INTER AMERICAN UNIVERSITY OF PUERTO RICO
METROPOLITAN CAMPUS
BUSINESS FACULTY
GRADUATE PROGRAM
SYLLABUS

I.   GENERAL INFORMATION

COURSE TITLE   :   MANAGEMENT SCIENCE
                                    APPLIED TO OPERATIONS MANAGEMENT
CODE AND NUMBER   :   BADM 6170
CREDITS   :   Three (3)
ACADEMIC TERM   :
PROFESSOR   :
OFFICE LOCATION AND HOURS   :
OFFICE TELEPHONE   :
E-MAIL
          :

II.   DESCRIPTION

APPLICATION OF QUANTITATIVE METHODS TO THE DECISION-MAKING PROCESS ADAPTABLE TO PRODUCTION AND OPERATIONS, UNDER CONDITIONS OF CERTAINTY, RISK AND UNCERTAINTY.

III.   OBJECTIVES

It is expected that upon completing the course, the student should be able to:

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.   CONTENT

1. Introduction to the Management Science Process
   a. Historical 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

If there is enough time we will cover Queuing Theory

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

V.   LEARNING 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.

Recommended Evaluation:

2 Partial Examinations	(40%)
Homework / Cases	(50%)
Attendance & Participation	(10%)
Total	(100%)

VII. SPECIAL NOTES

A. Auxiliary services or special needs

ALL STUDENTS WHO REQUIRE AUXILIARY SERVICES OR SPECIAL ASSISTANCE MUST REQUEST THEM AT THE BEGINNING OF THE COURSE OR AS SOON AS THEY BECOME AWARE THAT THEY NEED THEM, THROUGH THE CORRESPONDING REGISTRY, IN THE OFFICE OF THE COORDINATOR OF SERVICES FOR STUDENTS WITH DISABILITIES, DR. MARÍA DE LOS ÁNGELES CABELLO. SHE IS LOCATED IN THE COUNSELING AND COUNSELING PROGRAM, OFFICE 111, ON THE FIRST FLOOR OF THE JOHN WILL HARRIS BUILDING, EXTENSION 2306

B. Honesty, fraud, and plagiarism

DISHONESTY, FRAUD, PLAGIARISM AND ANY OTHER INAPPROPRIATE BEHAVIOR IN RELATION TO ACADEMIC WORK CONSTITUTES MAJOR INFRACTIONS SANCTIONED BY THE GENERAL STUDENT

REGULATIONS. THE MAJOR INFRACTIONS, AS STATED IN THE GENERAL STUDENT REGULATIONS, MAY HAVE AS A CONSEQUENCE, SUSPENSION FROM THE UNIVERSITY FOR A DEFINITE PERIOD GREATER THAN ONE YEAR OR THE PERMANENT EXPULSION FROM THE UNIVERSITY, AMONG OTHER SANCTIONS.

C. Use of electronic devices

CELLULAR TELEPHONES AND ANY OTHER ELECTRONIC DEVICE THAT COULD INTERRUPT THE TEACHING AND LEARNING PROCESSES OR ALTER THE ENVIRONMENT LEADING TO ACADEMIC EXCELLENCE WILL BE DEACTIVATED. ANY URGENT SITUATION WILL BE DEALT WITH, AS APPROPRIATE. THE HANDLING OF ELECTRONIC DEVICES THAT ALLOW STUDENTS TO ACCESS, STORE OR SEND DATA DURING EVALUATIONS OR EXAMINATIONS IS PROHIBITED

D. Compliance with the Provisions of Title IX

THE FEDERAL HIGHER EDUCATION ACT, AS AMENDED, PROHIBITS DISCRIMINATION BECAUSE OF SEX IN ANY ACADEMIC, EDUCATIONAL, EXTRACURRICULAR, AND ATHLETIC ACTIVITY OR IN ANY OTHER PROGRAM OR FUNCTION, SPONSORED OR CONTROLLED BY A HIGHER EDUCATION INSTITUTION, WHETHER OR NOT IT IS CONDUCTED WITHIN OR OUTSIDE THE PROPERTY OF THE INSTITUTION, IF THE INSTITUTION RECEIVES FEDERAL FUNDS.

IN HARMONY WITH THE CURRENT FEDERAL REGULATION, IN OUR ACADEMIC UNIT AN ASSISTANT COORDINATOR OF TITLE IX HAS BEEN DESIGNATED TO OFFER ASSISTANCE AND ORIENTATION IN RELATION TO ANY ALLEGED INCIDENT CONSTITUTING DISCRIMINATION BECAUSE OF SEX OR GENDER, SEXUAL HARASSMENT OR SEXUAL AGGRESSION. THE ASSISTANT COORDINATOR SR. GEORGE RIVERA CAN BE REACHED BY PHONE AT EXTENSION __2262 O 2147____, OR BY E-MAIL _____GRIVERAR@METRO.INTER.EDU.

THE NORMATIVE DOCUMENT TITLED **NORMS AND PROCEDURES TO DEAL WITH ALLEGED VIOLATIONS OF THE PROVISIONS OF TITLE IX** IS THE DOCUMENT THAT CONTAINS THE INSTITUTIONAL RULES TO DIRECT ANY COMPLAINT THAT APPEARS TO BE THIS TYPE OF ALLEGATION. THIS DOCUMENT IS AVAILABLE IN THE WEB SITE OF INTER AMERICAN UNIVERSITY OF PUERTO RICO (WWW.INTER.EDU).

VIII. EDUCATIONAL RESOURCES

a) Required Textbook

Taylor, Bernard (2019). *Introduction to Management Science:* (13th. Ed.). New York: Prentice Hall / Pearson

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 International
  - Expanded Academic ASAP

IX. BIBLIOGRAPHY (OR REFERENCES)

Brechner, E. (2015). *Agile Project Management with Kanban*. New York: Pearson Prentice Hall.

Reid, R. Dan & Sanders, Nada R. (2016). *Operations Management and Integrated Approach*. (6th. Ed.) New York: John Wiley and Sons.

Render, B., Stair R.M., Hanna, M.E. & Hale, T.S. (2015). *Quantitative Analysis for Management*, (12th. Ed.). New York: Pearson Prentice Hall

Rev. 8/2021