Course: Prescriptive Analytics - Optimizing
Data-Driven Decisions

Instructor Information

Professor: Javier Cerezo Lafuente

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Office Hours: Available by request. Please contact via email.

WhatsApp: +*** ** ** **

In-person or Zoom: Available after class or before class upon request.

A summary of my professional background:

- **Director of Data Science, Novartis**: Led teams on GenAI systems, evaluated LLMs, and developed financial forecasting tools for $40bn in sales and $13bn in costs.
- **Adjunct Professor, IE Business School**: Designed and taught advanced analytics courses in programming, AI/ML, and prescriptive analytics.
- **Senior Product Manager, Amazon**: Achieved double-digit

Subject Overview

This course focuses on **prescriptive analytics**, expanding upon the foundation laid in **Data Analytics for Managers**. Students will delve deeper into decision-making under resource constraints and risk assessment, with a particular focus on **optimization** and **simulation** techniques.

Learning Objectives

By the end of the course, you will have developed the following skills: - Building complex decision models. - Making data-driven decisions under constraints. - Solving optimization problems. - Conducting sensitivity analysis. - Developing simulation models. - Comparing and evaluating different decision-making approaches.

Course Structure

The course includes 10 sessions, which will cover the following dimensions: - **Lectures (20%)**: Focus on the theoretical background. - **Discussions (20%)**: Active participation to deepen understanding. - **Class Exercises (15%)**: Hands-on practice during class time. - **Group Work (25%)**: Collaborative problem-solving and project work. - **Individual Study (20%)**: Independent learning and preparation.

Topics Covered

- **Decision-Making Frameworks**: Structuring managerial decision problems and framing decisions.
- **Optimization Models**: Building and solving optimization problems using tools like Excel and Solver.
- **Sensitivity Analysis**: Understanding the impact of changes in decision variables.
- **Simulation**: Applying simulation techniques to decision-making under uncertainty.

Evaluation

Your performance will be evaluated based on: - **Final Exam (40%)**: Open book and notes exam. - **Group Assignments (20%)**: Two group assignments, each accounting for 10%. - **Class Participation (20%)**: Active contribution during lectures and discussions.

Course Policy on AI Tools

Generative AI tools may be used in specific cases, such as Excel formula generation, with proper acknowledgment. However, AI-generated content is not permitted in assignments, exams, or group submissions.

Ethical Conduct and Attendance

Students are expected to adhere to the university's Code of Conduct and Attendance Policy. Any unethical behavior may result in failure of the course.

Tentative Session Breakdown

Sessions 1-2: Introduction to Decision Making

- ▶ Role of intuition and analysis.
- ▶ Structuring managerial decision problems.
- ▶ Practical Case: Red Brand Canners (HBS).

Sessions 3-4: Building Decision Models

- ▶ Using Excel for decision models.
- ▶ Optimization with Solver.
- ▶ Sensitivity analysis.

Sessions 5-7: Advanced Optimization Techniques

- ▶ Case: Wellyntoy Products - Dynatron.
- ▶ Building and solving more complex optimization models.

Sessions 8-10: Review and Exam Preparation

- ▶ Revising key concepts.
- ▶ Final exam preparation.

Some practical remarks

Style and content

- ▶ Lectures will be light in math and heavier in applications
- ▶ Case and exercise discussions will showcase the decision tools
- ▶ Despite the case-study style of the class, the core will be quantitative
- ▶ Participation is 20% of assessment
- ▶ More than 30% absence from lectures and workshops will result in failing the course (unless excused)

Tools

- ▶ The main analytic tool that we will use is Excel
- ▶ You will need some tools besides regular Excel: Solver (Excel) and @Risk (Palisade Decision Tools)

Workshops

- ▶ Some of the sessions will consist of workshops instead of lectures
- ▶ You will work on a project case assisted by the instructor
- ▶ Please sign up for your preferred work-groups before the next