DAIDS-1-01T: Introduction to Artificial Intelligence

Total Marks: 100
External Marks: 70
Internal Marks: 30
Credits: 6
Pass Percentage: 40%

Course: Introduction to Artificial Intelligence	
Course Code: DAIDS-1-01T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Explain the basic concepts, principles, and techniques of artificial intelligence.
CO2	Explore real-world applications of AI in various domains such as healthcare, finance, and robotics.
CO3	Develop the ability to identify and formulate problems that can be solved using AI techniques.
CO4	Apply AI solutions to address real-world challenges.
CO5	Describe the basic concepts, principles, and techniques for the development of expert systems

Detailed Contents:

Module	Module Name	Module Contents
Module I	**Introduction to Artificial Intelligence**	Definitions of AI, Intelligent Agents, Problem solving. Knowledge, Reasoning and Planning: Logical Agents, Classical Planning, Knowledge Representation and Reasoning. Learning: Learning from examples, Knowledge in learning.
Module II	**Communicating, Perceiving and Acting**	Communication, Natural Language Processing, Perception, Computer Vision, Robotics.
Module II	**Searching**	Searching for solutions, uniformed search strategies: Breadth first search, depth first Search. Search with partial information (Heuristic search) Hill climbing, A*, AO* Algorithms
Module IV	**Expert Systems**	Introduction, basic concepts, structure of expert systems, the human element in expert systems how expert systems works, problem areas addressed by expert systems, expert systems success factors, types of expert systems, knowledge engineering, scope of knowledge, difficulties, in knowledge acquisition methods of knowledge acquisition, machine learning,

30/1/24

		intelligent agents, selecting an appropriate knowledge acquisition method, societal impacts reasoning in artificial intelligence, inference with rules, with frames: model based reasoning, case based reasoning, explanation & meta knowledge inference with uncertainty representing uncertainty.
Module V	**AI Applications (General)**	Speech Recognition, Image Recognition, Natural Language Processing, Autonomous Transportation. Natural Language understanding, Recognizing objects and describing images, Dimensionality reduction, feature selection and feature extraction.
Module VI	**AI Applications (Specific)**	Virtual Personal Assistants/ Chatbots, Gaming, Smart Cars, Drones, Fraud Detection, Software Testing and Development, Business, Health Care, Education, Finance.

Books

1. S. Russel and P. Norvig, "Artificial Intelligence – A Modern Approach", 2nd Edition, Pearson Education.
2. David Poole, Alan Mackworth, Randy Goebel, "Computational Intelligence: a logical approach", Oxford University Press.
3. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem solving", 4th Edition, Pearson Education.
4. J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers.

30/1/24

DAIDS-1-01T: Introduction to Data Science

Total Marks: 100
External Marks: 70
Internal Marks: 30
Credits: 6
Pass Percentage: 40%

Course: Introduction to Data Science	
Course Code: DAIDS-1-02T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Understand tools and techniques to analyze and extract insights from data received from different data sources such as social media, IoT devices, and sensors.
CO2	Understand the general techniques and frameworks that can be used to handle special types of data, such as acoustic, image, sensor, and network data
CO3	Apply mathematical or logical operations to the data to derive new insights.
CO4	Apply tools for understanding complex data structures and relationships.
CO5	Explore various applications of data science in the field of business, energy, health care, biotechnology, manufacturing, telecommunication, pharmaceuticals etc.

Detailed Contents:

Module	Module Name	Module Contents
Module 1	**Data Science**	Introduction to Data Science, Landscape-Data to Data science, Data Growth-issues and challenges, data science process. foundations of data science. Messy data, Anomalies and artefacts in datasets. Cleaning data.
Module II	**Data Acquisition and Processing**	Introduction, Structured Vs Unstructured data, data preprocessing techniques including data cleaning, selection, integration, transformation and reduction, data mining, interpretation.
Module III	**Representation of data**	Special types-acoustic, image, sensor and network data. Problems when handling large data – General techniques for handling large data, distributing data storage and processing with Frameworks
Module IV	**Data Science Ethics**	Doing good data science – Owners of the data - Valuing different aspects of privacy - Getting informed consent - The Five Cs – Diversity – Inclusion – Future Trends.
Module V	**Data Modeling:**	Basics of Generative modeling and Predictive modeling. Charts-histograms, scatter plots, time series plots etc. Graphs, 3D Visualization and

