ISE 7200
Advanced Nonlinear Optimization

ISE 7200

This is not an

Advanced Nonlinear Optimization class,

but an

Introductory Nonlinear Optimization class.

What you should necessarily know:

"Prereq.:

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

..."

What you should necessarily know:

If you have not taken an

introductory optimization course,

you do not have my permission to enroll!

What you should necessarily know:

- Linear programming
- Duality in linear programming
- Sensitivity in linear programming

Instructor

Prof. Antonio J. Conejo

286 Baker Systems

conejonavarro.1@osu.edu

Textbook

David G. Luenberger, Yinyu Ye.

“Linear and Nonlinear Programming,”

Third Edition, Springer, New York, 2008.

Available as an e-book from OSU libraries:

http://osu.worldcat.org/title/linear-and-nonlinear-programming/oclc/272298748&referer=brief_results

Other book

E. Castillo, A. J. Conejo, et al.

Building and Solving Mathematical Programming Models in Engineering and Science

John Wiley & Sons, Inc., 2001

Check it in the Eighteenth Avenue Library!

Office hours

Prof. Antonio J. Conejo

Wednesdays 1:00PM - 3:00PM, and

by appointment: conejonavarro.1@osu.edu

286 Baker Systems

Grading

- Four homeworks: 40% (10% each)
- Final exam (open books, no electronic devices , no calculators of any type): 50%
- Class participation: 10%

Grading

No “A” inflation!!!

Grading

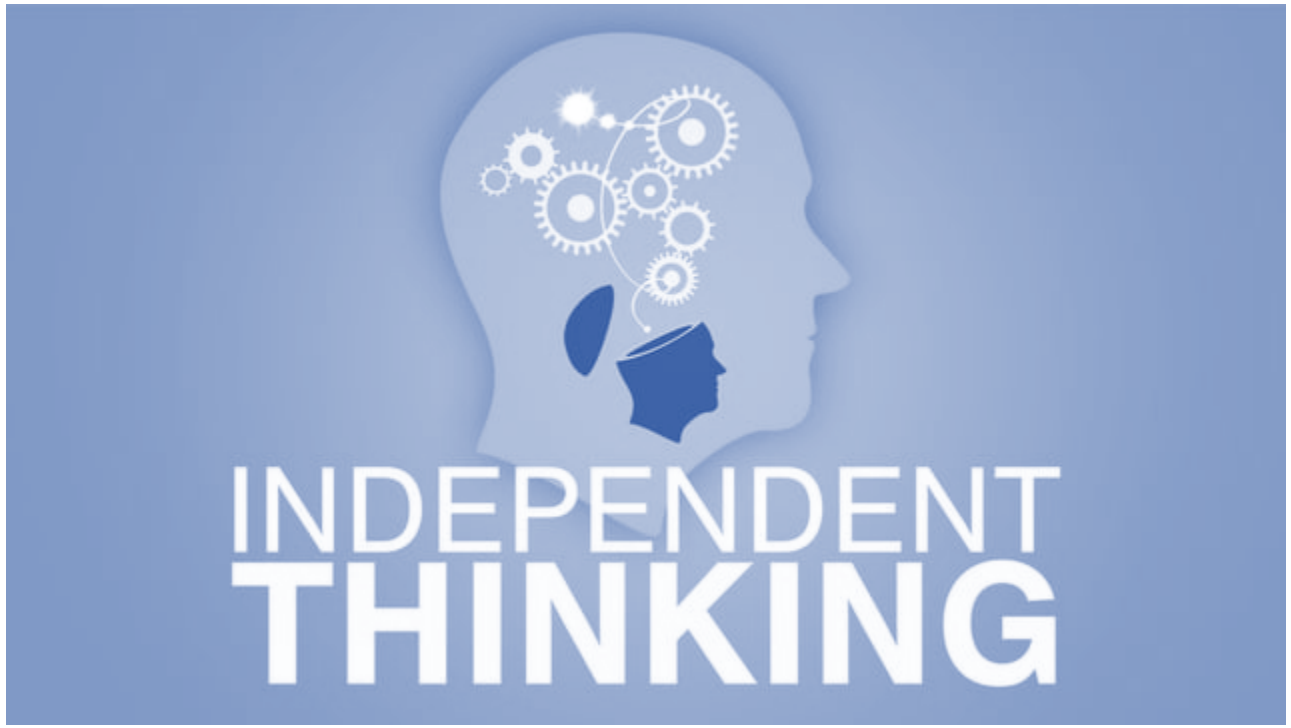
- Each one of the four homeworks is like a "take-home" exam!
- No late homeworks, please.
- Hand in: at the beginning of the class, in paper, as indicated in class.
- Each homework needs to be presented in class!

