



# INTRODUCTION TO SOFT COMPUTING

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**INTENDED AUDIENCE :** The course is of interdisciplinary nature and students from CSE ,IT,EE,ECE,CE,ME, etc. can take this course.

**INDUSTRIES APPLICABLE TO :** All IT companies, in general.

### COURSE OUTLINE :

Soft computing is an emerging approach to computing which parallel the remarkable ability of the human mind to reason and learn in an environment of uncertainty and imprecision. Soft computing is based on some biological inspired methodologies such as genetics, evolution, ant's behaviors, particles swarming, human nervous systems, etc. Now, soft computing is the only solution when we don't have any mathematical modeling of problem solving (i.e., algorithm), need a solution to a complex problem in real time, easy to adapt with changed scenario and can be implemented with parallel computing. It has enormous applications in many application areas such as medical diagnosis, computer vision, hand written character recondition, pattern recognition, machine intelligence, weather forecasting, network optimization, VLSI design, etc.

### ABOUT INSTRUCTOR :

Prof. Debasis Samanta holds a Ph.D. in Computer Science and Engineering from Indian Institute of Technology Kharagpur. His research interests and work experience spans the areas of Computational Intelligence, Data Analytics, Human Computer Interaction, Brain Computing and Biometric Systems. Dr. Samanta currently works as a faculty member at the Department of Computer Science & Engineering at IIT Kharagpur.

### COURSE PLAN :

**Week 1:** Introduction to Soft Computing, Introduction to Fuzzy logic, Fuzzy membership functions, Operations on Fuzzy sets

**Week 2:** Fuzzy relations, Fuzzy propositions, Fuzzy implications, Fuzzy inferences

**Week 3:** Defuzzification Techniques-I, Defuzzification Techniques-II, Fuzzy logic controller-I, Fuzzy logic controller-II

**Week 4:** Solving optimization problems, Concept of GA, GA Operators: Encoding, GA Operators: Selection-I

**Week 5:** GA Operators: Selection-II, GA Operators: Crossover-I, GA Operators: Crossover-II, GA Operators: Mutation

**Week 6:** Introduction to EC-I, Introduction to EC-II, MOEA Approaches: Non-Pareto, MOEA Approaches: Pareto-I

**Week 7:** MOEA Approaches: Pareto-II, Introduction to ANN, ANN Architecture

**Week 8:** ANN Training-I, ANN Training-II, ANN Training-III, Applications of ANN