20/1/24

		Presentation.
Module VI	**Applications of Data Science**	Business, Insurance, Energy, Health care, Biotechnology, Manufacturing, Utilities, Telecommunication, Travel, Governance, Gaming, Pharmaceuticals, Geospatial analytics and modeling

Books

1. Sinan Ozdemir, "Principles of Data Science", Packt Publishing, 2016
2. Joel Grus, "Data Science from Scratch", O'Reilly, 2016
3. Foster Provost & Tom Fawcett, "Data Science for Business", O'Reilly, 2013
4. Roger D. Peng & Elizabeth Matsui, "The Art of Data Science", Lean Publishing, 2015
5. Peter Bruce, Andrew Bruce, Peter Gedeck, "Practical Statistics for Data Scientists-2e: 50+ Essential Concepts Using R and Python", O'Reilly

30/1/24

DAIDS-1-03T: Python Programming

Total Marks: 100
External Marks: 70
Internal Marks: 30
Credits: 6
Pass Percentage: 40%

Course: Python Programming	
Course Code: DAIDS-1-03T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Explain the basic syntax and structure of Python programs.
CO2	Understand variables, data types, and basic operations.
CO3	Understand and use common programming constructs like loops and conditionals.
CO4	Define and use functions in Python.
CO5	Understand the basics of object-oriented programming in Python.

Detailed Contents:

Module	Module Name	Module Contents
Module I	**Introduction to Python**	Python installation and setup, Command line Basics; Python Objects and Data Structures Basics: Introduction to Python data types, Variable assignments, Numbers, String, String methods, Lists, Python Comparison Operators: Chaining comparison operators with logical operators, Pass Break and continue.
Module II	**Program Flow Control in Python**	If, Elif and Else statements in python, for loops, While loops
Module III	**Functions in Python**	Introduction to functions, Def keyword, User defined functions, arguments and parameters, Parameter naming in python
Module IV	**Object Oriented Programming**	Introduction, Classes and objects, attributes and methods, Inheritance and polymorphism, Special methods; Modules and Packages: Pip install and PyPi.
Module V	**Use of Python Libraries**	Utilize common Python libraries for specific tasks (e.g., NumPy for numerical computing, Pandas for data manipulation). Use libraries for data manipulation, analysis, and visualization.
Module VI	**File handling in Python**	Files in python, importing own files, Read and writing text files, working with CSV, XML and JSON files.

Books

1. Timothy Budd, "Exploring Python", TMH, 1st Ed, 2011
2. Allen Downey, Jeffrey Elkner, Chris Meyers, "How to think like a Computer Scientist: learning with Python", Green Tea Pr, 2002
3. Paul Barry, "Head First Python: A Brain-Friendly Guide", O'Reilly, 2nd ed. 2016
4. Udemy, https://www.udemy.com/course/complete-python-bootcamp/
5. Udemy,https://www.udemy.com/course/python-the-complete-python-developer-course

DAIDS-1-03P: Python Programming Lab

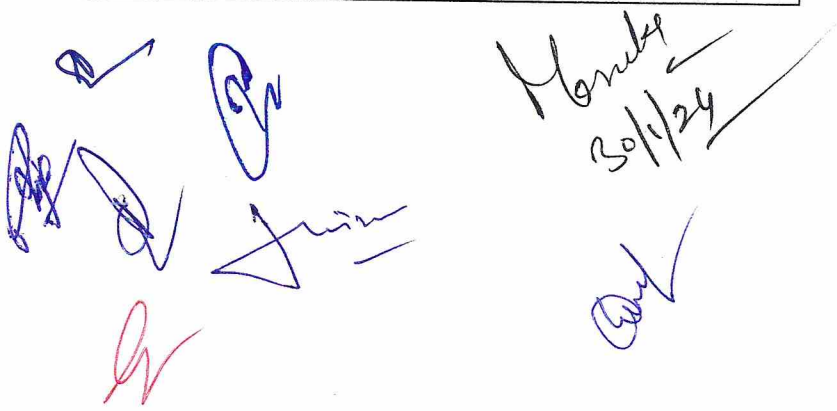
Total Marks: 50
External Marks: 35
Internal Marks: 15
Credits: 2
Pass Percentage: 40%

