# SC 653 - Optimisation for Large Scale ML

**Grades** :

2 HW - 25%

Midterm - 25%

Final - 40%

Class Participation- 10%

**Prereq** - Basic Optimisation, Probability, LA, Vector Calculus

**GOAL** : Optimisation problem formulation

Algorithms (Performance analysis)

**Syllabus:**

Part 1 - Foundational topics

* Convex opt. ~ Gradient Descent
* Constraint opt. ~ Projected Gradient Descent
* Non Smooth opt. ~ Sub Gradients
* Stochastic G.D

Part 2 - Advanced topics

* Optimal Algorithms ~ Accelerated , Adaptive methods
* 2nd order Algorithms ~ Newton method
* Algorithms for constraints ~ Interior point method

**References** -  
 Part 1 - Optimization for Data Analysis, Book by Benjamin Recht and Stephen J. Wright

Numerical Optimization, Book by Jorge Nocedal and Stephen J. Wright

Part 2 - Lectures on Convex Optimization, Book by Yurii Nesterov

Convex Optimization, Book by Lieven Vandenberghe and Stephen P. Boyd