

**INTRODUCTION TO
GAME THEORY**
POL 599UY, SPRING 2010
THR, 6:25 – 9:05 (MM 105)

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Office: 314N Jenkins Building
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Course Objectives. Game theory is the mathematical study of rational strategy selection in conflict situations involving two or more interdependent actors (or “players”), where outcomes for each player separately (all hence all players collectively) depend, in part, on the choices made by “opposing” players, in light of the range of preferences for each player over all possible outcomes.

The course is designed to provide upper level undergraduate students and graduate students with a firm grasp on the rudiments of noncooperative game theory, including, most notably, solution techniques for zero sum and non-zero sum games. Although the course is mainly intended for political science students, it also presents applications drawn from other academic disciplines such as economics, business administration, sociology and psychology.

Upon completion of the course students should have a sound appreciation of distinctions (and the practical consequences of distinctions) between pure strategies and mixed strategies, zero sum and non-zero sum games, two-player, three-player, and n-player games, games with perfect and imperfect information, games played once and repeated games. Moreover, students should learn valuable lessons about strategic behavior in business, politics, sports, international relations and military affairs, as well as useful techniques for achieving optimal outcomes in conflict situations that often arise in social, familial and campus settings.

Because this is an introductory course, no advanced mathematics is required. (Calculus is not a prerequisite). Nevertheless, this class provides a fast-paced and comprehensive introduction to a fairly rigorous subject. Commonsense and good analytical skills are essential.

Textbook: *Games, Strategies, and Decision Making*, Joseph Harrington, Jr.

Dimensions of Evaluation. Final grades will be determined in accordance with these criteria:

Problem Sets (Three)	60%	(20% each)
Final Examination	30%	
Term Paper	10%	
Class Participation & Homework	10%	(negative)*

* Students may lose points for failure to attend class with required regularity, failure to contribute to classroom discussions and activities, and failure to timely complete all required homework assignments.

General Requirements. Students are expected to regularly *attend class*. Failure to attend class with requisite regularity can lead to a disappointing grade, if only because material covered in class is likely to be emphasized on the problem sets and the final exam. Students are expected to be fully *prepared* when they attend class. As such, students should do all required readings listed in the attached Class Schedule, and be ready to discuss them, *before* coming to class. Preparation and participation can contribute materially to a good grade in this course. Students should bring the textbook to class. Students may use calculators in class, if necessary. However, calculators are certainly not required.

Classroom Behavior. Students may use computers in class solely for purposes of *taking notes*. Students may use electronic devices in class to record lectures only *upon the express prior approval of the instructor*. All other electronic devices (including cell phones) *are to be turned off*. No text messaging is permitted in class. *Students may not access the Internet for any reason in class*. Students may not send or receive emails or instant messages in class. *Students are expected to be fully attentive in class*. As such, students may not use class time for personal reading or correspondence, or for any other matter not specifically related to this course. Any student who violates any of these rules of behavior will be told to immediately leave the classroom. In the event of repeated violations, a student will be told to formally withdraw from the class.

Homework. In addition to reading assignments listed in the Class Schedule, students will be given a number of written homework assignments. These assignments are mainly intended to help students increase their familiarity with game theory concepts and build confidence in game theory solution techniques. These homework assignments will not be graded *per se*. However, a lack of demonstrable effort will adversely affect a student's final grade.

Each week, when your instructor returns your homework assignments, he will also post a document on the class Blackboard containing detailed solutions to the assigned homework problems. *Students are required to carefully read and review these documents*.

Work Groups. One of the salient learning objectives of this course is to promote a better understanding of group dynamics and, in particular, the benefit of selfless behavior by interdependent actors for the attainment of optimal social welfare in (small or large) groups. Consequently, the class will be divided into an array of small work groups. *Students in each work group are encouraged to do homework problems together and also to help each other prepare for exams*. Members of each work group will also solve problems together in class. Likewise, in class, the work groups will sometimes “play games” against each other.

Problem Sets. The Class Schedule denotes specific weeks when your instructor intends to distribute problem sets. **Think of the problem sets as take-home exams.** Generally, the problem sets consist of exercises (i.e., games) to be solved based on principles and techniques learned in class. Students will have a few days to hand in (or submit by email) their completed problem sets. *Exact posting dates of problem sets, and due dates of completed problems sets, will be announced in class.*

When completing the problem sets students may rely on their class notes, posted class slides, material in your assigned textbook, your homework assignments and all posted answers thereto, but no other sources of information whatsoever. **STUDENT MUST DO HER/HIS OWN WORK.** Absolutely no collaboration is permitted on problem sets. Students may NOT discuss (or attempt to discuss) the problems with other students in this class or with any other persons. Likewise, students may NOT access the Internet for any reason when working on the problem sets. **Any violations of these rules shall be deemed a material violation of the UM Honor Code.**

