

Game Theory – Is This Course For You?

The information below (*in addition* to the Course Description page) will help you make a more informed decision on choosing this course for the semester.

1. This is an introductory course

We start everything from scratch. If you have never even heard of game theory before, this is the place to start (nevertheless, those who have should still read on).

2. This is a course about game theory itself

This is not an economics course and there is no bias towards any particular field of application. We do use examples from economics, biology, political science, etc.

3. This is an in-depth course

You are not introduced to a “baby” version of the subject. We are thorough and do not shy away from questions touching the fundamentals of why the theory should work (or not). As much as it is possible at this stage of your mathematical thinking, we try to transition from “true because it looks like it on the diagram” to *proper mathematical modeling and proof*. Even if you had game theory before, this course will likely contribute to your better understanding of the subject, in turn substantially.

4. This is an applied mathematics course

Game theory is an applied mathematics discipline; its determining side is the real-life phenomena it tries to model. In this course we talk about real-life things almost as much as we talk about mathematics. For example, at a certain point of the course, we talk about *experiments*. The important role mathematics plays is being the (indispensable) *tool* to build the consistent (abstract) “mental picture” for our understanding of a real life situation. It forces us to be very clear about what assumptions we are making and it guides us as to the implications of these assumptions.

If you have started developing a comfort zone within pure mathematics, this course will move you (in and) out of it and will contribute greatly to your understanding of what it means to transform descriptions “in English” into mathematical models. It is also great to see some of the mathematical notions you might have already learnt (like simple set theory, probability theory, vectors and matrices, some real analysis) in action!

5. Mathematical prerequisite: simple set theory

This course is offered in a *mathematics* program, it therefore has a *rigorous* mathematical side. “Rigorous” here does *not* mean that you have to know “a lot” of mathematics. Rather, it means that you have to have a good understanding of a few basic notions of few areas (see below) of mathematics. Additionally, it also implies a certain way of thinking, i.e.: “thinking mathematically” (usually acquired through some exposure to mathematics).

It is *vital* that you are familiar with **naïve set theory** (*sets and set operations, Cartesian products, relations and functions and their properties, inverses*). Knowing that mathematics is based on sets and relations/functions between sets is necessary to understand the mathematical side of the course.

In the second half of the semester, we use some elementary probability theory, vectors and matrices and a little real analysis. If the background of the class makes it necessary, I will introduce these in a self-contained format during lecture and/or in an extra class. If you sign up for the probability class here at the BSM, you will have the probability tools covered by the time we start using them in this class and you will see them “in action”.