





Fuxxy Topology

MAT514

Prof. Dr Shamsun Naher Begum Shahjalal University of Science and Technology

> EDITED BY MEHEDI HASAN







Preface

This is a compilation of lecture notes with some books and my own thoughts. If there are any mistake/typing error or, for any query mail me at mehedi12@student.sust.edu.

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Part I Sheet

Chapter 1

Fuzzy Sets

Definition 1 (Characteristic function). Let X be a universal set and $A \subseteq X$. Then the function¹

$$\chi_A(x) = \begin{cases} 1; & x \in A \\ 0; & x \notin A \end{cases}$$

is characteristic function of A in X.

Definition 2 (Fuzzy Set). A fuzzy set² $A \subseteq X$ is a mapping $A : X \to [0, 1]$, where, $A(x) = y \in [0, 1]$ is called the membership function or, grade of membership of x in A. The collection of all fuzzy sets of X is denoted by $\mathcal{F}(x)$.

Definition 3 (Fuzzy subset). A fuzzy set A is called a fuzzy subset of another fuzzy set B if $A(x) \leq B(x)$ $\forall x \in X$. We denote it by $A \leq B$.

Definition 4 (Empty fuzzy set). A fuzzy set A is called empty fuzzy set if $\forall x \in X \ A(x) = 0$. The empty fuzzy set is denoted by $\underline{0}$. Thus, $\underline{0}(x) = 0 \ \forall x \in X$.

Definition 5 (Total fuzzy set). The total fuzzy set $\underline{1}$ is defined by $\underline{1}(x) = 1 \ \forall x \in X$.

Definition 6 (Equality of two fuzzy sets). Two fuzzy sets A and B of X is said to be equal iff $A \leq B$ and $B \leq A$.

¹Some authors use μ as characteristic function.

²Sometimes fuzzy set is denoted by A.