SYLLABUS

Course Code	Course Name	Credits
CSC703	Artificial Intelligence & Soft Computing	4

Course Objectives (CO):

1. To conceptualize the basic ideas and techniques of AI and SC.
2. To distinguish various search techniques and to make student understand knowledge representation and planning.
3. To become familiar with basics of Neural Networks and Fuzzy Logic.
4. To familiarize with Hybrid systems and to build expert system.

Course Outcomes : Students should be able to -

1. Identify the various characteristics of Artificial Intelligence and Soft Computing techniques.
2. Choose an appropriate problem solving method for an agent to find a sequence of actions to reach the goal state.
3. Analyse the strength and weakness of AI approaches to knowledge representation, reasoning and planning.
4. Construct supervised and unsupervised ANN for real world applications.
5. Design fuzzy controller system.
6. Apply Hybrid approach for expert system design.

Pre-requisites : Basic Mathematics, Algorithms

Module No.	Unit No.	Topics	Hrs.
1.0		**Introduction to Artificial Intelligence(AI) and Soft Computing**	4
	1.1	Introduction and Definition of Artificial Intelligence.	
	1.2	Intelligent Agents : Agents and Environments ,Rationality, Nature of Environment, Structure of Agent, types of Agent	
	1.3	Soft Computing: Introduction of soft computing, soft computing vs. hard computing, various types of soft computing techniques. **(Refer Chapter-1)**	
2.0		**Problem Solving**	10
	2.1	Problem Solving Agent, Formulating Problems, Example Problems	
	2.2	Uninformed Search Methods: Depth Limited Search, Depth First Iterative Deepening (DFID), Informed Search Method: A* Search	
	2.3	Optimization Problems: Hill climbing Search, Simulated annealing, Genetic algorithm **(Refer Chapter-2)**	

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3.0		**Knowledge, Reasoning and Planning**	10
	3.1	Knowledge based agents	
	3.2	First order logic: syntax and Semantic, Knowledge Engineering in FOL Inference in FOL : Unification, Forward Chaining, Backward Chaining and Resolution	
	3.3	Planning Agent, Types of Planning: Partial Order, Hierarchical Order, Conditional Order **(Refer Chapter-3)**	
4.0		**Fuzzy Logic**	12
	4.1	Introduction to Fuzzy Set: Fuzzy set theory, Fuzzy set versus crisp set, Crisp relation & fuzzy relations, membership functions,	
	4.2	Fuzzy Logic: Fuzzy Logic basics, Fuzzy Rules and Fuzzy Reasoning	
	4.3	Fuzzy inference systems : Fuzzification of input variables, defuzzification and fuzzy controllers. **(Refer Chapter-4)**	
5.0		**Artificial Neural Network**	12
	5.1	Introduction – Fundamental concept– Basic Models of Artificial Neural Networks – Important Terminologies of ANNs – McCulloch-Pitts Neuron	
	5.2	Neural Network Architecture: Perceptron, Single layer Feed Forward ANN, Multilayer Feed Forward ANN, Activation functions, Supervised Learning: Delta learning rule, Back Propagation algorithm.	
	5.3	Un-Supervised Learning algorithm: Self Organizing Maps **(Refer Chapter-5)**	
6.0		**Expert System**	4
	6.1	Hybrid Approach - Fuzzy Neural Systems	
	6.2	Expert system : Introduction, Characteristics, Architecture, Stages in the development of expert system. **(Refer Chapter-6)**	
		Total	52

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Chapter 1 : Intro. to Artificial Intelligence(AI) and Soft Computing 1-1 to 1-33

Syllabus :

Introduction and Definition of Artificial Intelligence. Intelligent Agents : Agents and Environments, Rationality, Nature of Environment, Structure of Agent, types of Agent Soft Computing: Introduction of soft computing, soft computing vs. hard computing, various types of soft computing techniques.

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1.2.2 Thinking Humanly : The Cognitive Modelling Approach 1-2
1.2.3 Thinking Rationally : The "Laws of Thought" Approach 1-3
1.2.4 Acting Rationally : The Rational Agent Approach 1-3
1.3 Categorization of Intelligent Systems 1-4
1.4 Components of AI 1-4
1.4.1 Computational Intelligence vs. Artificial Intelligence 1-6
1.5 History of Artificial Intelligence 1-6
1.6 Applications of Artificial Intelligence 1-7
1.7 Sub Areas/ Domains of Artificial Intelligence 1-8
1.8 Current Trends in Artificial Intelligence 1-9
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Chapter 2 : Problem Solving 2-1 to 2-61

Syllabus :

Problem Solving Agent, Formulating Problems, Example Problems Uninformed Search Methods : Depth Limited Search, Depth First Iterative Deepening (DFID), Informed Search Method : A* Search Optimization Problems : Hill climbing Search, Simulated annealing, Genetic algorithm

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Syllabus :

Knowledge based agents, First order logic: syntax and Semantic, Knowledge Engineering in FOL Inference in FOL : Unification, Forward Chaining, Backward Chaining and Resolution, Planning Agent, Types of Planning: Partial Order, Hierarchical Order, Conditional Order

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Syllabus :

Introduction to Fuzzy Set: Fuzzy set theory, Fuzzy set versus crisp set, Crisp relation & fuzzy relations, membership functions, Fuzzy Logic: Fuzzy Logic basics, Fuzzy Rules and Fuzzy Reasoning, Fuzzy inference systems: Fuzzification of input variables, defuzzification and fuzzy controllers.

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Syllabus :

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Syllabus :

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