INSTITUTE OF MATHEMATICS
College of Science
University of the Philippines Diliman

Math 180.1 Course Syllabus

A. Course Catalogue Description

Course Number	Math 180.1
Course Title	Operations Research I
Course Description	Introduction to linear programming; the simplex method; duality; sensitivity analysis; integer programming; nonlinear programming
Prerequisite	Math 40/equiv.
Course Credit	3 units
Number of Hours	3 hours/week

B. Course Content

I. Course Introduction and Orientation

II. Linear Programming

1. Formulation of LP models
2. Assumptions for LP models
3. Graphical solution
4. Special conditions of LP models
5. LP in standard form and canonical form

III. Simplex Method

1. Basics of the simplex method
2. Big M simplex method
3. Two phase simplex method
4. Revised simplex method
5. Numerical implementation using computer programs

IV. Duality

1. Formulation of the dual problem
2. Weak and strong duality theorems
3. Complementary slackness conditions
4. Karush-Kuhn-Tucker optimality conditions

V. Sensitivity Analysis

1. Change in cost vector
2. Change in the right-hand-side vector
3. Change in the technology matrix

VI. Integer Programming

1. Mathematical models
2. Branch-bound method
3. Cutting plane method

VII. Nonlinear programming

1. Mathematical models
2. Univariate unconstrained optimization: optimality conditions and solution method
3. Multivariate unconstrained optimization: optimality conditions and gradient-based methods
4. Multivariate constrained optimization
5. Lagrange multiplier technique
6. Karush-Kuhn-Tucker optimality conditions

For a more detailed syllabus, send an email request to ddapr@math.upd.edu.ph.