

ECON 956

(Topics in Mathematical Economics)

Organizational Meeting

Faculty Lounge

Tuesday, Jan. 9, 3:00

The agenda of the class will be flexible. Possible topics include:

Binary Relations How are preferences translated into choices? When can preferences be represented by a utility function? What do we implicitly assume when we use continuous utility functions? We'll go through famous papers by Debreu and Bowen.

Zorn's Lemma What is Zorn's lemma, and what does it have to do with something called the axiom of choice? We'll see how useful Zorn's lemma can be by proving Tarski's fixed point theorem and Spilrajn's theorem on extending partial orders.

Choice Theory What are the observable implications of our assumptions about individual preferences? We'll go through papers of Richter, Hansson, Suzumura, and others. We'll also see what the Russians have to say on this matter.

Arrow's Impossibility Theorem Exactly what is Arrow's theorem, and what does it mean? We'll prove the theorem using the theory of ultra-filters. Following the work of Fishburn and Kirman-Sonderman, we'll use these techniques to prove the existence of "invisible dictators" for infinite societies. We'll also check out some papers by Russian social choice theorists.

Harsanyi's Social Aggregation Theorem When society, as well as the individuals who make up society, have expected utility preferences over lotteries, social preferences have a very special form. Following a paper by Border, we'll prove this theorem using the separating hyperplane theorem.

Strategy-proofness Many social decision-making methods are vulnerable to strategic manipulation by group members. Since Gibbard's and Satterthwaite's elegant formalization of this observation, a large and interesting literature has examined the possibilities for designing strategy-proof ("non-manipulable") methods in a wide range of decision-making environments.

Existence of Bayesian Equilibrium Harsanyi, in his seminal paper, offers an easy proof of existence under rather strong assumptions. Things get more interesting when those assumptions are relaxed. We'll tackle an advanced paper by Milgrom and Weber, who allow for infinite-dimensional spaces of types and actions. This paper invites a variety of mathematical detours: measure theory basics, integration, Sperner's lemma, topology, the Fan-Glicksberg fixed point theorem, weak* convergence of measures on metric spaces, and more!

I can think of other topics as well: axiomatic bargaining theory, utilitarian social welfare orderings, cooperative game theory and the core, etc.