Course Goals:

> This course is designed to accomplish three goals. They are to (1) improve your mathematical skills, (2) develop an understanding and appreciation of the role that mathematics can and does play in our society, and (3) develop an understanding of the nature of mathematics. We will attempt to achieve these three goals by investigating the field of Game Theory.

Required Text

> *Models of Conflict and Cooperation*, by Rick Gillman & David Housman. A copy of the current draft of this book can be obtained from Gillman on the first day of class for $20.

Attendance

> Attendance in class is essential and mandatory.

Tests and Assignments

> There will be two mid-term tests, and a non-comprehensive final. These tests will given online using Blackboard.

> There will be two paper assignments described elsewhere. One will be due at just before spring break, the other will be due at the end of the semester.

> There will be extensive daily homework assignments. Selected problems will be collected and graded for completion and for comprehension.

> Each day, two students will be designated "notetakers". These students will take careful notes during class, transcribe them to a legible form and post them to CourseVU. Each student should have several opportunities to do this during the semester. These notes will be graded for clarity and writing quality.

Grades

> Points will be assigned as follows:

Tests, each	100 points	300
Paper, each	75 points	150
Attendance	50 points	50
Homework	50 points	50
Notetaking	50 points	50

> Earning 90% of all possible points guarantees an A; 80% guarantees a B; and 60% guarantees a C-.

Cellphones

> Cellphones and all other electronic devices (except calculators) should be turned off during class.

Honor Code

> Collaboration is encouraged on homework, but not to the point of copying another's work. On occasion you will be asked to generate individual data. The tests and final are closed book, closed notes, and the only human assistance is the instructor. The honor code criteria for the paper will be included with the instructions for that assignment.

Schedule

Date	Section	In class	Homework
5-Jan	no class		
7-Jan	nim	play nim	play nim, read 1.1 and 1.2
9-Jan	1.1 & 1.2	QA, play keypad and hex	read 1.3 do 1.2 # 2, 3, 4, 8
12-Jan	1.3	discuss heuristic v strategy	read 1.4 write 1.2 #6, do 1.3 # 5, 6, 7,12
14-Jan	1.4	discuss game trees	write 1.3 # 8, build game tree for [3,2]
16-Jan	1.4	more on game trees	do 1.4 # 2, 3, 14
19-Jan	no class		write 1.4 # 12
21-Jan	1.4	more on game trees	read 1.5, write 1.4 # 11
23-Jan	1.5	compute nim-sums	read 1.6 & 2.1, do 1.5 # 1, 2, 3, 4
26-Jan	1.6	discuss thms	read 2.2, write 1.5 # 5, 7, do 1.6 # 1, 4 and 2.1 # 1
28-Jan	2.1 & 2.2	discuss dialogue, ordinal pref	read 2.3, do 2.2 # 1, 3, 6, 8, 10
30-Jan	2.3	cardinal pref. and lottery	write 2.2 # 4, do 2.3 # 4, 5, 8
2-Feb	2.3	transformations and risk	do 2.3 # 3, 6, 9
4-Feb	no class		
6-Feb	2.3	risk and 2.3 # 10	read 2.4, write 2.3 # 7
9-Feb	2.4	Q&A on 2.4 & test; writing #1	read 3.1 and 3.2
11-Feb	no class		
13-Feb	3.1	discuss3.1 play bonus game	write 3.1 # 5, do 3.2 # 1, 2, 5, 11
16-Feb	3.1	report results, discuss paper	do 3.2 # 3, 8, 10
18-Feb	3.2	discuss # 2, 3, 8	write 3.2 # 4, read 3.3
20-Feb	3.3	apply solutions to games	do 3.3 # 1, 4, 5, 12, 15
23-Feb	3.4	do new problems in class	[do 3.3 # 2, 10] write 3.3 # 3, 8, 16, read 3.4
25-Feb	3.4	work the up-down tree in class	do 3.4 # 2, 3, 8 11 read 3.5
27-Feb	3.5	build up-down matrix in class	do 3.5 # 1, 2, 11, write 3.4 # 10, read 3.5 #14
16-Mar	3.5	discuss information sets	write 3.5 # 13, 15, read 4.1 and 4.2
18-Mar	4.1 & 4.2	lecture on mixed strategies	write 4.1 #1, do 4.2 # 1, 8
20-Mar	4.2	do homework problem	do 4.2 # 2, 6, 9, read 4.3
23-Mar	4.3	lecture on Nash, prudential	write 4.2 # 7, do 4.3 # 2, 3, 7, 10, read 4.4
25-Mar	4.3	interpretation and homework	do 4.3 # 5, 11
27-Mar	4.4	play a game, start a mx2 problem	write 4.3 # 6, 12, do 4.4 # 3*, 6
30-Mar	4.4	finish mx2 problem	do 4.4 # 3*, 7 read 4.5
1-Apr	4.5	identify zero-sum games	write 4.4 # 9, do 4.5 # 1a, 1d, 2b
3-Apr	x	review for test, play Hand game	do 4.5 # 6, read 7.1 & 7.2
6-Apr	7.1	review for test, start coalition	write 7.1# 2, do 7.2 # 1, 4
8-Apr	7.2	finish methods and properties	do 7.2 # 1, 4, read 7.3
10-Apr	no class		
13-Apr	7.3	properties	write 7.2 #4, do 7.2 # 1, read 7.3
15-Apr	7.3	Shapley method	do 7.3 #4, 5
17-Apr	7.4	Nucleolus method	do 7.4 # 4a-c, 5, write 7.3 # 6, read 7.5 & 8.1
20-Apr	7.5 & 8.1	summary & split estate	write 7.4 # 6, read 8.2
22-Apr	8.2	reports, methods, divorce	do 8.2 # 2, 7 read 8.3
24-Apr	8.3	properties, divorce	write 8.2 # 4, do 8.3 # 2, 8, read 8.4

