— COURSE —

Introduction to Fuzzy Theory
(VAS803)

VALUE ADDED
COURSE BROCHURE-30 HRS
2024-25

ABOUT THE UNIVERSITY

Sharda University envisions to serve the society by being a global University of higher learning in pursuit of academic excellence, innovation and nurturing entrepreneurship. It has 14,000+ students from 95+ countries, 29 states, and Union Territories, providing cultural diversity and global exposure to students. It has 26000+ alumni who are today leaders in their realms. Sharda University is NAAC A+ University with Overall NIRF Rank of 87. Teaching Learning Center at Sharda University is to equip the faculty members with the expertise, skills and knowledge they need for capacity building of students. Teaching as a profession requires highly specialized skills and knowledge to impact significantly on student learning and therefore teachers must refine their conceptual and pedagogical skills.

ABOUT SCHOOL

Sharda School of Basic Sciences and Research (SSBSR) boasts of providing an interdisciplinary approach, exposure to different disciplines in science including Chemistry,Bio-Chemistry, Physics, Mathematics, Life Sciences, and Environmental Sciences.

The Sharda School of Basic Sciences and Research is unique from other institutions of higher learning as it is committed to imparting knowledge in pure and applied sciences, which not only forms the foundation for further academic pursuits in science and technology but also acts as the foundation for students to pursue a career in multi facet directions.

The academic programs are designed to meet the requirement of the latest technological developments and envisages to become a state-of-the-art department that cater the students at Graduate, Post-Graduate and Research level along with providing high-quality education and cutting-edge interdisciplinary research in sciences. SSBSR has well-equipped laboratories for Physics, MATLAB, Microbiology, Molecular Biology, Cell Culture, Virology, Bio-Chemistry, Physical, Organic and Inorganic chemistry for Graduate and Post-Graduate Programs. In addition, there are Central Instrumentation Facility (CIF) and other advance research labs to promote research culture.

ABOUT COURSE

This is a course that provides an overview of the fundamentals and applications of fuzzy logic and fuzzy sets. Fuzzy theory is a branch of mathematics that deals with uncertainty and vagueness in decision-making and problem-solving.

COURSE SCHEDULE

Week	Content
1.	Introduction to Fuzzy Sets
2.	Fuzzy Operations
3.	Fuzzy Numbers
4.	Fuzzy Arithmetic
5.	Fuzzy Relations

RESOURCE PERSONS

Dr. Neha Bhardwaj
Assistant Professor
Department of Mathematics, Sharda University

Dr. Neha Bhardwaj is awarded with PhD degree in Mathematics from Delhi Technological University in 2015. She has completed MSc Applied Mathematics from IIT Roorkee in 2006. Her graduation is from CCS University in 2003. Her area of research is Approximation Theory. She has more than 13 years of teaching experience. She has published 14 research papers in reputed national/international journals, as of now. She has attended and presented research papers in various national and international conferences. During her research, she has been awarded International travel grant from DST under ITS. In 2018, she received TARE fellowship funded by SERB(DST) and currently working on the project under the fellowship.

Dr. Nidhi Sahni
Assistant Professor
Department of Mathematics, Sharda University

Dr. Nidhi Sahni did her M. Sc., Ph.D.in mathematics from D D U Gorakhpur University Gorakhpur. Her area of research is special functions and she has worked as a junior research fellow in a major research project during Ph.D. Dr. Nidhi Sahni is associated with Sharda University from September 2014 and she has a total of 14 years teaching experience.

1. Course Code	VAS803
2. Course Title	Introduction to Fuzzy Theory
3. Credits	Audit Course
4. Contact Hours (L-T-P)	30 Hours
Course Type	Value added course
5. Course Objective	1.To introduce the fundamental concepts of fuzzy theory. 2.To understand the mathematical foundations of fuzzy sets and fuzzy operations. 3.To explore the principles and methods of fuzzy reasoning and inference.
6. Course Outcomes	CO1: The student will be able to understand the basic concepts fuzzy sets. CO2: The student will be able to explain the mathematical foundations of fuzzy sets and operations, such as membership functions. CO3: The student will be able to explain fuzzy numbers. CO4: The student will be able to apply fuzzy arithmetic. CO5: The student will be able to develop fuzzy relations. CO6: The student will be able to find projection and transitive closure on fuzzy relations.
7. Course Description	This is an introductory course that provides an in-depth understanding of fuzzy logic, fuzzy sets, and their applications. Fuzzy theory is a mathematical framework that deals with uncertainty and imprecision, allowing for the representation and manipulation of vague or fuzzy concepts. This course explores the theoretical foundations of fuzzy theory and its practical applications in various fields, such as artificial intelligence, control systems, decision-making, and pattern recognition.

8. Outline syllabus

		CO Mapping
Unit 1	**Introduction to Fuzzy Sets**	
A	Introduction to Fuzzy sets , Crisp vs Fuzzy Types of Fuzzy sets	CO1,CO2
B	Membership functions ,	CO1,CO2
C	Alpha cuts	CO1,CO2
Unit 2	**Fuzzy Operations**	
A	Fuzzy operations: union, intersection, complement	CO2
B	t-norm, complements t-conorm,	CO2
C	Combination of operations	CO2,CO3
Unit 3	**Fuzzy Numbers**	
A	Introduction to Fuzzy arithmetic Interval arithmetic	CO3
B	+,-,* using alpha cuts MIN and MAX fuzzy numbers	CO3,CO4
C	Fuzzy arithmetic using Alpha cuts	CO3,CO4
Unit 4	**Fuzzy Arithmetic**	
A	Extension principle	CO5
B	Fuzzy arithmetic using Extension Principle	CO5
C	Fuzzy Equations.	CO5,CO6
Unit 5	**Fuzzy Relations**	
A	Relations, Introduction to fuzzy relations	CO5
B	Projections, Equivalence relation,	CO5,CO6
C	Transitive closure, compatibility relation.	CO5,CO6
Mode of Examination	Assignment/Quiz/Viva	
Text Book **Other Reference**	1. Bhargava, A.K., 2013. Fuzzy set theory fuzzy logic and their applications. S. Chand Publishing. 1. Zimmermann, H.J., 2011. Fuzzy set theory—and its applications. Springer Science & Business Media.	