Department of Mathematics
Faculty of Mathematics & Computer Science
PhD, Mathematics

Course Code	AM 502
Course Title	Advanced Numerical Optimization Technique
Course Credits	02

Course objectives:

Objective of the course is to introduce some latest and popular swarm intelligence and their implementation for real world problems. Students are inspired to understand how and why these techniques work, when they can be applied and their relative merits to each other and to more deterministic approaches.

Minimum Pre-requisites:

Programming in C++ or Matlab.

Course structure:

Introduction: An Introduction to Swarm Intelligence, Motivation, Definitions, and Key Principles

Particle Swarm Optimization: Basic Particle Swarm Optimization (PSO), Global and Local Best PSO, Geometric illustration of PSO, some latest variations of PSO, Basic Binary PSO, some latest variations of Binary PSO.

Artificial Bee Colony Optimization: Basic Artificial Bee Colony Optimization (ABC), ABC with Local Search Strategies, Latest Hybrid Versions of ABC.

Ant Colony Optimization: Simple Ant Colony Optimization (ACO), Some Recent Variations of ACO, Application of ACO to Travelling Salesman Problem and General Assignment Problem

Reading Suggestions:

- Computational Intelligence, An Introduction by Andries P. Engelbrecht, John Wiley and Sons, 2007
- Swarm Intelligence by Russell C. Eberhart, Yuhui Shi, James Kennedy, Elsevier Publishers, 2001

- Ant Colony Optimization by Marco Dorigo, Thomas Stützle, MIT Press, 2004
- Fundamentals of Computational Swarm Intelligence by Andries P. Engelbrecht, John Wiley and Sons, 2005
- Particle Swarm Optimization by Maurice Clerc

Evaluation and weightage:

- Surprise Quiz / test – 15 Marks
- Assignments - 05 Marks
- Class attendance and interaction during class – 10 Marks
- Mid Semester Examination – 30 Marks
- End Semester Examination – 40 Marks