**American University of Beirut**

**Faculty of Engineering and Architecture**

**Department of Industrial Engineering and Management**

**INDE 302: Operations Research 1**

**Fall 2015, MWF: 9:00 AM-9:50 AM, 10:00 AM-10:50 AM**

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**Instructor:**

Hussein Tarhini, Ph.D.

Email: ht27@aub.edu.lb

Office Hours: MWF: 11:00 AM-12:00 PM or by appointment

**Course Description:**

This course is an introduction to an operations-research approach to engineering decision-making. It includes the formulation, solution, interpretation, and implementation of mathematical models such as linear programming (LP), network problems, and project management (PM). Upon completion of the course, students will be able to develop and formulate a variety of optimization problems for engineering and economic systems, determine optimal solutions, and present managerial recommendations based on optimal solutions and sensitivity analysis.

**Course Objectives:**

- Understand the OR methodology of mathematical modelling
- Develop mathematical models for real problems
- Understand LP and how it is used in mathematical modelling
- Learn the basic theory behind LP
- Understand and use the simplex method, the main tool for solving linear programs
- Perform post-optimality analysis and use it to gain insights into the real system
- Apply the LP methods on real life applications.

**Text:** Hamdy S. Taha, Operations Research: An introduction, Ninth edition

**Tentative schedule:**

- Week 1: Introduction math modeling, and Linear Programming
- Week 2: LP graphical method and graphical motivation for the simplex method

- Week 3: The simplex method in tabular form and general steps of the simplex method
- Week 4: Big-M method and simplex variants
- Week 5: Simplex method in matrix form (revised simplex method).
- Week 6: Duality in LP.
- Week 7: Review for Midterm, **Midterm I**
- Week 8: Economic interpretation of duality
- Week 9: The dual simplex method and sensitivity (post-optimal) analysis
- Week 10: Sensitivity analysis.
- Week 11: Transportation model
- Week 12: Network models
- Week 13: Project Management models
- **Final Exam: Comprehensive**

**Homework:**

Homework problems will be assigned and graded frequently. Students are encouraged to solve the homework problems and to discuss their solution with each other and the instructor. However, each student must independently write and submit one assignment.

**Grading:**

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| Midterm exam | 40% |
| Final exam | 40% |
| Attendance, Homework, Pop Quizzes | 20% |

**University Rules and Regulations:**

Students are advised to review all relevant university rules and regulations including those related to attendance, cheating, plagiarism, misconduct, and academic integrity, among many others. It shall be expected that strict enforcement of these rules and regulations will be exercised.