Course: Python Programming Lab	
Course Code: DAIDS-1-03P	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Demonstrate proficiency in writing Python code to solve simple problems.
CO2	Use and manipulate basic data structures in Python, such as lists, tuples, and dictionaries.
CO3	Solve algorithmic problems using Python.
CO4	Utilize common Python libraries for specific tasks (e.g., NumPy for numerical computing, Pandas for data manipulation).
CO5	Use libraries for data manipulation, analysis, and visualization.

Detailed List of Programmes:

Programme No.	Name of Programme
P1	WAP to find the sum of two numbers
P2	WAP to find Area of Rectangle and Circle
P3	WAP to find Volume of Sphere
P4	WAP to find the maximum of three numbers in python
P5	WAP to print all the prime numbers between two numbers
P6	WAP to print FIBONACCI SERIES using WHILE Loop
P7	WAP to print FIBONACCI SERIES using FOR Loop
P8	WAP to calculate X^n by FOR Loop
P9	WAP to print FACTORIAL of List
P10	WAP to create a list of values inputted by user and sort in increasing order.
P11	WAP to find given number is PRIME or not.
P12	Demonstrate the use of polymorphism by creating different functions for

	sum.
P13	WAP to write an exception for divisibility of a number by 0.
P14	WAP to print the first 10 lines in text file using python
P15	Take a list of integers. WAP to find the pairs which give the minimum difference
P16	WAP to copy content from a file in a computer and paste it into another file.
P17	WAP to create a linked list using python
P18	Demonstrate the use of common Python libraries for specific tasks (e.g., NumPy for numerical computing, Pandas for data manipulation)
P19	Demonstrate the use of common Python libraries for data manipulation, analysis, and visualization.



DAIDS-2-01T: Machine Learning

Total Marks: 100
External Marks: 70
Internal Marks: 30
Credits: 6
Pass Percentage: 40%

Course: Machine Learning	
Course Code: DAIDS-2-01T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Understand the fundamental concepts and principles of machine learning.
CO2	Apply and evaluate various supervised learning algorithms
CO3	Explore and apply unsupervised learning techniques
CO4	Apply machine learning techniques to solve real-world problems
CO5	Evaluate the strengths and limitations of different machine learning approaches

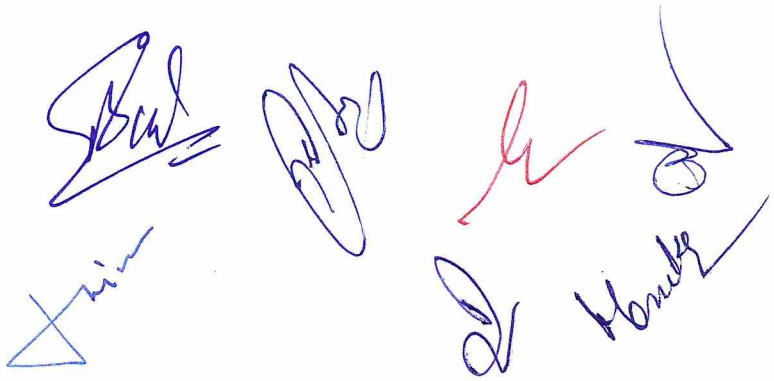
Detailed Contents:

