

MIE1621: Non-linear Optimization
Fall 2015

Course Description: Theory and computational methods of non-linear optimization. Convex sets, convex and concave functions. Unconstrained and Constrained Optimization. Quadratic Programming. Optimality conditions and convergence results. Karush-Kuhn-Tucker conditions. Introduction to penalty and barrier methods. Duality in nonlinear programming.

Instructor: Daniel Frances (frances@mie.utoronto.ca)

Reference Non-linear Programming, Theory and Algorithms
By M.S. Bazarra, H.D. Sherali and C.M. Shetty
3rd Edition, Wiley & sons.

Lectures Thursday 9-12 in MC306

Marking Scheme:		Due
UO Numerics	25%	Oct 15th
UO Test	25%	Oct 22nd
CO Numerics	25%	Nov 12th
CO Test	25%	Dec 3rd

<u>Date</u>	<u>Ref</u>	<u>Subject</u>
17-Sep		NLP Intro and Math Review
24-Sep		Optimality Conditions
01-Oct	a	Algorithms Overview
08-Oct		Steepest Descent
15-Oct		Newton and Quasi Newton Methods
22-Oct	b	Numerical Report and Presentations
29-Oct		Test
05-Nov		Intro to CO with Penalty and Barrier Methods
12-Nov		1st order Optimality Conditions (KKT)
19-Nov	c	1st order Optimality Conditions (KKT)
26-Nov		KKT Extension of Penalty Methods
03-Dec		Successive Quadratic Programming (SQP)
10-Dec		Test
17-Dec	d	Numerical Report and Presentations

Numerics part of the course

- a. Submit a "small toy" (2-dim) UO NLP problem and a "large real" UO NLP problem to experiment with,
- b. Experiment with algorithms to solve your "small" UO problem, and your "real" UO problem
Will require coding, changing alg. parameters, tracking progress of "small" problem on "contour" diagrams
Submit your UO Report, with code with standard I/O format, share your results in subgroups.
- c. Submit a "small toy" (2-dim) CO NLP problem and a "large real" CO NLP problem to experiment with,
- d. Experiment with algorithms to solve your "small" CO problem, and your "real" CO problem
Will require coding, changing alg. parameters, tracking progress of "small" problem on "contour" diagrams
Submit your CO Report, with code with standard I/O format, share your results in subgroups.