

# Course: Prescriptive Analytics - Optimizing Data-Driven Decisions

## Instructor Information

**Professor:** Javier Cerezo Lafuente

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**LinkedIn:** profile

**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 growth in consumer electronics, overseeing a €200MM topline for the Home Entertainment category in Spain and Italy.
- **Senior Associate, McKinsey & Company:** Managed strategy projects in Latin America, increasing mining output and TV revenue through ML models.
- **Airbus Senior Engineer:** Co-developed software for the A400M aircraft program and transferred flight physics engineering activities from Germany to Spain.
- **MBA, University of Chicago Booth:** Graduated with honors and awarded prestigious scholarships; GMAT 760 (99th percentile).
- **Technical Skills:** Python, R, SQL, AWS, cloud computing, and machine learning with a strong background in data science and engineering.
- **Languages:** Fluent in Spanish, English (TOEFL 117/120), and German (C1 level); member of Mensa International.

## 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.

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## **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 session
- Ideally you should form groups of three
- The workshops will take place in break-out rooms for each team
- Assignments will be based on workshops, managerial reports submitted electronically through Blackboard
- Deadline: each report will be due right before the next session

## Course Material and Evaluation

- **Material:** Lectures, cases, and articles uploaded on campus
- **Textbook (Optional):** “Data Analysis and Decision Making”, Albright, Winston, Zappe, Cengage, 4th Edition, 2011 (licenses available at IE Virtual Desktop)

## Assignments

- To be submitted electronically or as a hard copy
  - One report per group
  - **Assignment 1:** 20% of assessment, 5-pages report (excluding graphs and tables)
  - **Assignment 2:** 20% of assessment, 5-pages report (excluding graphs and tables)
  - **Exam:** Open books and notes, 40% of assessment
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