**GEORGE MASON UNIVERSITY**
**Department of Systems Engineering and Operations Research**

**OR 441/MATH 441 - Operations Research I –FALL 2010**
Tuesday & Thursday 1.30 pm- 2.45 pm, Robinson A 245
**Professor Roman A. Polyak**

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**Office** Hours: Thursday 4:00pm-6:00pm or by appointment; E-mail: *rpolyak@gmu.edu*
**Text:** ***Wayne.L.Winston, Operations Research Applications and Algorithms, Fourth Edition*, *Thomson, Brooks/Cole 2004.***

**Course Summary:** This course will introduce the basic mathematical ideas and methods of Deterministic Operations Research.

Modeling real life problems as well as the basic concepts of Linear Programming (LP) including duality, sensitivity analysis and simplex method for solving LP will be discussed.

Special LP problems including transportation, assignment and max-flow will be considered and correspondent methods for solving special LP will be introduced.

We are going to discuss briefly some concepts of integer and nonlinear optimization and their applications.

There will be by weekly homework assignment and a project, which requires modeling real life problems using MPL language.

Grading: 20% homework; 35% midterm exam; 10% computational project; 35% final exam

**Course Schedule**

| **Weeks** | **Topics:** |
|---|---|
| 1. | Introduction to OR. Mathematical modeling of real life problems. |
| 2. | Linear Programming, geometry of LP, basic linear algebra tools for solving LP. |
| 3. | Simplex method. |
| 4. | More on simplex method. |
| 5. | Sensitivity in LP. |
| 6. | Duality in LP. |
| 7. | Transportation problem. |
| 8. | **MIDTERM** (The transportation problem is not on the Midterm). |
| 9. | Assignment Problem and Hungarian method. |
| 10. | Networks and network optimization: shortest path, max flow. |
| 11. | Integer and combinatorial optimization. Branch and Bound method. |

1 2 -13. Elements of Nonlinear Optimization. Karush –Kuhn –Tucker's optimality condition.

14. Log-barrier function and Interior Point Methods.
15. Review

**FINAL DECEMBER 14th, 2010.**

This course assumes some knowledge of linear algebra and calculus, which we will review in process of developing the course.