27-Apr	no class		
29-Apr	8.4	characterization theorems	write 8.3 # 4, read epilogue
May-08	x	final review	
4-May	x	meet in lab for game playing	

MATH 120 Writing Assignment #1, Spring 2009

Read Chapter 1 (the Introduction) and Chapter 2 of *Biblical Games: A Strategic Analysis of Stories in the Old Testament* written by Steven Brams. I have put pdf copies of the two chapters in the Course Document part of Blackboard. It's not a great copy, but it works. You can read it online or print it if you prefer. If you don't like the copy quality, I have also put the book on two-hour reserve at the library.

Write a short paper (3-4 pages) which
   (a) Describes what Mr. Brams is attempting to do in the book generally and in these two chapters specifically.
   (b) Tells his definitions of each of the key concepts of game theory and notes how these are the same or different than the ones we have class already.
        • Strategic Game
        • Strategy
        • Outcome
        • Preferences
        • Game Tree
        • Game Matrix
        • Optimal Strategies
   (c) Gives examples of how he uses these concepts to do his analysis.
   (d) Describes your response to his effectiveness at
        • Illustrating the use of game theory in his analysis
        • Answering his primary question.

The paper is due in class Friday, March 20, at the end of the week after spring break. It should be written in standard paper format: 12pt Times New Roman, 1inch margins, etc. Do not use a cover page or folder; simply title the first page of the paper.

This paper counts toward 75 of the 600 points available in the course. They will be assigned as follows: 20 points – general quality of the writing; 20 points – response to part (b); 20 points – response to part (c); 15 points response to part (d).

Writing Assignment #2
Spring 2009

Attached is article referring to a game theoretic concept. I found it a few weeks ago while reading a popular (ie designed for a wide audience) magazine. You can actually find many references to game theory in print material.

Conduct an organized search to find references to game theory in popular print and internet NEWS articles. This excludes websites devoted to primarily discussing game theory. Identify three articles published since Jan 1, 2006.

Write a short (4 - 5 page) paper that summarizes each news item and describes the game theoretic features [type of game, the players, strategies, outcomes, preferences, etc] of each item. Conclude your paper with a short (1/2 - 3/4 page) commentary on what you learned about game theory from this exercise.

The paper is due in class the last day of classes. It should be written in standard paper format: 12pt Times New Roman, 1 inch margins, etc. Do not use a cover page or folder; simply title the first page of the paper and include copies of the articles in an appendix.

This paper counts toward 75 of the 600 points available in the course. They will be assigned as follows: 20 points – general quality of the writing; 20 points – accuracy of your summary of the articles; 20 points – accuracy of your modeling process; and 15 points - thoughtfulness of your answer to lessons learned (or not).