

Topics Covered
(in some cases briefly or specialized)

Linear Optimization Models/Theory

Network LP Models
Energy Network LP Models
AHP LP Models
CPM LP Models
LP Duality Theory
Post Optimality Anal.
Integer LPs
Total unimodularity
Project management models

**Azarm
Engineering
Optimization
ENME 610**

**Azarm
Multidisciplinary
Optimization
ENME 625**

**Gabriel
Operations Research
in Engineering
ENME 741**

**Gabriel
Stochastic
Programming
ENME 725**

**Gabriel
Equilibrium
Programming
ENME 722**

**Fathy
Optimal Control of
Energy Systems (OCES)
ENME 489/809**

Nonlinear Optimization Models/Theory

Unconstrained optimality conditions
Constrained optimality conditions (non-KKT)
Constrained optimality conditions (KKT)
Nonlinear post-opt. analysis
Convexity (simple)
Generalized convexity

Game Theory/Equilibrium Problems

Mixed Complementarity Problems
Two-level optimization
Nash Equilibria
generalized Nash Problems
Math. Programs with equilibrium constraints

Stochastic/Robust Optimization

Recourse problems
Chance constraints
Stochastic Dynamic Programming
Robust Optimization
Scenario-reduction methods
Risk Measures

Multiobjective Optimization

Classical

Linear
Nonlinear
Quality metrics for Pareto solutions

Non-Classical (Heuristics)

Nature-based models and methods, e.g.,
Multi-objective genetic algorithms

Optimization (linear/nonlinear)

Single-Objective Decomposition Methods
Benders (LPs)
generalized Benders (MINLP)
Dantzig-Wolfe Algorithm (LP)
Multisubsystem optimization methods
Multisubsystem post optimality sensitivity
NLP Duality Theory

Single-Objective non-Decomposition Methods

Simplex Method (LP)
Single-variable unconstrained
Multi-variable unconstrained
Multi-variable constrained
Branch-and-Bound
Genetic Algorithms (single obj.)

Multi-objective non-Decomposition Methods

Gradient-based
non Gradient-based

Approximations

Design of experiments
Surrogate modeling/dynamic system model reduction
Verification and validation
