SILVER OAK UNIVERSITY
College of Technology (01)
Bachelor of Technology in Computer Engineering/Information Technology
Subject Name: Data Science
Subject Code: 1010043361
Semester: 5th

Prerequisite:

1. Ability to learn new artificial intelligence, machine learning and deep learning algorithms.
2. Good analytical skills.
3. Good problem solving skills

Objective:

With the usage of Internet and World Wide Web increasing day by day, the field of AI and ML with its techniques is being used in many areas which directly affect human life. The objective of the course is to introduce the students with concepts of artificial intelligence and machine learning, and to build the applications using artificial intelligence and machine leaning for various domains.

Teaching and Examination Scheme:

Teaching Scheme					Evaluation Scheme				Total Marks
					Theory		Practical		
L	T	P	Contact Hours	Credit	CIE (TH)	ESE (TH)	CIE (PR)	ESE (PR)	
3	0	2	5	4	40	20	60	30	150

Content:

Unit No.	Contents	Teaching Hours	Weightage %
1	**Introduction to AI:** The AI Problems, The Underlying Assumption, AI techniques, The Level of The Model, Problems in AI, Criteria For Success.	5	10%
2	**State Space Search & Heuristic Search Techniques:** Defining The Problems As A State Space Search, Production Systems, Production Characteristics, Production System Characteristics and Issues in the Design of Search Programs, Generate-And-Test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis.	6	15%
3	**Game Playing:** Overview, MiniMax Search Procedure, Alpha-Beta Cut-offs, Refinements, Iterative deepening.	6	15%

4	**Introduction to Machine Learning:** Overview of Human Learning and Machine Learning, Types of Machine Learning, Applications of Machine Learning , Tools and Technology for Machine Learning .	5	10%
5	**Preparing to Model:** Machine Learning activities, Types of data in Machine Learning, Structures of data, Data quality and remediation, Data Pre-Processing: Dimensionality reduction, Feature subset selection.	7	20%
6	**Neural Network:** Introduction to neural network, Biological and Artificial Neurons, Types of Activation functions, Implementation of ANN, Architecture, Leaning process, Backpropogation, Deep Learning, GANs.	7	20%
7	**NLP(Natural Language Processing):** What is NLP? History of NLP, Advantages of NLP, Disadvantages of NLP, Components of NLP, Applications of NLP, How to build an NLP pipeline? Phases of NLP, NLP APIs, NLP Libraries	6	10%

Course Outcome:

Sr. No.	CO statement	Unit No	Marks Weightage %
CO-1	Understand the search technique procedures applied to real world problems	1	15
CO-2	Appreciate the underlying mathematical relationships within and across Machine Learning algorithms	2,3	25
CO-3	Evaluate the various Supervised and Unsupervised Learning algorithms using appropriate Dataset.	4,5	25
CO-4	Design and evaluate Deep learning Algorithms	6,7	15
CO-5	Design and implement various machine learning algorithms in a range of realworld applications	6,7	20

Teaching & Learning Methodology: -

The various methods or tools follows by the faculties to teach the above subject are:

1. PPT
2. Video Lectures etc

List of Experiments:

The students will have to solve at least five examples and related theories from each topic as an assignment/tutorial.

1. Study Prolog.

2. Design a tic-tac-toe game.
3. Explore following python libraries:
    i. i. numpy
    ii. ii. pandas
    iii. iii. sklearn
    iv. iv. Matplotlib etc
4. Perform travelling salesman using python.
5. Perform BFS in python.
6. Study about different Exploratory Data Analysis.

Major Equipment/ Instrument(Hardware/Software):

1. Latest configured Computer systems
2. Anaconda
3. Google Colab

Books Recommended: -

1. "Artificial Intelligence" -By Elaine Rich And Kevin Knight (2nd Edition) Tata Mcgraw-Hill
2. Machine Learning, Saikat Dull, S. Chjandramouli, Das, Pearson.
3. Neural Networks and Deep Learning, Michael Nielsen.
4. Deep Learning: Methods and Applications, Li Deng and Dong Yu.

List of Open Source Software/learning website:

- Andrew Ng,"Machine Learning",Stanford University https://www.coursera.org/learn/machine-learning/home/info
- Sudeshna Sarkar, "Introduction to Machine Learning", IIT Kharagpur. https://nptel.ac.in/courses/106105152/1
- Prof. BalaramanRavindran,"Introduction to Machine Learning", IIT Madras. https://nptel.ac.in/courses/106106139/1
- https://www.geeksforgeeks.org/machine-learning/
- https://www.tutorialspoint.com/machine_learning_with_python/index.htm
- http://neuralnetworksanddeeplearning.com/
- https://www.coursera.org/specializations/natural-language-processing