	Soft Computing	L	T	P	C
Version 1.0		3	0	0	3
Pre-requisites/Exposure	--				
Co-requisites	--				

Course Objectives

The Course objective is to provide overview on Soft Computing concepts, technologies, and applications. Upon the completion of this course, the students will be having the knowledge on the underlying principle of soft computing with its usage in various application and different soft computing tools to solve real life problems

Course Outcomes

On completion of this course, the students will be able to
CO1: Classify the various soft computing frameworks.
CO2: Be familiar with the design of neural networks, fuzzy logic and fuzzy systems
CO3: Develop application on different soft computing techniques like Fuzzy, GA and Neural network
CO4: Implement Neuro-Fuzzy and Neuro-Fuzz-GA expert system
CO5: Learn mathematical background for optimized genetic programming

Catalog Description

Soft computing is an emerging approach to computing which parallel the remarkable ability of the human mind to reason and learn in an environment of uncertainty and imprecision. Soft computing is based on some biological inspired methodologies such as genetics, evolution, ant's behaviors, particles swarming, human nervous systems, etc. Now, soft computing is the only solution when we don't have any mathematical modelling of problem solving (i.e., algorithm), need a solution to a complex problem in real time, easy to adapt with changed scenario and can be implemented with parallel computing. It has enormous applications in many application areas such as medical diagnosis, computer vision, hand written character recondition, pattern recognition, machine intelligence, weather forecasting, network optimization, VLSI design, etc.

Course Content

Unit I: 8 lecture hours
Concept of Computing Systems, Difference between Soft and Hard computing, Characteristics of Soft Computing, Requirement of Soft computing, Major Areas of Soft Computing, Applications of Soft Computing.

Unit 2: 6 lecture hours
What is Neural Network, Learning rules and various activation functions, Single layer Perceptron's, Back Propagation networks, Architecture of Backpropagation(BP) Networks,

Backpropagation Learning, Variation of Standard Back propagation Neural Network, Introduction to Associative Memory, Adaptive Resonance theory and Self Organizing Map, Recent Applications.

Unit 3: 9 lecture hours

Artificial Neural Networks: Supervised Learning: Introduction and how brain works, Neuron as a simple computing element, The Single layer Perceptron, Backpropagation networks: architecture, multilayer perceptron, backpropagation learning-input layer, accelerated learning in multilayer perceptron, The Hopfield network, Bidirectional associative memories (BAM), RBF Neural Network.

Artificial Neural Networks: Unsupervised Learning: Hebbian Learning, Generalized Hebbian learning algorithm, Competitive learning, Self- Organizing Computational Maps: Kohonen Network.

Unit 4: 5 lecture hours

Fuzzy Logic Crisp & fuzzy sets fuzzy relations fuzzy conditional statements fuzzy rules fuzzy algorithm. Fuzzy logic controller.

Unit 5: 8 lecture hours

Genetic algorithms basic concepts, encoding, fitness function, reproduction-Roulette wheel, Boltzmann, tournament, rank, and steady state selections, Convergence of GA, Applications of GA case studies. Introduction to genetic programming- basic concepts.

Textbooks

1. R. Rajasekaran and G. A and Vijayalakshmi Pa, *Neural Networks, Fuzzy Logic, and Genetic Algorithms: Synthesis and Applications*, Prentice Hall of India
2. D. E. Goldberg, *Genetic Algorithms in Search, Optimisation, and Machine Learning*, Addison-Wesley

Reference Books

1. L. Fausett, *Fundamentals of Neural Networks*, Prentice Hall
2. T. Ross, *Fuzzy Logic with Engineering Applications*, Tata McGraw Hill

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

Components	MSE	Presentation/Assignment/Test/Quiz etc.	ESE
Weightage (%)	20	30	50

Relationship between the Course Outcomes (COs), Program Outcomes (POs) and Program Specific Outcomes (PSOs).

Course Outcomes	PO1	PO2	PO3	PO 4	PO 5	PO6	PO 7	PO8	PO9	PO 10	PSO 1	PSO 2
CO1												
CO2												
CO3												
CO4												
CO5												
Average												

1=weak 2= moderate 3=strong