

**Course Code :** EE 713

**Course Title :** Neuro-Fuzzy Control Systems

**Credit Hours :** 3

### **Course Description**

Artificial neuron, Back propagation, Hopfield networks, Kohonen self-organization maps, Schemes of neuro control, Identification and control of dynamical systems, Fuzzy sets and fuzzy relations, Fuzzy rules and fuzzy algorithm, Fuzzy logic controller, Fuzzification and defuzzification interfaces, Decision making logic, Design of fuzzy logic controller, Optimization of membership function and rule base of fuzzy logic controller using neural networks, Fuzzy neuron.

### **Course Objectives**

This course will enable students to understand the fuzzy logic systems, the artificial neural networks, and will know how these techniques are applied to control systems.

### **Course Topics**

- Week no. 1: Artificial neuron.
- Week no. 2: Back propagation.
- Week no. 3: Hopfield networks.
- Week no. 4: Kohonen self-organization maps.
- Week no. 5: Schemes of neuro control.
  
- Week no. 6: Identification and control of dynamical systems.
  
- Week no. 7: Fuzzy sets and fuzzy relations. / 7<sup>th</sup> week evaluation.
  
- Week no. 8: Fuzzy rules and fuzzy algorithm.
  
- Week no. 9: Fuzzy logic controller.
  
- Week no. 10: Fuzzification and defuzzification interfaces.
  
- Week no. 11: Decision making logic.
  
- Week no. 12: Design of fuzzy logic controller. / 12<sup>th</sup> week evaluation
  
- Week no. 13: Optimization of membership function and rule base of fuzzy logic controller using neural networks.
  
- Week no. 14: Optimization of membership function and rule base of fuzzy logic controller using neural networks.
  
- Week no. 15: Fuzzy neuron.

Week no. 16: Final Examination

### References

- -Tsoukalas L.H, and Robert E.Uhrig, Fuzzy and Neural approach in Engineering, John Wiley and Sons, 1997.
- Jacek M.Zurada, Introduction to artificial Neural Systems, Jaico Publishing House Mumbai, 1997.
- Klir G.J and Yuan B.B, Fuzzy sets and fuzzy logic, Prentice Hall of India, New Delhi, 1997.
- Driankov D., Hellendron. H. Reinfrank M., An Intrtroduction to Fuzzy control, Narosa publishing House, New Delhi, 1996.
- Millon W. T., Sutton R.S. and Webrose P.J., Neural Networks for control, MIT Press, 1992.