

Nirma University
Institute of Technology, School of Technology
M. Tech. Computer Science and Engineering
Semester – II

L	T	P	C
2	0	2	3

Course Code	3CS12D203
Course Name	Soft Computing

Course Learning Outcomes (CLOs):

At the end of the course, students will be able to

1. comprehend different soft computing techniques
2. solve single-objective and multi-objective optimization problems using soft computing and evolutionary techniques
3. apply soft computing to solve problems for various application domains

Syllabus:

**Teaching
Hours:**

Unit I

Introduction to Soft Computing: Introduction to computing systems, Characteristics of Soft computing and Applications

2

Unit II

Fuzzy logic: Introduction to Fuzzy logic, Fuzzy sets and membership functions, Operations on Fuzzy sets, Fuzzy relations, rules, propositions, implications and inferences, Defuzzification techniques, Applications of Fuzzy logic

8

Unit III

Genetic Algorithms: Introduction, Basic GA framework, different GA architectures, GA operators, Applications

6

Unit IV

Genetic Programming: Building blocks and architecture-altering operators. Libraries and Trees.

5

Unit V

Multi-objective Optimization Problem Solving: Concept of multi-objective optimization problems (MOOPs) and issues of solving them, Multi-Objective Evolutionary Algorithm (MOEA), Swarm Intelligence, Some applications with MOEAs

9

Self-Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Laboratory Work:

Laboratory work will be based on above syllabus with minimum 5 experiments to be incorporated.

Suggested Readings[^]:

1. F. Martin, Mc neill, and Ellen Thro, Fuzzy Logic: A Pratical approach, AP Professional.
2. Timothy J. Ross, Fuzzy Logic with Engineering Applications, Willey.
3. Nikola K. Kasabov, Foundations of Neural Networks, Fuzzy Systems, and Knowledge Engineering, MIT Press.
4. Ahmed M. Ibrahim, Fuzzy Logic for Embedded Systems Applications, Elsevier Press.
5. Melanie Mitchell, An Introduction to Genetic Algorithms, MIT Press.
6. David E. Goldberg, Genetic Algorithms In Search, Optimization And Machine Learning, Pearson Education.
7. Randy L. Haupt and sue Ellen Haupt, Practical Genetic Algorithms, John Willey & Sons.
8. S. Rajasekaran, and G. A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logis and Genetic Algorithms: Synthesis, and Applications, Prentice Hall of India.
9. J.-S. R. Jang, C.-T. Sun, and E. Mizutani, Neuro-Fuzzy and soft Computing, PHI Learning.
10. Simon Haykin, Neural Networks and Learning Machines, PHI Learning.

L=Lecture, T=Tutorial, P=Practical, C=Credit

[^]this is not an exhaustive list