from other schools AI(Online) Overview of Recent Trends in AI/ML	L	T	P	C
Version 1.0	Contact Hours -45	3	0	0	3
Pre-requisites/Exposure	H. S. level Mathematics				
Co-requisites	--				

Course Objectives:

To develop awareness among students about the latest trends in the field of AI and ML
 To provide a basic concept of natural language processing and reinforcement learning
 To develop knowledge about the various facets and challenges of cognitive systems

Course Outcomes:

On completion of this course, the students will be able to

- CO1. **Define** challenges in the field of AI and ML
- CO2. **Compare** different types of cognitive systems
- CO3. **Develop** reinforcement learning algorithms
- CO4. **Develop** models for natural language processing

Catalog Description:

This course is designed to spread awareness about the state of the art topics of AI/ML. Starting from a historical perspective, the course is designed to illustrate the several challenges in the field of AI and ML along with several recent developments in areas like natural language processing and reinforcement learning.

Course Content:

Module 1: [10 Lecture Hours]

Computational Linguistic and NLP : Tokenization, POS Tagging, Constituent Parsing, Dependency Parsing, Formal Grammars, Language Modelling, Word sense disambiguation, Named Entity Recognition, Embedding.

Module 2: [11 Lecture Hours]

Reinforcement Learning : Multi arm bandits, Finite Markov Decision Process, Dynamic Programming, Monte Carlo Methods, Temporal Difference Learning, Approximate Solution methods.

Module 3:**[12 Lecture Hours]**

Cognitive Systems-An AI Paradigm shift: Birth of AI, Hebbian learning, cybernetics, perceptrons, non-linear systems, connectionist movement, backpropagation and neural networks, recurrent neural networks, vanishing and exploding gradients, support vector machines, the role of GPUs, deep learning.

Module 4:**[12 Lecture Hours]**

Challenges of AI/ML : Data availability: Quality and quantity, annotation, bias ; financial constraints: funding opportunities, role of government and industries; computational overheads: CPU vs GPU, quantum computing, communication bottlenecks: transition from 4G to 5G, knowledge transfer: skill enhancement, open sourcing, spreading AI awareness; explainability.

Text Books:

1. Speech and Language Processing - Dan Jurafsky and James H. Martin
2. Reinforcement Learning: An Introduction - Richard S. Sutton and Andrew G. Barto

Reference Books:

1. Deep Learning – Ian Goodfellow, Yoshua Bengio, Aaron Courville
2. Artificial Intelligence in Practice - Bernard Marr

Modes of Evaluation: Quiz/Assignment/ presentation/ extempore/ Written Examination

Examination Scheme:

Components	Internal Assessment	MTE	ETE
Weightage (%)	30	20	50

Relationship between the Course Outcomes (COs) and Program Outcomes (POs)

Mapping between COs and POs		
	Course Outcomes (COs)	Mapped Program Outcomes
CO1	Define challenges in the field of AI and ML	PO1, PO2, PO3, PO9, PSO3
CO2	Compare different types of cognitive systems	PO1, PO2, PO3, PO4, PSO3
CO3	Develop reinforcement learning algorithms	PO3, PO4, PO9, PSO4
CO4	Examine models for natural language processing	PO2, PO4, PSO4

Model Question Paper

Name: Enrolment No.:	 ADAMAS UNIVERSITY PURSUE EXCELLENCE		
Course: CSE11060 – Overview of recent trends in AI/ML Program: B.Tech with specialization in Artificial Intelligence and Machine Learning Stream: CSE Semester: VIII Time: 03 Hrs. Max. Marks: 40 Instructions: Attempt all questions from Section A (each carrying 1 marks); any Three Questions from Section B (each carrying 5 marks) any two questions from Section C (each carrying 10 marks).			
Section A (Answer All the Questions) (5 x 1 = 5)			
1.	Define Chomsky hierarchy of formal grammars	R	CO4
2.	What do you mean by Q-Learning	R	CO3
3.	List the main advantages of GPUs over CPUs	R	CO1
4.	Explain vanishing gradients	U	CO2
5.	Explain why modelling the XOR function is not possible with a perceptron	U	CO2
SECTION B (Attempt any Three Questions) (3 x 5 = 15)			
6.	Explain the backpropagation algorithm	U	CO2
7.	Demonstrate the role of multi arm bandits.	U	CO3
8.	Outline 5 major challenges in the field of AL and ML.	U	CO3
9.	Identify the POS Tags of the following sentences: 1) The buffalo is grazing on the field 2) A boy is going to school 3) The car is red 4) The president was elected 5) Walking is a good exercise	Ap	CO4
SECTION C (Answer Any Two Questions) (2 x 10 = 20)			
10.	What action value pair, Explain the role of optimal policy gradient in the training of reinforcement learning systems.	R, U	CO3
11.	Demonstrate how XOR problem can be solved by multi layered perceptrons	U	CO2
12.	Consider the following sentences: 1) ram is eating 2) eating rice is good 3) john is good 4) john buys rice 5) ram buys good rice Construct a unigram, bigram and trigram model and calculate the probability of the sentence “John eats good rice”	Ap	CO4