Module	Module Name	Module Contents
Module I	**Introduction to Machine Learning**	Introduction to ML, Applications of Machine learning, machine learning as a future; Data Pre-processing: Importing the libraries, Importing the dataset, taking care of missing data, encoding categorical data, Splitting the dataset into training set and test set, Feature scaling.
Module II	**Regression & Clustering**	Simple linear regression, Multiple linear regression, Logistic Regression, K-Nearest Neighbors, Support vector machine, Decision tree classification, Random forest classification, k-means clustering
Module III	**Introduction to Artificial Neural Networks**	Introduction to ANNs, Biological Neural Networks; Usefulness and Applications of ANNs; Architectures of ANNs: Single layer, Multilayer, Competitive layer; Learning: Supervised and Unsupervised; Activation functions; Linear and Non-linear Separability
Module IV	**Supervised Models**	**Hebb Net:** introduction, algorithm, application for AND problem; **Perceptron:** architecture, algorithm, application for OR Problem; **ADALINE:** architecture, algorithm, application for XOR problem; **MADALINE:** architecture, algorithm,

		application for XOR problem; **Back propagation Neural Network:** architecture, parameters, algorithm, applications, different issues regarding convergence
Module V	**Unsupervised Models**	**Kohonen Self –Organizing Maps:** architecture, algorithm, application, **Adaptive Resonance Theory:** introduction, basic architecture, basic operation, ART1 and ART
Module VI	**Deep Learning**	Introduction, Overview of Neural Networks, History and evolution of Deep Learning, Applications of Deep Learning, Introduction to CNNs

Books

1. Andreas C. Müller, "Introduction to Machine Learning with Python: A Guide for Data Scientists", Sarah Guido, 2016
2. E. Alpaydin, "Introduction to Machine Learning", 3rd Edition, PHI Learning, 2015
3. K. P. Murphy, "Machine Learning:A Probabilistic Perspective", MIT Press, 2012
4. https://www.udemy.com/course/machinelearning



DAIDS-2-02T: Data Mining & Visualization

Total Marks: 100
External Marks: 70
Internal Marks: 30
Credits: 6
Pass Percentage: 40%

Course: Data Mining & Visualization	
Course Code: DAIDS-2-02T	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Understand Data Warehouse fundamentals and Data Mining tools.
CO2	Understand Data Mining Techniques
CO3	Apply clustering methods like K means, hierarchical clustering, agglomerative clustering, divisive clustering to solve problems and evaluate clusters
CO4	Gain knowledge related to application areas of data mining
CO5	Understand the components involved in data visualization design.

Detailed Contents:

Module	Module Name	Module Contents
Module I	**Introduction to Data Mining**	**Data Mining:** Introduction, Scope, What is Data Mining; How does Data Mining Works, Predictive Modeling; Data Mining and Data Warehousing; Architecture for Data Mining; Profitable Applications; Data Mining Tools; Data Pre-processing: Overview, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.
Module II	**Data Mining Techniques**	Data Mining Techniques: An Overview, Data Mining Versus Database Management System, Data Mining Techniques- Association rules, Classification, Regression, Clustering, Neural networks.
Module III	**Clustering**	Clustering: Introduction, Cluster Analysis, Clustering Methods- K means, Hierarchical clustering, Agglomerative clustering, Divisive clustering, evaluating clusters.
Module IV	**Applications of Data Mining**	Applications of Data Mining: Introduction, Business Applications Using Data Mining- Risk management and targeted marketing, Customer profiles and feature construction, Medical applications (diabetic screening), Scientific

30/1/24

		Applications using Data Mining, Other Applications.
Module V	**Data Visualization**	Data Visualization: Introduction, Acquiring and Visualizing Data, Simultaneous acquisition and visualization, Applications of Data Visualization, Keys factors of Data Visualization (Control of Presentation, Faster and Better JavaScript processing, Rise of HTML5, Lowering the implementation Bar)
Module VI	**Exploring the Visual Data Spectrum**	Exploring the Visual Data Spectrum: charting Primitives (Data Points, Line Charts, Bar Charts, Pie Charts, Area Charts), Exploring advanced Visualizations (Candlestick Charts, Bubble Charts, Surface Charts, Map Charts, Infographics).

