MAT 782: Advanced Numerical Methods:
Nonlinear Optimization, Fall 2016

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Meeting Time: 2:15pm - 3:35am, MW, at *Carnegie Hall, Room 119*
Office Hour: 11:00am - noon, MW

This is a course on optimization for graduate students in mathematics, statistics, computer science, engineering and physics. Students who take this course are required to have knowledge in advanced calculus, linear algebra and basic numerical methods.

1. **Topics** covered by this course include

   - Algorithms for solving variational inequalities
   - Forward-backward splitting algorithms for non-convex optimization problems
   - Proximal alternating minimization algorithm for non-convex optimization problems

   The instructor will balance mathematical theory of optimization and numerical algorithms.

2. **Text book**. This course does not require a textbook. The following books will be useful

   (a) Heinz H. Bauschke and Patrick L. Combettes, *Convex Analysis and Monotone Operator Theory in Hilbert Spaces*, (2011).

   (b) Dimitri P. Bertsekas, *Nonlinear Programming*, 2nd Edition, ISBN: 1-886529-00-0

   (c) Yu. Nesterov, *Introductory Lectures On Convex Optimization: A Basic Course*, Boston: Kluwer Academic Publishers, (2004).

   (d) S. Boyd, L. Vandenberghe, *Convex Optimization*, Cambridge University Press (2004). See also the lectures online: http://www.stanford.edu/ boyd/cvxbook/

3. **Grades:** The course grade will be computed based on assignments.