

# Decision Analysis (Fall 2021)

## Motivation

Every single day of our lives, we both make decisions (e.g., choosing what to wear for tonight's party, choosing among different majors to pursue our education, choosing a partner, buying a car, etc.) and are affected by the decisions made by others (e.g., shutting down the country due to coronavirus outbreak, Brexit, united nations sanctions, etc.). Even though these decisions may seem to be very different, they all share a common feature: They are all made by either individuals or groups of human beings. We - human beings - have limited information processing capacity and cognitive abilities and tend to simplify problems which can lead to inconsistency and biases. Moreover, we have conflicting interests and intuitions which make it difficult to come up with a unified decision when multiple stakeholders are involved in a problem.

Assume you are choosing your future career. Making your decision about which direction to go, you would like to maximize your income, maximize your job security, maximize your job satisfaction, maximize your freedom and so on. In other words, the problem you are facing involves **multiple objectives** and no *course of action* achieves all of these objectives. So, you need to consider *trade-offs* between the benefits offered by different alternatives. Moreover, there are **uncertainties** regarding how the future will turn out to be; uncertainties about, for instance, how much your income would be, whether or not you would be satisfied with your job, and prospects you would face if the business failed. Associated with this would be your **attitude to risk**; Are you seeking risky alternatives aiming higher payoffs, or you naturally prefer to select the least risky alternative? Much of the frustration in attempting to understand your decision problem arises from its **complex structure**, and it would be even more complex if **multiple stakeholder** are involved in it (does your decision concern your partner?). In this course, we learn how decision analysis would be of assistance in the face of such complexities.

## Course structure

The course is structured as follows:

- We will start with introducing the biases that can arise when unaided decision makers face decision problems involving multiple objectives.
- Then, we will see how decision analysis can help with these sort of problems assuming little or no uncertainty about the outcomes of different courses of action. We will first consider decision problems with a single objective and then get to know about the methods for dealing with problems with multiple objectives.
- To be able to incorporate the uncertainty into our analysis, we first need to know how probability theory can be used to measure uncertainty. Applying probability to decision problems will enable us to include a decision maker's attitude towards risk into the analysis.

- Then we will learn about several tools and methods, e.g., decision trees, influence diagrams, and simulation models, for clarifying decision problems that are difficult to handle because of their size and complex structure.
- Decision making is an ongoing process and new information obtained over time will influence our perception of uncertainty and thereby our decisions. In the next step of the course, we learn how a decision maker should revise judgments in the light of new information.
- In practice, managers take actions to reduce risks rather than passively accepting them. We will learn how to use decision-analysis models as a structure for risk and uncertainty management and how to identify the aspects of the decision that have the greatest potential for reducing risks or exploiting opportunities.
- Even though there is usually an individual who is responsible for the consequences of a decision, decision are made in groups in many cases. We will get to know about the problems that can occur in group decision making and will discuss the role of decision analysis in this context.

We will learn many new concepts and tools through different examples and cases. You can find the course description [here](#).

## Teacher

Below, you may find my contact information. Please do not hesitate to write to me if you have any questions regarding the course.

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