1. Course Number and Name: 420 CPE – Intelligent Systems

2. Credits and Contact Hours: 3 Credit

a. Lecture – 2 day per week at 50 minutes for 16 weeks
b. Laboratory – 1 day per week at 100 minutes for 16 weeks

3.Course Coordinator or Instructor:

Dr. Jalal

4. Text Book:

- Artificial Intelligence: A Modern Approach, 3/e (Prentice Hall 2009) Stuart Russell & Peter Norvig.
- Artificial Intelligence: A New Synthesis 2/e (Morgan Kuffmann) Nils J. Nilson.

5. Specific Course Information:

a. **Catalog Description:** Intelligent agent, problem solving and search, game playing, knowledge representation, and machine learning, and robotics. Neural Networks and Fuzzy systems. In the laboratory, course topic based experiments are designed to increase the subject understanding.

b. **Prerequisites:** 321 CPE Automatic Control System

c. **Status:** Required

6.Specific Goals for the Course:

a.Course Outcomes:

1. Develop an ability to design an intelligent program in PROLOG.
2. Analyze AI techniques and Intelligent system methodologies to make intelligent programs.
3. Develop an ability to use PROLOG programming skill and MATLAB tools to solve an Intelligent system problem.
4. Analyze and realize the importance of the different codes of Ethics for Intelligent machine
5. Demonstrate lifelong learning by synthesizing information from several sources.
6. Demonstrate an ability to communicate AI ideas effectively in writing.

b.Student outcomes in Criterion 3 addressed by course:

Course LOs #	Map course LOs with the program LOs. (Place course LO #s in the left column and Student LO #s across the top.)											
	Student Learning Outcomes Use LOs Codes											
	a1	**a2**	**b1**	**b2**	**b3**	**b4**	**c1**	**c2**	**c3**	**c4**	**d1**	**d2**
1			√									
2					√							
3							√					
4									√			
5										√		
6											√	

7. List of Topics: 420CPE – Intelligent Systems

List of Topics for Theory:

- **Introduction to Artificial Intelligence:** What is AI?, Some Applications of AI, The multidisciplinary nature of AI, Different paradigms of AI, The philosophical concepts of strong and weak AI, Development of AI over time, AI programming in PROLOG, Intelligent systems
- **Search Techniques:** Solving Problems by Searching, Breadth First Search, Depth First Search, Depth Limited Search, Iterative Deepening Depth-First Search, Best First Search, A* Search.
- **Knowledge Representation and Reasoning:** Propositional Logic, Predicate Logic, Production Systems, Semantic Networks, Frame Systems, Scripts.
- **Neural Networks:** Introduction to Neural Networks, Applications of Neural Networks, the Biological Neuron, Structure of an Artificial Neuron, Feed Forward Neural Networks, Back-Propagation Learning of Neural Networks.
- **Fuzzy logic:** Crisp logic, fuzzy sets, membership functions, fuzzy set operators, fuzzy relations, fuzzification & defuzzification, fuzzy logic applications
- **Review Intelligent Agents:** Agents and Environments, Concept of rationality, Nature of Environments, Structure of Agents. Machine Ethics: Creating an Ethical Intelligent Agent

List of Topics for Laboratory:

- Introduction to Prolog: Defining relations by facts, Defining relations by rules, Recursive rules
- Write a prolog program to find maximum of two numbers. Write a prolog program to check whether a word or number palindrome or not.
- Write a prolog program to find factorial of a given number. Write a prolog program to find Fibonacci series of N numbers
- Write a prolog Program to implement Breadth first search.
- Write a prolog Program to implement Depth first search.
- Write a prolog Program to implement A* search.
- Write a prolog program to identify the family tree structure with different relationships
- Using prolog predicate logic, Truth tables for logical expressions. Prolog program for implementing inheritance in semantic networks.
- Simulate logic gates using perceptron model in MATLAB
- Modeling three inputs to generate single output through neural network using MATLAB.
- Fuzzy logic in classification using MATLAB.