

Data Sciences and Operations

USC Marshall School of Business

DSO 570

Professor Paat Rusmevichientong

The Analytics Edge: Data, Models, and Effective Decisions

Spring 2021 (3.0 units)

Time: MW 5 – 6:20pm (Section 16301 ONLINE)

TuTh 5 – 6:20pm (Section 16279 ONLINE)

Who should take the course?

Students who wish to go beyond the standard business analytics course. You will learn about “getting an edge” -- how to make effective decisions using data and models through optimization. The skills and tools learned in this course will give you a unique analytics and competitive edge, and they can be applied to a broad range of careers, including finance, consulting, marketing, operations, and technology.

Course objectives

The course will teach students how to convert data into models, and most importantly, *how to use the models to make effective decisions through optimization*. Students will learn about optimization concepts and tools, and see how it can be applied to a broad range of applications. The class will provide students with extensive hand-on optimization practices.

Key Concepts

- Decision trees
- Bayes' Rule
- Probability distributions
- Linear programming (LP)
- Shadow prices
- Linear optimization under uncertainty
- LP in finance and operations
- Nonlinear programming and applications to portfolio optimization
- Integer programming
- Dynamic optimization over time
- Applications in aviation, supply chain, manufacturing, and retail

Course description

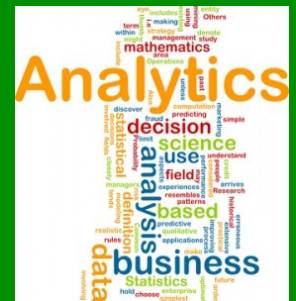
You will learn how to build models from data, and how to translate these models into effective decisions through optimization, providing you with a unique analytics and competitive edge. We will study four modules:

- Framework for effective decision-making
- Dealing with uncertainty: Fundamentals of probability
- From data to models: Building blocks of optimization
- Putting everything together: Effective decisions through optimization

Comparison to other DSO courses: This course (DSO 570) provides a much more in-depth study of optimization models and methods in decision-making. We will also cover more business cases involving optimization. There is minimal overlap with DSO 547.

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Optimization