INTER AMERICAN UNIVERSITY OF PUERTO RICO
METROPOLITAN CAMPUS
ECONOMICS AND ADMINISTRATIVE SCIENCES FACULTY
MBA PROGRAM

COURSE SYLLABUS

I. GENERAL INFORMATION

COURSE TITLE		Advanced Methods in Production Planning and Control
CODE AND NUMBER	:	BAD-6170
CREDITS	:	Three (3)
ACADEMIC TERM	:	
PROFESSOR	:	
OFFICE HOURS	:	
OFFICE TELEPHONE	:	
ELECTRONIC MAIL	:	

II. DESCRIPTION

Application of operations research to production planning and control: linear programming, queuing theory, probability models, PERT, simulation and use of computers. PREREQUISITES: Admission to M.B.A. Program

III.OBJECTIVES

1) The student should be able to approach complex production and operations problems using a systematic, analytical process.

2) The student should be able to simplify complicated problems in production and operations using mathematical models.

3) The student should be able to apply several valuable business decision-making tools in the area of production and operations.

4) The student should be able to discuss tradeoffs between “optimal” solutions and “best” solutions.

5) The student should be able use a decision-tree to graphically model and solve problems in decision environments characterized by “risk”.

6) The student should be able to use linear programming models and the Simplex methodology applied to contemporary business problems in particular those related to the area of production and operations.

7) The should be able to analyze linear programming sensitivities

8) The student should be able to find optimal graphical solutions to two-variable problems and to find optimal solutions in n-variable problems.

9) The student should be able to use the transportation and assignment models to solve contemporary business problems.

10) The student should be able to perform a breakeven analysis for production and operations.

11) The student should be able to make decisions in a project environment and to use PERT/CPM to solve typical project networks concerns, such as project due dates and crashing costing.

IV. COURSE CONTENT

1. Introduction to the Management Science Process
    a. Historial development of Management Science
    b. Management Science Business Application

2. Management Science Process
    a. Step One: Problem Definition
    b. Step Two: Mathematical Model Construction
    c. Step Three: Solving a Mathematical Model
    d. Step Four: Results Monitoring

3. Linear Programming
    a. Introduction to Linear Programming Concept
    b. Graphical Linear Programming Method
        i. Limiting Assumptions of Linear Programming (Restrictions)
        ii. Establishing Restrictions
        iii. Feasibility Area
        iv. Objective Function
        v. Solving Graphically for an Optimal Solution
    c. Simplex Method
        i. Six steps solution
            1. Constructing an Initial Tableau
            2. Slack Variables in Solution
            3. Pivot Method
            4. Minimization Problems
            5. Maximization Problems
            6. Search Path
            7. Shadow Price
            8. Range
            9. Sensitivity
    d. Transport Method
        i. Transport Matrix
        ii. Initial Allocations
            1. Least-Cost Method of Allocation
            2. Vogel´s Approximation Method of Allocation
        iii. Optimal Solution
        iv. Degeneracy Problem

4. Integer Linear Programming
    a. Use and Complexities of Integer Linear Programming
    b. ILP Sensitivity Analysis
    c. Problem solution using ILP
5. Network Models
        i. Transport Problem
        ii. Assignment Problem
        iii. The Traveling Salesman Problem
        iv. Shortest Path Problem
        v. The Minimal Spanning Tree Problem
        vi. Maximal Flow Problem
6. Project Management using Pert/CPM
    a. Activities definition
    b. Gantt Charts
    c. AOA Network
    d. AON Network
    e. Early Start, Early Finish Analysis
    f. Late Start, Late Finish Analysis
    g. Critical Path
    h. Crashing
        i. Cost Analysis
7. Queuing Theory
    a. Basic Elements of Queuing Theory
    b. M/M/I Queuing System
    c. M/M/k Queuing System
    d. M/M/l Queuing System
    e. M/M/k/F Queuing System
    f. M/M/l/m Queuing System
    g. Economic Analysis of Queuing System
    h. Tandem Queuing System
    i. Line Balancing
8. Simulation
    a. Monte Carlo Method
    b. Random Number Mappings for Continuous Random Variables
    c. Queuing System Simulation
    d. Inventory System Simulation
    e. Comparing Simulation Results

V. ACTIVITIES

A. Lectures
B. Case Studies
C. Supplementary readings
D. Internet searches
E. Audiovisual Support: Powerpoint presentations, videos
F. Presentation and discussion of relevant academic journal or trade journal articles

VI. EVALUATION

Required activities to achieve course objective should include various pedagogical activities such as, homework, presentations, short quizzes, partial examinations and interactive participation. It is highly recommended the utilization of the Blackboard platform as a support system for the course. Assessment techniques should be applied at professor discretion.

