EC-312C	FUZZY LOGIC (ELECTIVE - II)	L	T	P	C
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COURSE OBJECTIVES:

1. To develop the fundamental concepts such as fuzzy sets, operations and fuzzy relations.
2. To lean about the fuzzification of scalar variables and the defuzzification of membership functions.
3. To learn three different inference methods to design fuzzy rule based system.
4. To develop fuzzy decision making by introducing some concepts and also Bayesian decision methods
5. To learn different fuzzy classification methods.

COURSE OUTCOMES:

After successful completion of the course, the students are able to

1. understand the basic ideas of fuzzy sets, operations and properties of fuzzy sets and also about fuzzy relations.
2. understand the basic features of membership functions, fuzzification process and defuzzification process.
3. design fuzzy rule based system.
4. know about combining fuzzy set theory with probability to handle random and non-random uncertainty, and the decision making process.
5. gain the knowledge about fuzzy C-Means clustering.

UNIT I *Text Book - 1,2* **(12)**

Classical sets : Operations and properties of classical sets, Mapping of classical sets to the functions. Fuzzy sets - Membership functions, Fuzzy set operations, Properties of fuzzy sets. **Classical and Fuzzy relations :** Cartesian product, crisp relations-cardinality, operations and properties of crisp relations. Fuzzy relations-cardinality, operations, properties of fuzzy relations, fuzzy Cartesian product and composition, Fuzzy tolerance and equivalence relations, value assignments and other format of the composition operation.

UNIT II *Text Book - 1* **(10)**

Fuzzification and Defuzzification : Features of the membership functions, various forms, fuzzification, defuzzification to crisp sets, λ- cuts for fuzzy relations, Defuzzification to scalars. Fuzzy logic and approximate reasoning, Other forms of the implication operation.

UNIT III *Text Book - 1* **(10)**

Fuzzy Systems : Natural language, Linguistic hedges, Fuzzy (Rule based) System, Aggregation of fuzzy rules, Graphical techniques of inference,Membership value assignments: Intuition, Inference, rank ordering, Fuzzy Associative memories.

UNIT IV *Text Book - 1* **(11)**

Fuzzy decision making : Fuzzy synthetic evaluation, Fuzzy ordering, Preference and consensus, Multi objective decision making, Fuzzy Bayesian, Decision method, Decision making under Fuzzy states and fuzzy actions.

UNIT V *Text Book - 1,2* **(11)**

Fuzzy Classification : Classification by equivalence relations-crisp relations, Fuzzy relations, Cluster analysis, Cluster validity, C-Means clustering, Hard C-Means clustering, Fuzzy C-Means algorithm, Classification metric, Hardening the Fuzzy C-Partition.

LEARNING RESOURCES:

TEXT BOOK(s):

1. Timothy J.Ross - Fuzzy logic with engineering applications, 3rd edition, Wiley,2010.
2. George J.KlirBo Yuan - Fuzzy sets and Fuzzy logic theory and Applications, PHI, New Delhi,1995.

REFERENCE BOOK(s):

S.Rajasekaran, G.A.Vijayalakshmi - Neural Networks and Fuzzy logic and Genetic Algorithms, Synthesis and Applications, PHI, New Delhi,2003.

WEB RESOURCES:

http://www.nptel.ac.in/syllabus/syllabus.php?subjectId=111106048