NYU TANDON SCHOOL OF ENGINEERING

ECE-GY 6233 System Optimization Methods

Foundations of AI and Machine Learning

Prof. Quanyan Zhu • 646-997-3371

Meeting Time: 2:00PM - 4:30PM Fridays

W. Hamilton, C. Jacobi, and R. Bellman

Course description: This course is appropriate for both upper-level undergraduates and graduate students with basic knowledge in matrix theory (linear algebra) and calculus. Optimization is a very important subject which finds applications in many branches of science and engineering, to name a few, economics, computer science, financial engineering, systems engineering, electrical and computer engineering, mechanical engineering. The course aims to equip students with practical optimization methods for solving real-world applications and prepare them for a career in academia and industry. Topics to be covered include linear programming, nonlinear programming, calculus of variations and dynamic programming.

Pre-requisites: The course is offered as a first-year graduate level course. Basic knowledge of linear algebra, calculus and differential equations and scientific computing is assumed.

Grading and Exams:

Homework: 20% Midterm Exam: 25% Final Exam: 35% Term Project: 20%

Required Text:

[BV] S. Boyd and L. Vandenberghe, *Convex Optimization*, Cambridge University Press, 2004.
[CB] C. Bishop, *Pattern Recognition and Machine Learning*, Springer, 2006.

Supplementary Text:

[MI] M. D. Intriligator, *Mathematical Optimization and Economic Theory*, SIAM Classics in Applied Mathematics, 2002.
[LY] D. Luenberger and Y. Ye, *Linear and Nonlinear Programming*, Springer, 2008.

TOPICS:

- Linear programming
- Convex optimization
- Gradient and proximal algorithms
- Classification and regression
- Deep learning
- Calculus of variations
- Dynamic programming
- Variational Inference