UB - Department of Industrial and Systems Engineering
IE 572 Linear Programming
Fall 2014

# 1   COURSE CONTACT

○ Class Meetings: T R 3:30–4:50 PM, NSC 222
○ Course Website: https://piazza.com/buffalo/fall2014/ie572/home
○ Instructor: Dr. Changhyun Kwon
  – E-mail: chkwon@buffalo.edu
  – Office: 318 Bell Hall
  – Office hours: Mon 11:00–12:00, Wed 2:30–3:30, or by appointment
○ Teaching Assistant: Mr. Alireza Farasat
  – E-mail: afarasat@buffalo.edu
  – Office: 424 Bell Hall
  – Office hours: Mon 3–5, or by appointment

When you email the instructor or TA, you need to include **your name** and the **course number** (IE 572). Please state "IE 572" explicitly in the subject of your email messages. Also, it is very helpful to set up your email client correctly so that your email message has your name as the sender.

# 2   COURSE DESCRIPTION

This course will be an intensive study of Linear Programming (LP). LP deals with the problem of minimizing or maximizing a linear function in the presence of linear equality and/or inequality constraints. Both the general theory and characteristics of LP optimization problems as well as effective solution algorithms and applications will be addressed. The course is a good one for students who are planning to apply Operations Research (OR) tools in all areas of application in the public and private sectors including production or manufacturing problems and service/logistics related problems as well as to learn an optimization software tool. This course is part of the core for the MS and PhD degrees concentrating in OR; therefore comprehension of the underlying mathematical theory/why things work is critical to earning a good grade.

# 3   TOPICS COVERED

○ Nature and examples of LP problems
○ Review of Linear Algebra and Convex Analysis
○ The Simplex Method
○ Revised Simplex
○ Bounded Simplex
○ Duality and Sensitivity
○ Dantiz-Wolfe Decomposition/Column Generation
○ Robust Linear Optimization

## 4   Required Textbook

○ Mokhtar S. Bazaraa, John J. Jarvis, Hanif D. Sherali, *Linear Programming and Network Flows*, John Wiley & Sons, 4th Edition, 2010.

## 5   Other References

○ Introduction to Linear Optimization (Athena Scientific Series in Optimization and Neural Computation, 6) by Dimitris Bertsimas, John N. Tsitsiklis and John Tsitsiklis (Feb 1, 1997)
○ Linear Programming by James P. Ignizio and Tom M. Cavalier (Nov 12, 1993)
○ Linear Programming (Series of Books in the Mathematical Sciences) by Vasek Chvatal (Sep 15, 1983)
○ Linear Programming: Foundations and Extensions (International Series in Operations Research & Management Science... by Robert J Vanderbei (Nov 26, 2007)
○ Linear and Nonlinear Programming (International Series in Operations Research & Management Science) by David G. Luenberger and Yinyu Ye (Jul 7, 2008)

## 6   Optimization Software

This course involves homework assignments that require optimization software. In particular, the students will learn how to use The Julia Language with the Gurobi Optimizer.

Students are encouraged to install Julia and Gurobi on their own computer. Students need to access the following web document, for installation help and example codes: `http://stom.chkwon.net/resources/computer-help/julia/`

## 7   Grading

- **25% Homework Assignments.** You must work on the homework problems independently. You are allowed to discuss with other fellow students, but you must present the idea independently, and state the names of the students with whom you discussed. The allowed discussion does NOT include reading other students' writings.
- **25% Mid-term Exam I.** Scheduled on September 30, in class.
- **25% Mid-term Exam II.** Scheduled on October 30, in class.
- **25% Final Exam.** Scheduled on December 11, 3:30–6:30 PM, NSC 222.

## 8   Academic Honesty and Integrity

The University at Buffalo has a responsibility to promote academic honesty and integrity and to develop procedures to deal effectively with instances of academic dishonesty. Students are responsible for the honest completion and representation of their work, for appropriate citation of sources, and for respect for others academic endeavors. By placing their name on academic work, students certify the originality of all work not otherwise identified by appropriate acknowledgments. Please take your time to visit

`http://grad.buffalo.edu/Academics/Policies-Procedures/Academic-Integrity.html`

**One simple rule:** If you fail to meet the UB policy and the instructor's policy for academic honesty and integrity, you will at least receive 'F', and it is possible that you are suspended or expelled from the university.

# 9    EXAMPLES OF ACADEMIC DISHONESTY

Academic dishonesty includes, but is not limited to, the following:

- *Previously submitted work.* Submitting academically required material that has been previously submitted—in whole or in substantial part—in another course, without prior and expressed consent of the instructor.
- *Plagiarism.* Copying or receiving material from any source and submitting that material as ones own, without acknowledging and citing the particular debts to the source (quotations, paraphrases, basic ideas), or in any other manner representing the work of another as ones own.
- *Cheating.* Soliciting and/or receiving information from, or providing information to, another student or any other unauthorized source (including electronic sources such as cellular phones and PDAs), with the intent to deceive while completing an examination or individual assignment.
- *Falsification of academic materials.* Fabricating laboratory materials, notes, reports, or any forms of computer data; forging an instructors name or initials; resubmitting an examination or assignment for reevaluation which has been altered without the instructors authorization; or submitting a report, paper, materials, computer data, or examination (or any considerable part thereof) prepared by any person other than the student responsible for the assignment.
- *Misrepresentation of documents.* Forgery, alteration, or misuse of any University or Official document, record, or instrument of identification.
- *Confidential academic materials.* Procurement, distribution or acceptance of examinations or laboratory results without prior and expressed consent of the instructor.
- *Selling academic assignments.* No person shall sell or offer for sale to any person enrolled at the University at Buffalo any academic assignment, or any inappropriate assistance in the preparation, research, or writing of any assignment, which the seller knows, or has reason to believe, is intended for submission in fulfillment of any course or academic program requirement.
- *Purchasing academic assignments.* No person shall purchase an academic assignment intended for submission in fulfillment of any course or academic program requirement.

# 10    DISABILITY SERVICES

If you have a disability and may require some type of instructional and/or examination accommodation, please inform me early in the semester so that we can coordinate the accommodations you may need. If you have not already done so, please contact the Disability Services office. The office is located at 25 Capen Hall and the telephone number is (716) 645-2608. The website is at: http://www.ub-disability.buffalo.edu/