1. Students are expected to review prerequisite material as needed, and to read assignments and complete written exercises prior to the class session.

2. Students are required to actively participate in class discussions.

3. The student will be required to complete case studies and homework problems as a mean to practice the acquired practical knowledge in the classroom.

4. This course requires intense practice of quantitative exercises presented in class. Therefore it is important that student's complete al assigned text exercises and case analysis before coming to the classroom. This is a way of acquiring practical knowledge in the classroom.

5. The exercises require the use of spreadsheets as a way of better solving the assigned problems. Furthermore it provides the student a way to situational analysis in a closer way to those used in the area of production and operations.

6. Due to the nature of the intense mathematical practice attendance to class is mandatory with a higher evaluation weight at the end of the course.

VII. SPECIAL NOTES

A. Special Accommodations

Students who require special accommodations must request these services at the beginning of the course as soon as they notice that they need help. Students can access this service with Professor Jose Rodriguez, Coordinator of Students with Special Needs at the Guidance and Counseling Office on the first floor at Metro's Student Center.

B. Plagiarism

Plagiarism, dishonesty, fraud and any other type of manipulation or inappropriate behavior related with academic performance are unacceptable in our institution. Disciplinary actions will be taken on students found guilty of such practice as established in Chapter V, Article 1, Section B.2 of the Student's Rules and Regulations handbook.

INTER AMERICAN UNIVERSITY HAS VERY STRICT REGULATIONS REGARDING PLAGIARISM (USING THE IDEAS OR WORDS OF OTHERS WITHOUT GIVING PROPER CREDIT), SO IT IS IMPORTANT THAT YOU SPECIFICALLY READ CHAPTER 5, ARTICLE 1, SECTION B.2C OF THE STUDENT' RULES AND REGULATIONS HANDBOOK. THIS SECTION CLEARLY EXPLAINS WHAT PLAGIARISM IS. IN ADDITION, IT EXPLAINS THE TYPES OF SANCTIONS STUDENTS ARE EXPOSED TO WHEN THEY COMMIT IT.

C. USE OF ELECTRONIC DEVICES

CELLULAR (MOBILE) TELEPHONES AND ANY OTHER ELECTRONIC DEVICE THAT COULD INTERRUPT THE TEACHING-LEARNING PROCESS OR DISRUPT A MILIEU FAVORABLE FOR ACADEMIC EXCELLENCE WILL BE DEACTIVATED. CRITICAL SITUATIONS WILL BE DEALT WITH IN AN APPROPRIATE MANNER. THE USE OF ELECTRONIC DEVICES THAT PERMIT THE ACCESSING, STORING OR SENDING OF DATA DURING TESTS OR EXAMINATIONS IS PROHIBITED.

VIII. RESOURCES

a) Required Textbook

Lawrence, John A. & Pasternack, Barry A. (2005 or Latest Ed.). *Applied Management Science: Modeling, Spreadsheet Analysis, and Communication for Decision Making.* (3nd. Ed.) New York: John Wiley and Sons.

b) Audiovisual and Information Technology

Campus On-line Services at - http://cai.inter.edu/

- **Use of CIT Open Lab is encouraged for use of Spreadsheets and other support software such as SPSS.**
- **ProQuest**
- **Infotrac (Database)**
  - Business and Company Resource Center
  - General Business File Internacional
  - Expanded Academic ASAP

IX. BIBLIOGRAPHY

Reid, R. Dan & Sanders, Nada R. (2009). **Operations Management and Integrated Approach**. (4th. Ed.) New York: John Wiley and Sons.

Anderson, Sweeney and Williams (2000 or Latest Ed.). *An Introduction to Management Science: Quantitative Approaches to Decision Making*, (9th. Ed.) New York: South-Western College Publishing.

Hillier, F.S. (2002). *Introduction to Operations Research*. (7th. Ed.). Illinois: Mc Graw-Hill Co.

Hillier, F.S. & Hillier, M. (2002). *Introduction to Management Science*. (2nd. Ed.). Illinois: McGraw-Hill.

Lowery and Stover (2008). *Managing Projects with Microsoft Project 2007*. New York: John Wiley and Sons.

Mantel, Meredith, Shafer and Sutton (2001). *Core Concepts of Project Management*. New York: John Wiley and Sons.

Render and Stair. (1999).*Quantitative Analysis for Management*. (7th. Ed.) New Jersey: Prentice Hall.