

**Course Syllabi: UEE802 Intelligent Algorithms in Power System (L : T : P :: 3 : 0 : 2)**

1. **Course number and name:** UEE802; Intelligent Algorithms in Power System

2. **Credits and contact hours:** Credits: 4.0; Hours: 5

3. **Text book, title, author, and year**

- *Lin, C., Lee, G., Neural Fuzzy Systems, Prentice Hall International Inc. (2000).*
- *Rajashekran, S. and VijaylaksmiPai, G.A., Neural Networks, Fuzzy Logic and Genetic Algorithm Synthesis and Applications, Prentice–Hall of India Private Limited (2004).*
- *Taylor, C.W., Power System Stability, McGraw–Hill (2007).*
- *Kosko, B., Neural Networks and Fuzzy Systems: a Dynamical systems Approach to Machine Intelligence, Prentice–Hall of India Private Limited (1992).*
- *Zurda, J.M., C++ Neural Networks and Fuzzy Logics, BPS Publication (2001).*

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, Problem solving methods and searching techniques.

**Fuzzy Systems:** Fuzzy sets, Operation on fuzzy sets, Fuzzy relations, Fuzzy measures, Fuzzy logic, Fuzzy controller.

**Artificial Neural Networks:** Fundamental concepts, Basic models, Learning rules, Single layer and multi-layer feed-forward and feedback networks, Supervised and unsupervised learning, Recurrent networks, Modular network, Self organizing maps, Function networks, Neural network controller.

**Genetic Algorithm:** Basic principle, Evolution of genetic algorithm, Hybrid genetic algorithm.

**Hybrid Systems:** Integrated neural- fuzzy system simulated evolution for neural network learning, Fast learning algorithms for training NN.

**Applications:** Short term and long term load forecasting, Identification, Classification, Fault location and fault diagnosis, Stability evaluation, Economic load dispatch, Voltage estimation, Hydro-thermal scheduling, DC/AC four quadrant drive control.

**Laboratory Work**

Training algorithms of neural networks and fuzzy logic, Implementation of fuzzy logic, Neural Networks (NN) 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:

- Implement fuzzy controllers by modelling the human intelligence into mathematical model.
- Mathematically model the human learning capability and solve 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
- Genetic Algorithm
- Hybrid Systems