



Advanced Nonlinear Optimization

ISE 7200

Credit Hours:

3.00 - 3.00

Course Levels:

Graduate (5000-8000 level)

Course Components:

Lecture

Course Description:

Unconstrained and constrained nonlinear optimization, covering applications, theory dealing with convexity, optimality conditions, duality, and algorithms.

Prerequisites and Co-requisites:

Prereq: Calculus, linear algebra, computer programming, and an introductory optimization course, or permission of instructor.

Course Goals / Objectives:

- Recognize the need for different assumptions in nonlinear programming, and the need for derivative-free as well as gradient-based algorithms
 - Understand the commonality between Newton-type methods and extensions for both unconstrained and constrained optimization
 - Gain knowledge of specialized optimization and numerical software for nonlinear optimization
 - Lagrangian duality
 - Convex sets and functions
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Course Topics:

- Convergence theory for nonlinear optimization algorithms
 - Derivative-free optimization and line search
 - Newton's method and self concordance (unconstrained optimization)
 - Quasi-Newton and Conjugate Gradient Methods
 - Automatic Differentiation and Numerical Tools for Factorizations
 - Linearly constrained optimization, and interior point methods
 - Nonlinear constrained optimization
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Designation:

Elective

Required