• Purpose: In social science, researchers use mathematical models to analyze agents’ choices. In this course, I will introduce standard models frequently used in social science. The models vary depending on the choice environment of the agents.

For each model, I will explain when and why one can use the model. In particular, I will provide necessary and sufficient conditions (i.e., axioms) under which one can use the model. I will teach proofs.

Some of the axioms have been tested in experiments. I will also mention such empirical findings.

• Grading:
  – Participation and Presentation (20%)
  – Midterm Exam (40%)
  – Final Exam (40%)

• Class Schedule
  – Binary relation and its properties.
  – Representation of weak order
    * Finite case
    * Countable case
    * Uncountable case
  – Mixture space and Hersten Milnor’s theorem
  – von Neumann-Morgenstern objective expected utility theory

* I do not talk much about risk aversion in my class based on the coordination with the instructor of SS 205a. You will learn risk aversion in SS 205a. I also recommend for you to read chapter 6 of Mas-Colell, Whinston, and Green. “Microeconomic theory”. Oxford University Press.
– Allais paradox
– Anscombe-Aumann subjective expected utility theory
– Choice under ambiguity
  * Ellsberg paradox
  * Gilboa Schmeidler’s maxmin subjective expected utility theory
– Random choice
  * Random utility model
  * Logit model
– Revealed preference
– Intertemporal preference

• Text Books:

  – I will distribute a lecture note. The lecture note is based on the following two books:
    * Peter Fishburn, “Utility Theory for Decision Making” out of print, the pdf is available at http://oai.dtic.mil/oai/oai?verb=getRecord&metadataPrefix=html&identifier=AD0708563
  – As for von Neumann-Morgenstern objective expected utility theory, I recommend
  – As for random utility and revealed preference, I recommend

• Participation:
  – At the beginning of each class, I will check your attendance.
  – During the quarter, you need to answer my questions in class at least 20 times.

• Homework:
  – In most of your homeworks, you need to provide mathematical proofs.
  – The proofs must be self-contained and do not have any gaps.
  – Your homeworks must be written by LATEX. I will not accept hand-written homeworks.

• Office Hours: Any time after the class or by appointment.