ECON 407 Game Theory

Professor: Daniel G. Arce M.
Office: 327 Buckman   Office Phone: 843-3121
Office Hours: Tues 8:00-9:30 am; Wed, 2:00-3:30pm (you can also drop in or arrange an appointment).

Text: Strategy. An Introduction to Game Theory by Joel Watson (required). Also required:
Gibbons, Robert (1997). "An Introduction to Applicable Game Theory," *Journal of Economic Perspectives*, 11(1) 127-149 (on reserve).

Corequisites: EC 307 (and its prerequisites).

The purpose of this course is to undertake an unabashed study of the topics in game theory that economists find of interest. We will ¡celebrate! the application of game theory in the analysis of economic, political and social phenomena. The use of critical thinking skills and mathematical analysis will be at the level of an upper-level economics course. The point is to have fun via intellectual curiosity. At the very least, this course should improve your strategic decision-making.

Method of Evaluation	Weight
Problem Sets/Homework	30%
Exam 1	20%
Exam 2	25%
Final Exam	25%

Note:
1. The 90%, 80%, 70%, 60%, <59% for grades in the range of of A,B,C,D, and F, respectively, is guaranteed, but is flexible downward. The +/- system will also be followed.
2. I reserve the right to reward participation by raising final grades by a maximum of 10%. Participation is not attendance.
3. I encourage you to work the problem sets in groups. Do not wait until the night before to do your homework. **You may turn in your problem set as a group. No more than 4 to a group.**
4. When reading assignments are given, you must **read the article in advance** and **bring the related text/article to class** on the due date so that we may refer to the material. These assignments are given in **bold** in the tentative schedule of topics.
5. It is usually the case that the English language is not a precise enough instrument with which to solve games of interest; hence, we must use mathematics. Consequently, you will leave this course with 'mathematical maturity.' Calculus will be used in this course.
6. A good way to prepare for the exams – in addition to the problem sets – is to do all the problems/examples in the text and assigned readings.
7. The handouts for each lecture are found in my faculty folder. Print out (and read) a copy before each class.
8. The handouts are not self-contained; you may need note paper for class too.
9. Class is cancelled if Memphis or Shelby County public schools are closed due to weather.

Tentative Schedule of Topics/Events

	Day	**Date**	**Topic**	**Source (Chapter: pages)**
1	R	11 Jan	Syllabus & Introduction	Watson 1, 4
	M	15 Jan	**King Day – No Classes**	
2	T	16 Jan	Dominant Strategies	Watson 6, 7
3	R	18 Jan	Nash Equilibrium	Watson 9 Skyrms (2001)
4	T	23 Jan	Taxonomies	**Rapoport & Guyer (1966) Colman (1999) 6, 3-8 Watson 9, p.84**
5	R	25 Jan	Coordination Games (no class handout)	Notes Schelling (1960) 3
6	T	30 Jan	Nash Equilibrium	Watson 10
7	R	1 Feb	Stackelberg & Principal-Agent Models	Watson 25
8	T	6 Feb	Nash & Stackelberg: Complements & Substitutes	Notes
9	R	8 Feb	Collective Action & the PD	**Hardin (1968) Arce and Sandler (2005) ¶1-22 Sandler and Arce (2003) ¶1-18**
10	T	13 Feb	**Exam 1**	
11	R	15 Feb	Biology and Games	Notes
12	T	20 Feb	Mixtures	Watson 11 Osbourne (2004), Chap 4
13	R	22 Feb	**No Class**	
14	T	27 Feb	Evolutionary Stable Strategies	Notes Osborne (2004), Chap 13 Hirshleifer (1982)
15	R	1 Mar	ESS Replicator Dynamics	Notes

	Day	Date	Topic	Source
16	T	6 Mar	Supergames/Repeated Games	Watson 22 **Axelrod (1984)**
17	R	8 Mar	Folk Theorems	Watson 12, 22 Routledge (1998)
	F	9 Mar	**Spring Break Begins 10pm**	
	T	13 Mar	**Spring Break**	
	R	15 Mar	**Spring Break**	
18	T	20 Mar	**Agency and Enforcement Games**	**¡Attempt this handout prior to class as a review!**
19	R	22 Mar	**Exam 2**	
	F	23 Mar	Withdraw Period Ends	
20	T	27 Mar	Extensive Form	Watson 2, 3, 14 Kuhn (1953)
21	R	29 Mar	**No Class**	
22	T	3 Apr	Subgame Perfection	Watson 15, 19
	R	5 Apr	**No Class – Easter Break**	
23	T	10 Apr	**No Class**	
24	R	12 Apr	Moves by Nature	Notes
25	T	17 Apr	**Asymmetric ESS Application**	**Arce & Gunn (2005)** Gunn (2002)
24	R	19 Apr	Incomplete Information and the Harsanyi Transformation	Watson 26
25	T	24 Apr	Bayes/Nash Equilibrium	Watson 26, 28
26	R	26 Apr	Terror Signaling	**Arce & Sandler (2007)**
	F	27 Apr	**No Classes: Honors Day and URCAS**	
27	W	**2 May**	**Exam 3: 8am (75 minutes)**	

Reading list (on reserve in the library)

Arce M., Daniel G. and L. Beth Gunn (2005). Working Well With Others: The Evolution of Teamwork and Ethics, *Public Choice*, 123: 115-131.

