DEPARTMENT OF MATHEMATICS

Teaching Schedule

Course Objectives: To Summarize concepts of Fuzzy Logic to enhance ability of analysing pure and applied mathematical problems.

Course Outcomes: Upon completion of the course, students shall be able to

CO1: clarifying the fundamental concepts, properties and operations of classical sets and fuzzy sets.
CO2: classify the differences and similarities between fuzzy sets and classical sets theories.
CO3: become familiar with fuzzy relations and the properties of these relations.
CO4: identity and understand the different fuzzy membership functions.
CO5: illustrate a distinction between classical logic and fuzzy logic at the conceptual level.
CO6: fuzzify the usual form of problems having vagueness or uncertainty and solve them by using fuzzy logic and fuzzy system.

Unit	Sub Unit	No. of Lect.(s)	Topics	Reference Chapter/ Additional Reading	Teaching Methodology to be used	Active Learning Activities	Evaluation parameter
Unit 1: Introduction, Classical Sets and Fuzzy Sets:[11 hours]						
1	1.1	2	Definition of Fuzzy sets. Classical Sets	Ch#1,2 Dr. A K Bhargaya Ch#1,2 T.J. Ross	Chalk & Talk / Presentation	**For Slow learners:** Students will solve the questions given by teacher at the end of unit. **For Active learners:** Students will find the applications at the end of unit.	Unit Test1 Internal Examination Presentation
	1.2	2	Operations on Classical Sets, Properties of Classical Sets				
	1.3	2	Mapping of Classical Sets to Functions, Fuzzy Sets				

	1.4	3	Fuzzy Set Operations, Properties of Fuzzy set				
	1.5	2	Alternative Fuzzy Set Operations.				
Unit 2: Classical Relations and Fuzzy Relations: [11 hours]							
2	2.1	1	Cartesian Product	Ch# 7 Dr. A K Bhargaya Ch#3 T.J. Ross	Chalk & Talk / Presentation	**For Slow learners:** Students will solve the questions given by teacher at the end of unit. **For Active learners:** Students will find the applications at the end of unit.	Unit Test1, 2 Internal Examination Presentation
	2.2	2	Crisp Relations				
	2.3	2	Fuzzy Relations				
	2.4	2	Tolerance and Equivalence Relations				
	2.5	2	Value Assignments				
	2.6	2	Other Forms of the Composition Operation				
Unit 3: Properties of Membership Functions, Fuzzification, and Defuzzification: [12 hours]							
3	3.1	2	Fuzzy membership functions	Ch# 7 Dr. A K Bhargaya Ch#4 T.J. Ross	Chalk & Talk / Presentation	**For Slow learners:** Students will solve the questions given by teacher at the end of unit. **For Active learners:** Students will find the applications at the end of unit	Unit Test 2 Internal Examination Presentation
	3.2	2	Features of the Membership Function				
	3.3	2	Various Forms Fuzzification				
	3.4	2	Defuzzification to Crisp Sets				

						For Slow learners / Active learners	
	3.5	2	λ-Cuts for Fuzzy Relations				
	3.6	2	Defuzzification to Scalars				
Unit 4: Fuzzy Logic and Fuzzy Systems: [11 hours]							
4	4.1	1	Classical Logic	Ch# 10 Dr. A K Bhargaya Ch#5 T.J. Ross	Chalk & Talk / Presentation	**For Slow learners:** Students will solve the questions given by teacher at the end of unit. **For Active learners:** Students will find the applications at the end of unit	Internal Examination Presentation
	4.2	2	Fuzzy Logic				
	4.3	2	Approximate Reasoning				
	4.4	2	Natural Language,				
	4.5	1	Linguistic Hedges				
	4.6	21	Fuzzy (Rule-Based) Systems				
	4.7	1	Graphical Techniques of Inference				

Text books:

1. Ross T. J., "Fuzzy Logic with Engineering Applications", Wiley India Publications.
2. Dr. A.K. Bhargaya, "Fuzzy Set Theory, Fuzzy Logic and Their Applications" S chand publication.

Reference books:

1. Klir G. J., St. Clair U. H. & Yuan B., "Fuzzy set Theory Foundations and Applications", PHI Inc. USA,1997.
2. Ganesh M., "Introduction to Fuzzy Sets and Fuzzy Logic", PHI, New Delhi, 2006.
3. Dubois D. and Prade H., "Fuzzy Sets and Systems: Theory and Applications", Academic Press, Cambridge, MA, 1980.

Course Objectives and Course Outcomes Mapping:

- Understand the concepts of fuzzy set theory: CO1, CO2, CO3, CO4
- Summarize concepts of fuzzy logic to find the satisfactory solution of uncertain mathematical problems: CO5, CO6

Course Units and Course Outcomes Mapping:

Unit No.	Unit	Course Outcomes					
		CO1	CO2	CO3	CO4	CO5	CO6
1	Introduction, Classical sets and Fuzzy sets	√	√				√
2	Classical relations and Fuzzy relations			√			√
3	Properties of membership Functions, Fuzzification, and Defuzzification				√		√
4	Fuzzy logic and Fuzzy systems					√	√

Programme Outcomes (PO)

PO1: Knowledge

Provides knowledge about the fundamentals of pure, applied and computing mathematics and its applications to students that creates the opportunities in industries and research centers.

PO2: Core Competence

Creates competency in science and mathematics to formulate, analyses and solve problem and/or also to pursue advanced study or research.

PO3: Breadth

Trains students having good knowledge in unearth core of academia and industry by the roots of mathematics.

PO4: Evaluation

Imparts in students to raise trial and error-based curiosity and problem-solving functionality with research based advanced tutorial for higher level decision makings tools.

Programme Outcomes and Course Outcomes Mapping:

Programme Outcomes	Course Outcomes					
	CO1	CO2	CO3	CO4	CO5	CO6
PO1	✓	✓	✓	✓		
PO2		✓	✓	✓		✓
PO3		✓	✓	✓	✓	
PO4					✓	✓