

Course Syllabi: UEE702: Intelligent Techniques in Electrical Engineering (L : T : P :: 3 : 0 : 2)

1. **Course number and name:** UEE702: Intelligent Techniques in Electrical Engineering
2. **Credits and contact hours:** 4.0 and 5
3. **Text book, title, author, and year**

Text Books / Reference Books

- *Lin, C., Lee, G., Neural Fuzzy Systems, Prentice Hall International Inc. (2000).*
- *Rajashekran, S. and Vijaylaksmi Pai, G.A., Neural Networks, Fuzzy Logic and Genetic Algorithm Synthesis and Applications, PrenticeHall of India Private Limited (2004).*
- *Zurda, J.M., C++ Neural Networks and Fuzzy Logics, BPS Publication (2001).*
- *Kosko, B., Neural Networks and Fuzzy Systems: a Dynamical systems Approach to Machine Intelligence, Prentice Hall of India Private Limited (1992).*

- a. Other supplemental materials
 - Nil

4. Specific course information

- a. Brief description of the content of the course (catalog description)

Introduction: Concept of artificial intelligence, Introduction to classical problem solving methods and heuristic search techniques.

Fuzzy Systems: Fuzzy sets, Operation on fuzzy sets, Fuzzy relations, measures, Fuzzy logic, Fuzzy logic controller (FLC).

Artificial Neural Networks: Fundamental concepts, Basic models, Learning rules, Single layer and multi-layer feed-forward and feedback networks, Supervised and unsupervised methods of training, Recurrent networks, Modular network.

Genetic Algorithm: Basic principle, Evolution of genetic algorithm, Hybrid genetic algorithm, trends in stochastic search.

Hybrid Systems: Integrated hybrid systems such as neuro-fuzzy, fuzzy-neuro.

Applications: Short term and long term load forecasting, Identification, Classification, Fault location and fault diagnosis, Economic load dispatch, DC/AC four quadrant drive control.

Laboratory work: Training algorithms of neural networks and fuzzy logic, Implementation of fuzzy logic, Neural networks and genetic algorithms on various applications, Use of MATLAB tools of fuzzy logic and NN.

5. Specific goals for the course

After the completion of the course, the students will be able to:

- Examine the fuzzy system and implement fuzzy controllers for control and classification.
- Explain neural networks behaviour and use them for classification, control system and optimization problem.
- Obtain the optimum solution of well formulated optimisation problem using evolutionary approach.
- Formulate hybrid intelligent algorithms for typical electrical application.

6. Brief list of topics to be covered

- Fuzzy Systems

- Artificial Neural Networks
- Artificial Neural Networks
- Genetic Algorithm
- Hybrid Systems
- Applications