Books

1. Jiawei Han, Micheline Kamber and Jian Pei, "Data Mining Concepts and Techniques", 3rd Edition, 2000
2. Pang-Ning Tan, Michael Steinbach, and Vipin Kumar, "Introduction to Data Mining", Pearson, 2005
3. M. Kantardzic, "Data Mining: Concepts, Models, Methods, and Algorithms", 2nd Edition, Wiley-IEEE Press, 2011
4. Jon Raasch, Graham Murray, Vadim Ogievetsky, Joseph Lowery, "JavaScript and jQuery for Data Analysis and Visualization", 2014
5. Ben Fry, "Visualizing data: Exploring and explaining data with the processing environment", O'Reilly, 2007

30/1/24

DAIDS-2-01P: Machine Learning Lab

Total Marks: 50
External Marks: 35
Internal Marks: 15
Credits: 2
Pass Percentage: 40%

Course: Machine Learning Lab	
Course Code: DAIDS-2-01P	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Apply a perceptron to solve binary classification problems.
CO2	Apply ADALINE and MADALINE to solve binary classification problems.
CO3	Write code to implement the backpropagation algorithm from scratch.
CO4	Implement and experiment with different clustering algorithms.
CO5	Work with real-world datasets to apply machine learning algorithms or training neural networks.

Detailed List of Programmes:

Programme No.	Name of Programme
P1	Extract the data from database using python
P2	Implementation of Linear Regression
P3	Implementation of Logistic regression
P4	Implementation of Decision tree classification
P5	Implementation of K-nearest Neighbor
P6	Implement the Perceptron Learning rule works for OR Gate training.
P7	Implement the ADALINE works for AND Gate training.
P8	Implement the MADALINE works for XOR Gate training
P9	Build Artificial Neural Network model with back propagation
P10	Implementing K-means Clustering
P11	Implementation of Unsupervised Learning Algorithm ART1
P12	Implementation of Unsupervised Learning Algorithm ART2

30/1/24

DAIDS-2-03P: Project

Total Marks: 100
External Marks: 70
Internal Marks: 30
Credits: 6
Pass Percentage: 40%

Course: Project	
Course Code: DAIDS-2-03P	
Course Outcomes (COs) After the completion of this course, the students will be able to:	
CO1	Demonstrate a sound technical knowledge in the field of AI & DS.
CO2	Gain ability to identify research gaps through literature survey, problem identification, formulation and solution.
CO3	Design solutions to problems utilizing a systems approach.
CO4	Gain ability of communication, management, leadership and entrepreneurship skills.
CO5	Obtain capability and enthusiasm for self-improvement through continuous professional development and life-long learning

Description

To develop project in the field of AI & DS

Study projects can be individual or team projects. Team projects are limited to a maximum number of 3 students (and should be defined according to the complexity of the study).

At the beginning of the 2nd semester (deadline 15 March for Jan Admission Cycle and 15 October for July Admission Cycle) every student /group has to submit his/their application for the study project to the Programme Coordinator for the approval of topic and team members. Within 15 days after approval the topic, the students have to write a project synopsis. The project synopsis should follow a scientific structure and consists basically of the following parts:

1. INTRODUCTION (1 PARAGRAPH)
2 LITERATURE SURVEY (2-3 pages)
(reviews of 4-5 papers/journals/articles/techniques/wares/etc)
3. RESEARCH GAPS (1 paragraph)
4. PROBLEM FORMULATION (1 paragraph)
5. OBJECTIVES OF PROJECT

The major aim of this project is to ..... To achieve the major aim, following objectives are proposed for the study

30/1/24

1.

2.

3.

6. METHODOLOGY/PLANNING OF WORK (1 page)

Research type, unit, methods, tools of data collection / analysis. Methodology will include the steps to be followed to achieve the objective of the project during the project development.

7. H/W AND S/W REQUIREMENTS (1 paragraph)

Software/Hardware required for the development of the project

8. EXPECTED OUTCOMES (1 paragraph)

At the end of the study project, the students have to write a project report. The project report should follow a scientific structure and consists basically of the following parts:

1. INTRODUCTION

2 LITERATURE SURVEY

3. PROBLEM FORMULATION

4. OBJECTIVES OF PROJECT WORK

The major aim of this project is to …….. To achieve the major aim, following objectives are proposed for the study

1.

2.

3.

5. METHODOLOGY

6. MAJOR FINDINGS

7. CONCLUSIONS & FUTURE SCOPE

The length of the final project report should be about 30-40 A4 pages (about 9000-12000 words).

The due date for the final version of the report is at least one week before the official presentation. The duration of the presentation is 10-15 min with an additional 10 min discussion in English.