Arce M., Daniel G. and Todd Sandler (2005). The Dilemma of the Prisoners' Dilemmas. *Kyklos*, 58(1) 3-24.

Arce M., Daniel G. and Todd Sandler (2007). Terrorist Signaling and the Value of Intelligence, *British Journal of Political Science*, forthcoming.

Aumann, Robert (1985). What is Game Theory Trying to Accomplish?, Chapter 1 in K.J. Arrow and S. Honkapohja (eds.), *Frontiers of Economics*, Oxford: Basil Blackwell, Pp.28-76.

Aumann, Robert. (1996). On the State of the Art in Game Theory: An Interview with Robert Aumann. In W. Albers et al (eds), *Understanding Strategic Interaction*, Berlin: Springer-Verlag, Pp.8-34.

Bergstrom, Theodore 2002. Evolution of Social Behavior: Individual and Group Selection. *Journal of Economic Perspectives*, 16(2) 67-88.

Bergstrom, Theodore 2003. The Algebra of Assortative Encounters and the Evolution of Cooperation. *International Game Theory Review* 5(3) 211-228.

Axelrod, Robert (1984). The Success of TIT FOR TAT in Computer Tournaments, Chapter 2 in *The Evolution of Cooperation*, NY: Basic Books.

Colman, Andrew M. (1999). Game Theory & its Applications in the Social and Biological Sciences, London: Routledge, Section 6.6 of Chapter 6.

Cornell, Bradford and Richard Roll (1981). Strategies for Pairwise Competitions in Markets and Organizations," *Bell Journal of Economics*, 12(1) 201-213.

Ellingsen, Tore (1997). The Evolution of Bargaining Behavior, *Quarterly Journal of Economics*, 12(2) 581-602. Reading through this article would be great preparation for the exam.

Foss, Nicholas (2001). Leadership, Beliefs, and Coordination: An Explorative Discussion. *Industrial and Corporate Change* 10(2) 357-388.

Gibbons, Robert (1997). An Introduction to Applicable Game Theory, *Journal of Economic Perspectives*, 11(1) 127-149.

Gunn, L. Beth (2002). Senior Seminar Paper.

Haigh, John (1975). Game Theory and Evolution. *Advances in Applied Probability*, 7(1) 8-11.

Hamburger, Henry (1973). N-Person Prisoner's Dilemma, *Journal of Mathematical Sociology*, 3(1) 27-48.

Hardin, Garrett (1968). The Tragedy of the Commons, *Science* 162: 1243-48.

Hirshleifer, Jack (1982). Evolutionary Models in Economics and Finance, *Research in Law and Economics*, 4: 1-60.

Kuhn, H.W. (1953). Extensive Games and the Problem of Information, *Contributions to the Theory of Games II*, 193-216.

Leonard, Robert (1994). Reading Cournot, Reading Nash: The Creation and Stabilisation of the Nash Equilibrium, *The Economic Journal*, 104(424) 492-511.

Moulin, Hervé (1981). Deterrence and Cooperation. A Classification of Two-Person Games. *European Economic Review*, 15(2) 179-93.

Osbourne, Martin J. (2004). Chapter 4 (Mixed Strategy Equilibrium) and Chapter 13 (Evolutionary Equilibrium) in *An Introduction to Game Theory*, NY: Oxford University Press.

Rapoport, Anatol and Melvin Guyer (1966). A Taxonomy of 2×2 Games, in Ludwig von Bertalanffy and Anatol Rapoport (eds), *General Systems*, 11: 203-214.

Routledge, Bryan R. (1998). Economics of the Prisoner's Dilemma: A Background. Chapter 6 in P.A. Danielson (ed), *Modeling Rationality, Morality and Evolution*, NY: Oxford University Press.

Sandler, Todd (2003). Collective Action and Transnational Terrorism, *World Economy*, 26(6) 779-802.

Sandler, Todd and Daniel G. Arce M. (2003). Pure Public Goods versus Commons, *Land Economics*, 79(3) 355-68.

Sandler, Todd and Keith Sargent (1995). Management of Transnational Commons: Coordination, Publicness, and Treaty Formation. *Land Economics* (71)2 145-62.

Schelling, Thomas C. (1960). Bargaining, Communication, and Limited War, Chapter 3 in *The Strategy of Conflict*, Cambridge, MA: Harvard University Press.

Selten, Reinhard (1985). Comment, Chapter 1 in K.J. Arrow and S. Honkapohja (eds.), *Frontiers of Economics*, Oxford: Basil Blackwell, Pp.77-87.

Skyrms, Brian (1996). Sex and Justice,"Chapter 1 in *Evolution of the Social Contract*, Cambridge: Cambridge University Press.

Skyrms, Brian (2004). The Stag Hunt, Chapter 1 in The Stag Hunt and the Evolution of Social Structure, Cambridge: Cambridge University Press, Pp.1-13.

Sober, Elliott 1998. Three Differences Between Deliberation and Evolution. In P.A. Danielson (ed), *Modeling Rationality, Morality and Evolution*, NY: Oxford University Press, pp.408-422.