CS408: Swarm and Evolutionary Computing	L	T	P	Discrete Mathematics, Artificial Intelligence
	3	1	0	

Course Objective: The course explores a variety of evolutionary algorithms and their application for problem solving. The student should be able to understand the bio- inspired algorithms and apply them to optimize parameters in real-world problems.

S. No.	Course Outcomes (CO)
CO1	Describe components, strategies, and fitness functions in evolutionary computing.
CO2	Implement and analyze the Particle Swarm Optimization algorithm and its update mechanisms.
CO3	Develop and apply genetic algorithms, including chromosome generation, fitness evaluation, and evolutionary operations.
CO4	Analyze and implement hybrid approaches combining Particle Swarm and Genetic Algorithms for multi-objective optimization.
CO5	Utilize nature-inspired algorithms like Cuckoo Search and Ant Colony Optimization for real-world optimization challenges.

S. No	Contents	Contact Hours
UNIT 1	Introduction to Evolutionary Computing: Global Optimization, Components of an evolutionary algorithm, Evolution strategies, Fitness Functions, Learning Classifier systems, Parameter Control, Multi-modal Problems	8

UNIT 2	Swarm Intelligence: Introduction to Swarm Intelligence and its application to optimization problems, Particle Swarm Optimization algorithm, position and velocity updation	8
UNIT 3	Genetic Algorithm: Population and generation of chromosomes, Fitness function, survival of the fittest, reproduction, cross-over and mutation, Genetic algorithm convergence, Genetic programming	10
UNIT 4	Hybrid Methods and Multi-objective Evolutionary Algorithms: Variants of Particle Swarm optimization and Genetic Algorithm, Hybridization of Particle Swarm and Genetic based optimizations, Hybrid Multi-objective Optimization algorithms	8
UNIT 5	Recent nature-inspired evolutionary algorithms: Cockoo search algorithm, Artificial Bee Colony Optimization, Ant Colony Optimization, Fire-fly algorithm, Bacterial Foraging, Application to the travelling salesman problem	8
UNIT 6	Application to real world optimization problems	6
	Total	**48**