MAT 645 – Numerical Optimization

Course Code & Number	Course Name	Credit Hours	Lec.	Lab.	Tut.	Prerequisites
MAT 645	Numerical Optimization	4	3	1	1	

Syllabus:

Convexity: convex sets, convex functions, characterization of convex functions, properties of convex functions.

Unconstrained problems: First order and second order local optimization conditions, the case convex programs.

Constrained problems: Optimal conditions for constrained problems, Karush Kuhn and Tucker theorem, Lagrange multipliers and duality, The case of convex problems.

Optimization algorithms and methods: The Simplex method, Deterministic direct search (Nelder Mead), Descent-type methods (Gradient, Quasi-Newton methods, *BFGS*), Genetic algorithms, Evolution strategies; *PSO*), Numerical implementation.

References:

1. J. Nocedal and S. Wright; ***Numerical Optimization***; 2nd Edition, Springer, 2006. **(Main Reference)**
2. N. Gould and S. Leyffer; ***An Introduction to Algorithms for Non-linear Optimization***; Springer, 2003.
3. S. Chandra, Jayadeva and A. Mehra; ***Numerical Optimization with Applications***; 1st Edition, Alpha Science Intl Ltd, 2009.