

EBGN655 - Advanced Linear Programming

Spring 2013

Lectures	Monday, Wednesday	8:00am - 9:15am	211 Engineering Hall
Instructor	A. M. Newman		
	Office:	319 Engineering Hall	
	Office Hours:	Monday	10:45am-11:15am
		Tuesday	8:00am-9:00am; 5:00pm-8:00pm
		Wednesday	10:45am-11:15am
	email:	newman@mines.edu	
Teaching Assistants (TAs)	Ady Van-Dunem and Marvin King		
	Office:	123 Engineering Hall	
	Office Hours:	Monday	1:00pm-2:00pm

GENERAL INFORMATION

- **Textbooks:**

- ★ R. Rardin. *Optimization in Operations Research*, Prentice Hall, 1998 (optional).
- ★ Fourer, Gay, Kernighan. *AMPL: A Modeling Language For Mathematical Programming*, Thompson, 2003 (optional).
- ★ Martin. *Large Scale Linear and Integer Optimization*, Kluwer Academic Publishers, 1999 (optional).

- **Assignments:** There will be a weekly assignment due on Wednesday in class the following week.
- **Project:** There will be a project involving formulating, solving and analyzing a challenging problem, writing code, and/or performing a literature review. The project group may consist of between one and four students. The project will be due during finals week.
- **Exams:** There will be a midterm and a final examination. Both are open book. You must wait 48 hours after the exam has been handed back to ask (me) any grading questions.

- **Grading:**

- ★ Class Participation: 5%
- ★ Homework Assignments: 20%
- ★ Project: 25%
- ★ Midterm: 20%
- ★ Final: 30%

Grading is done on a curve where 90% is sufficient but not necessarily necessary for an A-, 80% is sufficient but not necessarily necessary for a B-, etc.

COURSE OUTLINE

- **I. Introduction and Linear Programming Formulations**

- ★ Motivation
- ★ Mining applications
- ★ Energy applications

- **II. Dual Simplex Method**

- **III. Interior Point Methods**

- **IV. Algorithmic Tuning for Linear Programs**

- ★ Choice of algorithm and problem structure (primal versus dual)
- ★ Choice of pivoting rules (Simplex) and crossover time (interior point)
- ★ Numerical stability (including dense and sparse matrices, condition numbers, and degeneracy)

- **V. Column Generation**

- ★ Cutting stock problem
- ★ Theory
- ★ Scripting the procedure

- **VI. Dantzig-Wolfe Decomposition**

- **VII. Dynamic Programming** (Time permitting)

RULES

- Please do not send email regarding homework problems; come to office hours instead.
- Statute of limitations for questions about grading is one week from the student's receipt of the graded work.
- I do not want to see or hear your cell phone. Ever. This includes during office hours.
- No rudeness of any kind towards anyone in the class will be tolerated.
- Do not talk to your neighbor during class.
- You may confer with others regarding the homework and project, but the work you hand in must be your own. Please ensure it is done neatly.
- Attendance in class is required. Be on time.
- Any alternate arrangements for exams must be submitted in writing at least one week in advance of the exam. Any additional arrangements regarding disabilities must be *formally* and *legally* documented and approved.

A minor infraction of the above rules will result in a warning. A major infraction will result in expulsion from the class.