

750722, Fuzzy Logic in Computer Science

3 hours per week, 3 credit hours, prerequisite: **none**

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Teaching Method: 37 hours Lectures (2-3 hours per week) + 8 hours Seminars (1 per 2 weeks)

Aims: This module aims to introduce the concepts of fuzzy logic and its applications in database systems, data

structures, AI, and pattern recognition.

Learning Outcomes:

On completion of this module, the student should:

- Understand the concepts of fuzzy logic.
- Be able to use fuzzy logic in different areas of applications.
- Be able to give reasoning about the problem solutions.

Textbooks and Supporting Materials:

1. Bart Kosko, Fuzzy Engineering, Prentice Hall International, 1998.
2. Timothy Ross, Fuzzy Logic with Engineering Applications, McGraw Hill, 1995.
3. Klir and Yuan, Fuzzy Sets and Fuzzy Logic: Theory and Applications, Prentice Hall, 2000.
4. Frederick E. Petry and Patrick Boso, Fuzzy Databases: Principles and Applications (International Series in Intelligent Technologies, 5), Kluwer Academic Publishers, 1995.
5. A. Yazici, Fuzzy Databases Modeling, Springer Publisher, 2004.
6. Atanassov, K Physica-Verlag, Intuitionistic Fuzzy sets: Theory and Applications, New York, 2000.
7. R.R.Yager and L.A.Zadeh, An Introduction to Fuzzy Logic Applications in Intelligent System, Kluwer Academic Publisher, 1992.
8. Didier Dubois, Henri Prade and Ronald R. Yager, Fuzzy Information Engineering A Guided Tour of Applications, John Wiley and Sons, 1997.
9. Pal and Dutta Majumder, Fuzzy Pattern Recognition, Willy Eastern Publications, 1999.

10. Z.Pawalak, Rough Sets: Theoretical Aspects of Reasoning about Data, Kluwer Academic Publisher, 2002.

11. Inuiguchi, Masahiro, Tsumoto, Shusaku, and Hirano, Shoji, Rough Set Theory and Granular Computing Series: Studies in Fuzziness and Soft Computing, Springer 2003.

Synopsis:

1- Imprecise and Incomplete data/information, Uncertainty, Vagueness, Fuzziness, fuzzy hedges, Approximate Reasoning Concept.

2- Fuzzy Sets, Rough Sets and Systems, Examples, Various Fuzzy Operations, Graphical Representations.

3- Fuzzy Number and various operations on them, Fuzzification and De-fuzzification.

4- Fuzzy Relations and various applications of fuzzy relations, fuzzy graphs.

5- Fuzzy Rule-Based System Centre of Gravity method.

6- Applications of Fuzzy Logic in Database System.

7- Applications in Data Structures.

8- Applications in Pattern Recognition.

9- Applications in AI

Assessment: Two 1-hour midterm exams (15% each); Assignments (10%); Seminars (10%); 2-hours

Final Exam (50%)