Quantitative Methods in Management

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Course Description
The area of quantitative methods for decision making uses the scientific method as the basis to research and help make decisions on complex problems of the organizations. The purpose of this course is to equip the participants with the relevant tools and techniques for applications in solving managerial problems. The focus of this course will be on applications of quantitative methods in business situations.

Objectives
The objective of the course is to learn the fundamental concepts, the quantitative models, up to date solution techniques in problem solving and complex decision making.

Methodology
The methodology of the course is based on what is known as Operations Research, a science that offer to the decision maker different quantitative methodologies in order to make decisions. During the course we will see how to apply these techniques in different areas of an organization, such as marketing, production and operations, logistics, finance, etc. Emphasis will be made on practical and real world applications. Excel spreadsheet together with the module "Solver" will be intensively used.

Evaluation criteria
- Final exam: 50% of the grade. You need to obtain in this exam at least a 4 out of 10 to pass the course.
- Continuous evaluation: 40% of the grade:
  - 20% homeworks and case studies
  - 20% paper presentation
  - 10% attendance

Students are required to attend 80% of classes. Failing to do so without justified reason will imply a Zero grade in the participation/attendance evaluation item and may lead to suspension from the program.

Note: This document is only informational, detailed contents and faculty may change.
As with all courses taught at the UPF BSM, students who fail the course during regular evaluation will be allowed ONE re-take of the examination/evaluation. Students that pass any Retake exam should get a **5 by default as a final grade for the course.** If the course is again failed after the retake, students will have to register again for the course the following year.

In case of a justified no-show to an exam, the student must inform the corresponding faculty member and the director(s) of the program so that they study the possibility of rescheduling the exam (one possibility being during the “Retake” period). In the meantime, the student will get an “incomplete”, which will be replaced by the actual grade after the final exam is taken. The “incomplete” will not be reflected on the student’s Academic Transcript.

Plagiarism is to use another’s work and to present it as one’s own without acknowledging the sources in the correct way. All essays, reports or projects handed in by a student must be original work completed by the student. By enrolling at any UPF BSM Master of Science and signing the “Honor Code,” students acknowledge that they understand the schools’ policy on plagiarism and certify that all course assignments will be their own work, except where indicated by correct referencing. Failing to do so may result in automatic expulsion from the program.”

**Calendar and Contents**

**Weeks 1-2**
1. **Linear Programming:**
   1.1. Structure of the problem.
   1.2. Mathematical conditions.
   1.3. Objectives and constraints.
   1.4. Examples of formulations: human resources problems, capacity problems, transportation problems.

**Week 3**
2. **Solution methods in LP**
   2.1. Graphical method
   2.2. The simplex algorithm
   2.3. Solver and other software.

**Week 4**
3. **Integer programming**
   3.1. Problem formulation.
   3.2. The branch and bound procedure.
   3.3. The knapsack problem.
   3.4. Assignment problems.

**Week 5**
4. **Multiobjective programming**
   4.1. Objective space.
   4.2. Efficiency in solutions.

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4.3. The weighting method and constraint methods. Case studies.
4.4. Goal programming.

Week 6-7
5. Network Models
   5.1. Network notation
   5.2. Maximal flow
   5.3. Shortest Path
   5.4. Location modelling and logistics

Week 8-9
6. Project Management
   6.1. Critical Path Model
   6.2. PERT
   6.3. PERT/CMP
   6.4. Probabilistic PERT
   6.5. Case study

Week 10
7. Waiting Lines and Queuing Theory and Modelling
   7.1. Waiting line characteristics
   7.2. Arrivals
   7.3. Service
   7.4. The M/M/1 model
   7.5. The M/M/m model
   1.1. Case studies

Reading Materials/ Bibliography/Resources

Basic textbooks:


Additional references


Quantitative Methods in Management

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**Bio of Professor**

Daniel Serra graduated in 1984 in Economics from the Autonomous University of Barcelona, and obtained a master in systems analysis and his PhD in the Whiting School of Engineering at Johns Hopkins University in 1989. He is actually professor of management in the department of Economics and business at the Universitat Pompeu Fabra (UPF). His fields of specialization are logistics and quantitative methods in management. He has more than 30 publications in international journals, such as European Journal of O.R., Computers and O.R., Journal of the Operational Research Society, Network and Spatial Economics, Journal of Regional Science, Geographical Analysis, Papers in Regional Science, among others. He belongs to the editorial board of Geographical Analysis, International Journal of Regional Science, Supply Chain Practice, and International Journal of Operations Research and Information Systems. He has worked in consulting for several firms and institutions in the implementation of quantitative models for decision making. He has been vicerrector of the UPF from 2001 to 2013. Actually, he is the Dean of the UPF Barcelona School of Management.

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