Exams

Final Exam:

Thursday Apr 27, 2:00PM - 3:45PM, Baker Systems 272

Key element for A+++



Course Description

- Introduction
  - Optimization problems
  - Convex sets and convex functions
  - Local minima and global minima

Course Description

- Optimality conditions for Unconstrained Problems (UP)
  - First order necessary conditions
  - Second order sufficient conditions
- Optimality conditions for Equality Constrained Problems (ECP)
  - Regularity
  - First order necessary conditions
  - Second order sufficient conditions
- Optimality conditions for Inequality Constrained Problems (ICP)
  - First order necessary conditions
  - Second order sufficient conditions
- Optimality conditions for Equality and Inequality Constrained Problems (EICP)
  - First order necessary conditions
  - Second order sufficient conditions

Course Description

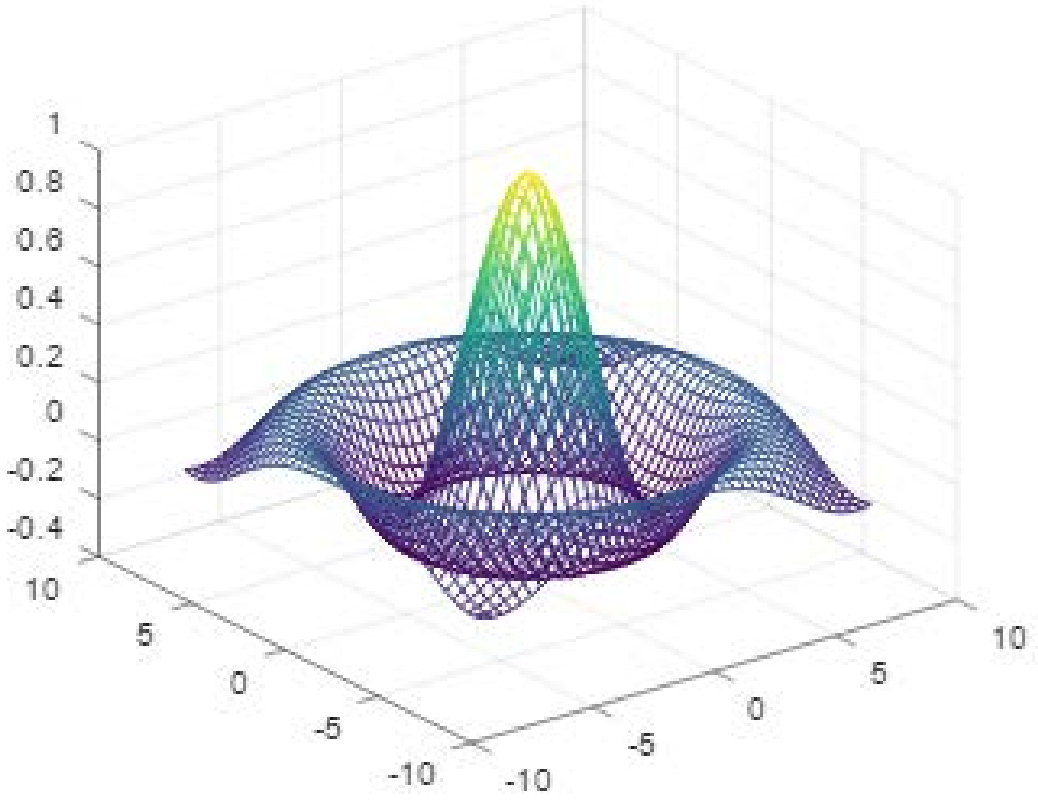
- Complementarity
  - Equilibria
  - Bi-level models
  - Equilibria of bi-level models
- Line search
  - Direct solution
  - Quadratic interpolation
  - Others

Course Description

- Iterative algorithms to solve UPs
  - Steepest-decent
  - Newton
  - Quasi-Newton
  - Coordinate-descent
- Iterative algorithms to solve ECPs
  - Penalty
  - Multipliers
- Iterative algorithms to solve ICPs
  - Barrier
  - Multipliers
- Iterative algorithms to solve EICPs
  - Penalty and Barrier
  - Multipliers

Software

Octave: www.gnu.org/software/octave/

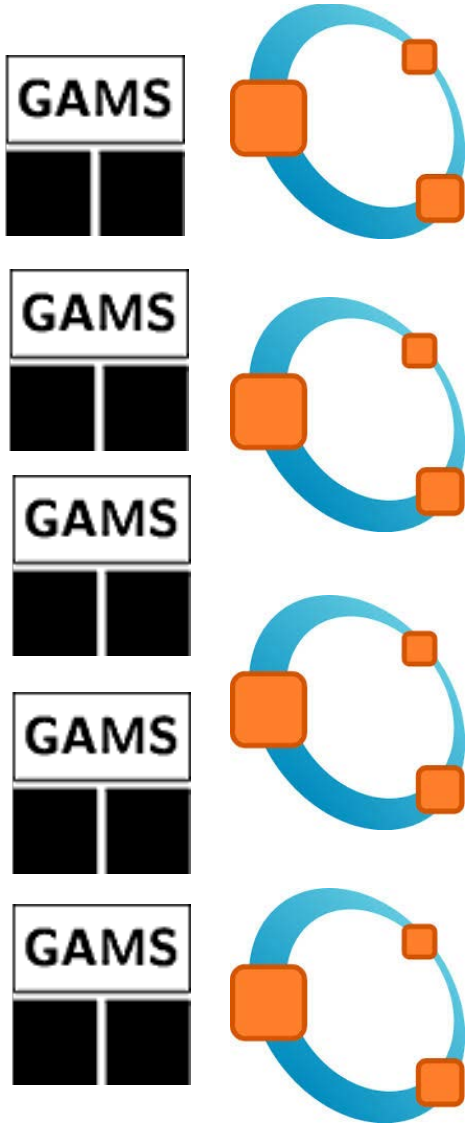


Software

GAMS: www.gams.com

Software

- We will do lab work at class
- If possible, bring your laptop to class
- No cell phones, please



I hope you will enjoy this course!