

**MAT 781: Advanced Numerical Methods:
Nonlinear Programming, Fall 2011**

Dr. Lixin Shen

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Meeting Time: 3:45 - 5:05 M, W

Office Hour: 10:00 - 11:00 M, W

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 advanced calculus, linear algebra and basic numerical methods.

Topics covered by this course include

- Background of Convex functions
- Nonexpansiveness and Fixed-point Theory
- Fenchel–Rockafellar Duality
- Proximity Operators and Moreau Envelope
- First-order Methods and the Nesterov Algorithm
- Theory and Algorithms of Lagrange Multipliers

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

Text book for the course is *Convex Analysis and Monotone Operator Theory in Hilbert Spaces*, by Heinz H. Bauschke and Patrick L. Combettes, 2011.

Credit: 3 hours.

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