

Course code	Course Name	L-T-P Credits	Year of Introduction
CS361	SOFT COMPUTING	3-0-0-3	2016
Prerequisite: Nil			
Course Objectives			
<ul style="list-style-type: none"> To introduce the concepts in Soft Computing such as Artificial Neural Networks, Fuzzy logic-based systems, genetic algorithm-based systems and their hybrids. 			
Syllabus			
Introduction to Soft Computing, Artificial Neural Networks, Fuzzy Logic and Fuzzy systems, Genetic Algorithms, hybrid systems.			
Expected Outcome			
The Students will be able to			
<ol style="list-style-type: none"> Learn soft computing techniques and their applications. Analyze various neural network architectures. Define the fuzzy systems. Understand the genetic algorithm concepts and their applications. Identify and select a suitable Soft Computing technology to solve the problem; construct a solution and implement a Soft Computing solution. 			
Text Books			
<ol style="list-style-type: none"> S. N. Sivanandam and S. N. Deepa, Principles of soft computing – John Wiley & Sons, 2007. Timothy J. Ross, Fuzzy Logic with engineering applications, John Wiley & Sons, 2016. 			
References			
<ol style="list-style-type: none"> N. K. Sinha and M. M. Gupta, Soft Computing & Intelligent Systems: Theory & Applications-Academic Press /Elsevier. 2009. Simon Haykin, Neural Network- A Comprehensive Foundation- Prentice Hall International, Inc.1998 R. Eberhart and Y. Shi, Computational Intelligence: Concepts to Implementation, Morgan Kaufman/Elsevier, 2007. Driankov D., Hellendoorn H. and Reinfrank M., An Introduction to Fuzzy Control- Narosa Pub., 2001. Bart Kosko, Neural Network and Fuzzy Systems- Prentice Hall, Inc., Englewood Cliffs, 1992 Goldberg D.E., Genetic Algorithms in Search, Optimization, and Machine Learning- Addison Wesley, 1989. 			
Course Plan			
Module	Contents	Hours	End Sem. Exam Marks
I	Introduction to Soft Computing Artificial neural networks - biological neurons, Basic models of artificial neural networks – Connections, Learning, Activation Functions, McCulloch and Pitts Neuron, Hebb network.	07	15%
II	Perceptron networks – Learning rule – Training and testing algorithm, Adaptive Linear Neuron, Back propagation Network – Architecture, Training algorithm	07	15%
FIRST INTERNAL EXAM			

III	Fuzzy logic - fuzzy sets - properties - operations on fuzzy sets, fuzzy relations - operations on fuzzy relations	07	15%
IV	Fuzzy membership functions, fuzzification, Methods of membership value assignments – intuition – inference – rank ordering, Lambda – cuts for fuzzy sets, Defuzzification methods	07	15%
SECOND INTERNAL EXAM			
V	Truth values and Tables in Fuzzy Logic, Fuzzy propositions, Formation of fuzzy rules - Decomposition of rules – Aggregation of rules, Fuzzy Inference Systems - Mamdani and Sugeno types, Neuro-fuzzy hybrid systems – characteristics - classification	07	20%
VI	Introduction to genetic algorithm, operators in genetic algorithm - coding - selection - cross over – mutation, Stopping condition for genetic algorithm flow, Genetic-neuro hybrid systems, Genetic-Fuzzy rule based system	07	20%
END SEMESTER EXAMINATION			

Question Paper Pattern

1. There will be *five* parts in the question paper – A, B, C, D, E
2. Part A
 - a. Total marks : 12
 - b. Four questions each having 3 marks, uniformly covering modules I and II; All four questions have to be answered.
3. Part B
 - a. Total marks : 18
 - b. Three questions each having 9 marks, uniformly covering modules I and II; Two questions have to be answered. Each question can have a maximum of three sub-parts
4. Part C
 - a. Total marks : 12
 - b. Four questions each having 3 marks, uniformly covering modules III and IV; All four questions have to be answered.
5. Part D
 - a. Total marks : 18
 - b. Three questions each having 9 marks, uniformly covering modules III and IV; Two questions have to be answered. Each question can have a maximum of three subparts
6. Part E
 - a. Total Marks: 40
 - b. Six questions each carrying 10 marks, uniformly covering modules V and VI; four questions have to be answered.
 - c. A question can have a maximum of three sub-parts.
7. There should be at least 60% analytical/numerical/design questions.