## **Optimization Methods**

Instructor: Urmambetov B.M.

Office Hours: W, F: 8.00-12.40 pm, or by appointment.

**Prerequisites**: Mathematics. The Academic Honesty Code states "I will be honest in all my academic activities and will not tolerate dishonesty"

## **Course Content**

This course focuses on the connection between real life problems and mathematical optimization. Students will learn how to model real life problems, formulate real life problems as optimization problems, and how to solve and analyze these optimization problems.

Our primary goal is to study the methods of optimization. We mainly focus on problems arising in economics and business, although general problems will be considered with applications to other fields.

The following mathematical techniques will be covered: Simplex method, The Big M Method, Stepping Stone method, Modified Distribution method, Hessians.

The course is modular in structure. There are 7 modules in all

Week 1.Examples of Optimization Problems.Introduction to Linear Programming.Graphical method for two variable optimization problem. Examples.

Week 2-3. Standard form of linear programming (LPP) problem. Assumptions in LPP Models. The Simplex Algorithm. Converting an LP to Standard Form. Using the Simplex Method to Solve Maximization Problem.

Week 5.Duality in LP.Converting an LP to Standard Form . Using the Simplex Method to Solve Minimization Problems. The Two-Phase Simplex Method. The Big M Method.

Week 6-7. Transportation Problems. Balanced and Unbalanced Problems. Finding Basic Feasible Solutions for Transportation Problems.

Week 9.Stepping stone method.

Week 10-11. Modified Distribution Method.

Week 12-14. Optimization: functions of two and more variables. Quadratic forms. Hessians. Week 15. Preparation to final exam.

## Textbooks

- (1) Fundamental methods of mathematical economics. Alpha C. Chiang. McGraw-Hill, Inc.1984.
- (2) An Introduction to Optimization. Edwin K.P. Chong, Stanislav H. Zak. John Wiley and Sons,1994.

## Organization

Course Grades:

- Midterm Exam 40%
- Final Exam 50%
- Homework 5%
- Class participation 5%
- Midtermexam date: Tentatively set for March 3, 2016.
- Final exam date: Saturday, May 7.
- Homework: At the conclusion of each module is homework assignment. You may work in small groups of up to 3 students on the homework exercises.
- Participation: This includes participation in class experiments and collaborative learning exercises.

 $\begin{array}{l} \mbox{Grading Scale:} \\ 0 \leq F \leq 49 < D \leq 55 < C - \leq 60 < C \leq 65 < C + \leq 70 < B - \leq 75 < B \leq 80 < B + \leq 85 < A - \leq 90 < A \leq 100. \end{array}$