The course syllabus provides a general plan for the course; deviations may be necessary.

Statement on Academic Honesty: Students are expected to abide by GSU’s policy on academic honesty, which is published in the student handbook. A portion of this policy follows:

“As members of the academic community, students are expected to recognize and uphold standards of intellectual and academic integrity. The University assumes as a basic and minimum standard of conduct in academic matters that students be honest and that they submit for credit only products of their own efforts. The student is responsible for understanding the legitimate use of resources; the appropriate ways of acknowledging academic, scholarly, or creative indebtedness; and the consequences of violating this responsibility”

Statement on accommodation for a disability. “Students who wish to request accommodation for a disability may do so by registering with the Office of Disability Services. Students may only be accommodated upon issuance by the Office of Disability Services of a signed Accommodation Plan and are responsible for providing a copy of that plan to instructors of all classes in which an accommodation is sought.” [Office of Disability Services is located in the Student Center]

Statement on course assessment. "Your constructive assessment of this course plays an indispensable role in shaping education at Georgia State. Upon completing the course, please take time to fill out the online course evaluation."

Course Description and Objectives: Game theory, also known as multi-person decision theory, analyzes situations in which payoffs to players depend on the behavior of other players as well as the player himself/herself. Game theory has found many applications in various fields, such as economics, biology, law, politics, sociology, and computer science. The purpose of this course is to introduce the basic tools of game theoretical analysis to our graduate students, mainly Ph.D. students.

Game-theoretic fundamentals include basic decision theory and measurement of payoffs, games in normal (strategic) and extensive forms, Nash equilibrium and its refinements, existence results, perfect and imperfect information, mixed strategies, introduction to repeated
games, games with incomplete information. In the process, we will introduce many applications of game theory in economics.

**Prerequisites:** Students should be comfortable with mathematical notation and formal reasoning. Some background in microeconomics (Econ 9010 and 9030), mathematical techniques (Econ 8030), and basic probability theory (Econ 8740) are required. Students without this background are urged to contact the instructor before deciding to enroll in the course.

**Grading Policy:** There will be a set of HW assignments, two exams and one paper presentation. The final grade for the course will be based on exams (25% each), presentations (25%) and HW assignments (25%). I’ll drop two lowest HW assignment scores. If you decide to write a term paper then you do not need to take Exam 2.

**Letter Grades:** A+ (98-100), A (94-97), A- (90-93), B+ (87-89), B (83-86), B- (80-82), C+ (77-79), C (73-76), C- (70-72), D (60-69), F (0-60).

**Textbooks:**

**Other Books and General Readings:** As the course progresses, I will distribute reading material. You may find the following books useful as supplementary materials:
- Shoham, Y. and Leyton-Brown, K., 2010. Algorithmic, Game-Theoretic and Logical Foundations

**Course Outline** (deviations may be necessary)

1. Introduction *(week 1)*
   (a) Strategic Games
   (b) Dominant Strategies
   (c) Nash Equilibrium
   (d) Maxmin strategies
   (e) Strictly Competitive Games
(O&R, Ch.2.1-2.3; A&C, Ch.2; A&C, 9.2)


2. Nash Equilibrium *(week 2)*

   (a) Games with Incomplete Information

   (b) Extensive Form Games

(O&R 2.4-2.6; A&C 2.7, 3, 4.1-4.3)


3. Correlated Equilibrium *(week 4)*

   (a) *(O&R, 3.1-3.3)*


4. Rationalizability *(week 3)*

   (a) Rationalizability

   (b) Iterated Elimination of strictly/weakly Dominated Strategies

   (c) Dominance Solvability

(Osborne and Rubinstein: Ch. 4)


5. Sequential Games *(week 3)*

   (a) Main results

   (b) Applications: The Monitoring Game, Optimal Contracts

   (A&C, Ch.4)

6. Sequential Rationality *(week 5)*

   (a) Sequential Equilibrium
(b) Trembling Hand Perfect Equilibrium
(c) Perfect Bayesian Equilibrium
(d) Applications: Job Market Signaling

(O&R: Ch.12; A&C, Ch.8)

7. Repeated Games (*week 6*)

(O&R, Ch.8; A&C, Ch.7)

8. Exam 1 (*week 7*)

9. Auctions (*week 8*)

(a) Private Value Auctions
(b) Common Value Auctions
(c) The Revenue Equivalence Theorem

(A&C, Ch.5; Fudenberg and Tirole, Ch.7)

10. Mechanism Design (*week 9 & 10*)

(a) Mechanism Design with a Single Agent
(b) Mechanism Design with Several Agents
(c) The Groves Mechanism
(d) Inefficiency Theorems

(Fudenberg and Tirole: ch. 7)

11. Evolutionary Equilibrium (*week 11*)

(a) Monomorphic pure strategy equilibrium
(b) Polymorphic equilibrium


12. Bargaining Problem (*week 12*)

(a) The Nash Solution
(b) The core of a Bargaining Game
(c) Sequential Bargaining
(d) Applications: Allocating the Tax Burden, an automobile purchase.

(A&C, Ch.6)


13. Matching Algorithms (week 13)


14. Networks (week 14)


15. Exam 2 (week 15)

**Topics for presentation**

1. Level-k thinking


2. Repeated Games


3. Quantal Response Equilibrium


4. Regret Minimization
5. Deferred Acceptance Auctions

(a) Milgrom, P. and Segal, I., 2014, June. “Deferred-acceptance auctions and radio spectrum reallocation". In EC (pp. 185-186).

6. Networks
