S.No.	Topic	No. of Lectures
3.	Basics of data mining and CRISP-DM	2
4.	Organizational and data understanding	3
5.	Intents and limitations of data mining, database, data warehouse, data mart and data set	4
6.	Types of data, privacy and security, data preparation, collation and data scrubbing.	4
7.	Data mining models and methods, correlation, association rules	6
8.	K-means, clustering understanding of concept, preparation and modelling.	5
9.	Discriminant analysis, linear regression, logistic regression, understanding, preparation and modeling.	5
10.	Decision trees, neural networks, understanding, preparation and modeling.	5
	Total	**40**

IX. List of Practicals

S.No.	Topic	No. of Practicals
1.	Working of OpenOffice and RapidMiner	3
2.	Preparing RapidMiner Dataset	3
3.	Handling the inconsistent data, missing data, attribute reduction	4
4.	Performing analysis on dataset using RapidMiner	3
	Total	**13**

X. Suggested Reading

- Dr Matthew *North Data Mining for the Masses A Global Text Project Book* ISBN: 0615684378ISBN-13: 978-0615684376.
- Mohammed J Z, Troy and Wagner M Jr. *Data Mining and Analysis: Fundamental Concepts and Algorithms*. Universidade Federal de Minas Gerais, Brazil. Cambridge University Press ISBN 978-0-521-76633-3 Hardback.

I. Course Title : Artificial Intelligence

II. Course Code : CSE 502

III. Credit Hours : 2+1

IV. Aim of the course

To introduce students with techniques and capabilities of artificial intelligence (AI) and enable them to do simple exercises.

V. Theory

Unit I

Definitions of intelligence and artificial intelligence. What is involved in intelligence? Disciplines important to AI. History of development of AI. Different types of AI. Acting humanly, Turing test. AI systems in everyday life. Applications of AI.

Unit II

Classical AI, concept of expert system, conflict resolution, multiple rules, forward chaining, backward chaining. Advantages and disadvantages of expert system. Fuzzy logic and fuzzy rules. Fuzzy expert systems.

Unit III

Problem solving using AI, search techniques, breadth first search, depth first search, depth limited search, bidirectional search, heuristic search, problems and examples. Knowledge representation, frames, methods and demons, correlations, decision trees, fuzzy trees.

Unit IV

Philosophy of AI, Penrose's pitfall, weak AI, strong AI, rational AI, brain prosthesis experiment, the Chinese room problem, emergence of consciousness, technological singularity, Turing test.

Unit V

Modern AI, biological brain, basic neuron model, perceptrons and learning, self-organizing neural network, N-tuple network, evolutionary computing, genetic algorithms, agent methods, agents for problem solving, software agents, multi agents, hardware agents.

VI. Practical

Prolog language, syntax and meaning of Prolog programs, Lists, operators, arithmetic. Using structures: Example programs, controlling backtracking, input and output. more built-in procedures, programming, style and technique, operations on data structures. Advanced tree representations, basic problem-solving strategies, depth-first search strategy, breadth-first search strategy.

VII. Learning outcome

Ability to understand and apply principles of AI in solving simple problems to enable them to get insight into working of AI based systems.

VIII. Lecture Schedule

S.No.	Topic	No. of Lectures
1.	Definitions of intelligence and artificial intelligence. Disciplines important to AI. History of development of AI.	2
2.	Different types of AI. Acting humanly, Turing test. AI systems in everyday life. Applications of AI.	2
3.	Classical AI, concept of expert system, conflict resolution, multiple rules, forward chaining, backward chaining.	3
4.	Advantages and disadvantages of expert system. Fuzzy logic and fuzzy rules. Fuzzy expert systems.	3
5.	Problem solving using AI, search techniques, breadth first search, depth first search	4
6.	Depth limited search, bidirectional search, heuristic search, problems and examples.	4
7.	Knowledge representation, frames, methods and demons, correlations, decision trees, fuzzy trees.	3
8.	Philosophy of AI, Penrose's pitfall, weak AI, strong AI, rational AI, brain prosthesis experiment,	2
9.	Chinese room problem, emergence of consciousness, technological singularity, Turing test.	3
10.	Modern AI, biological brain, basic neuron model, perceptrons and learning, self-organizing neural network,	3
11.	N-tuple network, evolutionary computing, genetic algorithms,	2
12.	Agent methods, agents for problem solving, software agents,	2
13.	Multi agents, hardware agents.	1
	Total	**31**

IX. List of Practicals

S.No.	Topic	No. of Practicals
1.	Prolog language, syntax and meaning of Prolog programs, Lists, operators, arithmetic.	4
2.	Using structures: Example programs, controlling backtracking, input and output. more built-in procedures, programming, style and technique, operations on data structures.	5
3.	Advanced tree representations, basic problem-solving strategies, depth-first search strategy, breadth-first search strategy.	5
	Total	**14**

X. Suggested Reading

- GNU PROLOG *A Native Prolog Compiler with Constraint Solving over Finite Domains* Edition 1.44, for GNU Prolog version 1.4.5 July 14, 2018.
- Ivan Bratko, *Prolog Programming for Artificial Intelligence.*
- Warwick K. 2012. *Artificial Intelligence: The Basics* ISBN: 978-0-415-56482-3 (hbk).

I. Course Title : Neuro-Fuzzy Application in Engineering

II. Course Code : CSE 503

III. Credit Hours : 2+1

IV. Aim of the course

To learn the basic concept of neural network models and fuzzy logic based models and apply fuzzy reasoning and fuzzy inference to solve various agricultural engineering problems

V. Theory

Unit I

Basic concepts of neural networks and fuzzy logic, differences between conventional computing and neuro-fuzzy computing, characteristics of neuro-fuzzy computing.

Unit II

Fuzzy set theory: Basic definitions, terminology, formulation and parameters of membership functions. Basic operations of fuzzy sets: Complement, intersection, vision, T-norm and T- conorm. Fuzzy reasoning and fuzzy Inference: Relations, rules, reasoning, Inference systems, and modeling. Applications of fuzzy reasoning and modelling in engineering problems.

Unit III

Fundamental concepts of artificial neural networks: Model of a neuron, activation functions, neural processing. Network architectures, learning methods. Neural network models: Feed forward neural networks, back propagation algorithm, applications of feed forward networks, recurrent networks, hopfield networks, hebbian learning, self organizing networks, unsupervised learning, competitive learning.

Unit IV

Neuro–fuzzy modelling: Neuro-fuzzy inference systems, neuro-fuzzy control.

Unit V

Applications of neuro-fuzzy computing: Time series analysis and modelling, remote sensing, environmental modelling.