ISyE 7672 **Convexity**

Topics:

Convex sets: basics
- Definitions, examples, elementary algebraic and topological properties
- Main theorems
  - Caratheodory, Radon, Heeley
  - Separation
  - Krein-Milman

Theory of finite systems of linear inequalities
- Theorem of the alternative
- Structure of polyhedral sets
- Theory of linear programming

Convex functions
- Definitions, examples, sufficient conditions, elementary properties
- Gradient inequality
- Optimality conditions
- Subgradients and Frenchal conjugacy

Convex Programming
- Convex programs (usual and conic forms)
- Lagrange and conic duality
- Optimality conditions in convex programming
- Saddle points: definitions, existence, interpretation