Timeliness and *completeness* are requisite virtues in this class. Students who fail to submit completed answers to problem sets in a timely manner will realize a material reduction in points, or no points at all, depending on the circumstances. No excuses will be recognized (and no extensions of time will be granted) except for university approved reasons *strictly construed*. After each PS is graded and returned, your instructor will post a document on the Blackboard containing detailed answers. *It is absolutely essential that students read and review these documents, regardless of the grade you received on the PS.* Before you tackle any new material it is important that you understand what you did wrong, and have a firm grasp of learning points you may have missed, on the most recent problem set. Therefore, reading and reviewing each of these documents is a *supplemental reading assignment* in this course.

UM Blackboard. Students must know how to access the web-based UM Blackboard for this class. Homework assignments, answers to homework assignments, problem sets and detailed answers to problem sets will be posted on the class Blackboard.

Class Cancellation Policy. In the unlikely event a class is canceled (due to natural disaster, inclement weather, instructor illness, etc.) you are responsible for having done the work assigned on the syllabus and schedule of class assignments by the stated due date.

Honor Code. Needless to say, cheating, plagiarism, failure to do one's own work on problem sets, violating the prohibition against communication or collaboration and with others about exercises in problem sets, use of the Internet with regard to problem sets, reliance on any unapproved extraneous material when completing problem sets, and/or any other violation of the UM Honor Code will not be tolerated. Any student who violates these rules will receive a grade of "F" for the course and will be reported to the honor council. Any student with direct knowledge of any violation or attempted violation of these rules by any other student is required to report the incident immediately to the instructor. Any student who fails to timely report the incident shall be deemed equally culpable, and shall be penalized accordingly. These rules shall be strictly enforced. **Govern yourself accordingly.**

Term Paper. One of the overriding course objectives is to sensitize students to normative, prescriptive and descriptive uses of game theory – or, in other words, ways and means whereby the abstract games you learn in class facilitate a better understanding of "real world" problems outside of class. Consequently, each student in this course is required to maintain a "journal." Whenever you personally observe a competitive situation, a collective action dilemma, or a strategic interaction that can be explained, solved or modeled (formally or informally) by game theoretic principles, *make an appropriate entry in your journal.*

Suitable material for journal entries can be found almost anywhere – on television, in the newspaper, around campus, at work, at home, at play – in almost every aspect of social, political, or economic life. Almost any real-life situation that involves bargaining, negotiation, strategic behavior, moves and countermoves is amenable to a game theoretic interpretation. So, there is no shortage of potential source material for your journal. During the semester you are encouraged to go back and revise past journal entries to incorporate more detail about the salient facts and any additional comments about applicable game theoretic concepts.

On or before the last regular day of class, **Thursday, April 29**, each student will submit a term paper consisting of type-written examples of applied game theory, drawn from entries in your journals. The papers will be graded on the following criteria:

- Number, diversity and creativity of examples.
- Proper application of game theoretic principles to each example.
- Depth of analysis,
- Neatness and presentation.

Term papers should include a minimum of five examples. However, there is no maximum number. Likewise, there are no page limitations, although a normative standard based on past experience is 15 to 20 pages in length exclusive of a cover page. Your instructor is mainly looking for well-developed case studies involving the proper application of game theory to real world situations, supported by formal models (i.e., proper “games”) similar to the models you studied in this course (and the games we played in class). Stated differently, your instructor is mainly interested in the *quality* of your paper. Nevertheless, sometimes *quantity* has a *quality* all its own. A substantial number of good examples of *game theory in action* can offset a lesser amount of detailed analysis of individual cases. Although there are no special format constraints, any citations and references should adhere to generally accepted academic criteria.

The underlying purpose of this exercise is to ascertain how well you understand the game theoretic principles that are covered in this course. *How well you understand these principles*, is, in part, manifested by your ability to identify and fully explain real world applications of game theory. Once you *start* seeing them, you will never *stop* seeing them; and you will therefore realize optimal benefit from your educational experience in this course. Remember, creativity counts. And, most importantly, so does originality. *As such, you must do your own work!* Students may not collaborate on their journals or final papers; and rules against plagiarism shall be strictly enforced.

Final Examination. Unlike the problem sets, the final examination is not a *take home exam*. It will be administered in class on the date and time indicated in the official UM final examination schedule. However, this test will be an *open note, open book exam*, meaning that students can rely on their textbooks, notes, homework assignments, and answers to problems sets when taking the exam. *However, students may not use their computers or personal communication devices for any purpose during the final exam.* Of course, standard prohibitions against cheating and other honor code violations are rigorously enforced with regard to the final exam.