Game Theory ISCI 330 Class Notes (2007)

Class 1: Jan. 9 Tuesday – Course Intro/Overview

Prep
1) Bring syllabus as handouts?
2) Print out class list with student pictures
3) Bring poker chips, prize for overall winner

Logistics (20 min)
1) Intro self, Kevin
2) ISCI philosophy behind co-instruction
   a) get students’ ideas – what has worked well, not so well in other courses
   b) common purpose, but may have different methods, philosophies, opinions
3) Go over syllabus—policies, schedule, textbook, other texts (library on reserve), projects, etc.
4) Student Introductions
   a) where you’re from
   b) major and subjects integrated
   c) favorite non-academic hobby/activity
   d) anything else we should know?
5) Gillian (introduction)
6) Verify attendance with students registered, auditors?
7) Questions?

Poll students (15 min)
1) GT definition?
2) How is it useful? Why is it important? Who uses it?
3) ISCI definition?
4) How/why does GT fit into ISCI?
5) What are you hoping to get out of the class?

GT the Big Picture (25 min)
1) GT as a “Systems Science” (Integrated Science?)
   a) Diagram of Sci disciplines → Sys Sci → Math and Philosophy (increasing levels of abstraction)
      i) Disciplines where used: economics, biology, computer science, psychology, political science, sociology – anyone interested in characterizing social interactions that affect utility of agents
   b) Mario Bunge: “stuff-free science”
      i) School, flock, crowd example
      ii) GT players (= agents) (abstract notion: could be bacteria, people, groups, nations, computer programs, etc.)
         (1) Things that can be said to have interests (utility), but don’t have to be conscious of these interests
(2) In GT we are interested in their cooperative/competitive interactions (not what they actually are)

c) Mario Bunge: “an exact and scientific metaphysics”
   i) GT exact -- fully developed mathematical theory
   ii) GT scientific – (applies to many sci fields: economics, biology, CS, psychology, linguistics)
   iii) GT metaphysical – applies to the real world, useful in everyday life and interactions; competition and cooperation fundamental aspects of real world

2) Nobel Prizes in Economics (for GT work)
   a) 2005 Robert J. Aumann and Thomas C. Schelling:
      i) “for having enhanced our understanding of conflict and cooperation through game-theory analysis"
   b) 1994 John C. Harsanyi, John F. Nash Jr., Reinhard Selten
      i) “for their pioneering analysis of equilibria in the theory of non-cooperative games"

3) GT > DT or DT > GT?
   a) GT both descriptive and normative – it describes systems but also says what agents “should do” in different circumstances

4) Illustrate game matrix as
   a) GT: neighbor waters lawn and your car y/n; bring umbrella y/n
   b) DT: it rains y/n; bring umbrella y/n (NO WEATHER FORCAST)
   c) Modifications
      i) Ordinal preferences (B>S>T>W) vs. real numbers
      ii) Probability of different decisions by opponent (or nature, i.e. with weather forecast)

5) Questions

Play a game (20 min)

1) Fish PG game, 4 to a group.
   a) Three times, 2-4 rounds each (but don’t tell them)
      i) No talking or communicating
      ii) Give them 45 seconds to talk within groups
      iii) Allow them to make rules within groups
   b) Prize for overall winner
   c) Parting question: what rule maximizes individual gain (utility) if we play many rounds?