CAS EC403(A1)   **Boston University**
Game Theory   **Spring 2020**

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OFFICE HOURS: W 6-7:30PM & R 2:30-4PM   RM.309, 270 BAY STATE RD.
LECTURES: M &W 4:30-5:45PM   CAS B12

TEXT: Avinash Dixit, Susan Skeath & David H. Reiley Jr.,
            Games of Strategy (4th ed.), W.W. Norton 2015

GRADE: Tests   30% (Test1 [15%] + Test2 [15%])
            Exams   70% (Exam1 [30%] + Exam2 [40%])
            *** No make-up tests or exams will be given. ***

COURSE DESCRIPTION:
        The origins of modern game theory and its application to economics can be traced back to the 1830's, when the mathematician Antoine Augustin Cournot wrote his now famous model of duopoly, but for a century its development was fitful and slow. After the appearance of John von Neumann and Oskar Morgenstern's 'Theory of Games and Economic Behavior' in 1944, interest and research in the subject underwent a phase of rapid and extensive growth. It is now regarded by economists and social scientists as a central theory of human strategic interaction, and in recent years it has even entered the conversations of an educated public.
        In this introductory course, we will study the logical and analytic underpinnings of game theory. From the rigorous formulation of models of interaction and the concept of strategies, we will move on to the positive and normative assertions of game theory – Nash Equilibrium, Iterated Deletion of Dominated Strategies, Rationalizability, Sub-game Perfection, Evolutionary Stability, etc., and examine assumptions about human decision and social institutions that may support these assertions. Many of these ideas have been motivated by economic phenomena, which still provide the best illustrations of game theory as well as inspirations for game theorists.
        It is also well known that game theory frequently makes predictions which appear to be at odds with observed human behavior, whether seen in natural settings or deliberate experiments. We will discuss some of these findings, and may occasionally engage in experimentation ourselves. However, even when we feel that game theory fails to deliver empirically sound predictions or prescriptions, a useful way to understand why it may be so is to scrutinize its assumptions and logic as closely and deeply as we can.
        Being an advanced undergraduate course intended for economists, the student is assumed to come equipped with basic knowledge of economic theory and mathematics (including some calculus and probability theory), but most important of all is his/her ability and willingness to think clearly and logically.

COURSE SCHEDULE: See attached.

ACADEMIC CONDUCT: It is the student's responsibility to read, understand and observe the *Academic Conduct Code* (http://www.bu.edu/academics/resources/academic-conduct-code/, also available from CAS Advising and Student Academic Life). Cases of suspected misconduct will be referred to the Dean's Office. Furthermore, acts of plagiarism or cheating will be penalized with failing grades.

COURSE SCHEDULE   Details of this schedule are subject to change. Registered students can log into the course website at http://learn.bu.edu/. You should visit this website frequently to get the latest course schedule, check announcements, obtain class material and verify your personal grading record.

♦ LECTURE complements READING and self-study. They are not substitutes. To do well in this course, you must understand both thoroughly.

♦ HOMEWORK problems are specified as follows: "S2.3" refers to Solved Exercise S3 at the end of Chapter 2 of Dixit-Skeath-Reiley, while U2.3 refers to the Unsolved Exercise U3 in the same chapter. "S2.1- 2.4" means "S2.1, S2.2, S2.3 and S2.4". Additional problems may be given out in class from time to time.

♦ SOLUTION to the homework problems, tests and exams will be posted on the course website. But you will not benefit from the solutions unless you have worked seriously on the problems.

♦ A TEST will focus on homework problems assigned since the last test or exam (but not including the day of the test). It is given in the second half of class.

♦ An EXAM will test your comprehensive understanding of the course material up to the time of the exam.

(!!) ATTENDANCE: This course is very intensive and each class is almost equivalent to one week's instruction during a regular semester. *Regular attendance is therefore essential.* Also, there will be *no make-up for missed tests or exams.*

DATE	LECTURE	READING	HOMEWORK
	Game Theory and Strategic Interactions		
W1/22	Model of Strategic Interactions:	Ch. 1, 2	S2.1-2.2, U2.3-2.4
	(1) Game Form and Payoffs		
	(2) Predicting Play and Giving Strategic Advice		
	Extensive-form/ Sequential-move Games & Backward Induction		
M1/27	Backward Induction and the problems it raises	Ch. 3	S3.1-3.4
W1/29	Model of the Decision Maker:		
	(1) Individual preference and optimizing behavior		U3.5-3.10
	(2) Knowing the preferences and rationality of others		
M2/03	What is a Strategy? Actions by self and Beliefs about others		
	Strategic-form (Normal-form)/Simultaneous-move Games & Nash Equilibrium		
W2/05	Normal-form Games with Complete Information	Ch. 4	S4.1-4.7, U4.1-4.7
M2/10	Nash Equilibrium and the problems it raises		S4.8-4.12
W2/12	Dominant and Dominated Strategies		U4.8-4.12
M2/17	*<Holiday; Substitute Monday Schedule on Tuesday 2/18>*		
T2/18	Iterated Deletion of Dominated Strategies		
W2/19	Relationship between Games in Extensive and Strategic Forms		
M2/24 <u>TEST1</u>	Maximin and Rationalizable Strategies	Ch. 5	S5.4-5.6, U5.5-5.7
	Test covers homework problems from 1/22 through 2/19		
	Game Theory and Economic Behavior		
W2/26	Continuous strategies and best-response functions	Ch. 5	S5.1-5.3, S5.7-5.9, U5.8-5.10
M3/02	Cournot's Model of Oligopoly	Review relevant parts of your	
	Bertrand and Hotelling's Models of Oligopoly	Intermediate Microeconomics textbook	

DATE	LECTURE	READING	HOMEWORK
W3/04	Economic Externalities and Collective Actions	Ch. 11	S11.1, S11.4, U11.3, U11.5
	Public Decisions and Voting	Ch. 15	S15.1-S15.2, U15.3, U15.5
	Auctions	Ch. 16	S16.2-16.4, U16.2-16.4
	Rubinstein's Bargaining Model	Ch. 17	S17.2, U17.1-17.2
M3/09 & W3/11	*<Spring Recess>*		
M3/16	*Review, Problem Solving, Discussion or Experiment*		
W3/18 <u>EXAM 1</u>	*Exam covers course material through 3/16*		
	Extensive-form Games with Imperfect Information		
M3/23	Multi-stage Games, Inferences about the Past	Ch. 6	S6.1-6.5, U6.1-6.5
W3/25	Subgame Perfect Equilibrium and Sequential Rationality		S6.6-6.10, U6.6-6.10, U6.11-6.12
	Mixed Strategy		
M3/30	Mixed Strategies: Tax Evasion and Random Audits	Ch. 7	S7.1-7.10
	Interpretations of Mixed Strategies		U7.1-7.12
W4/01	Correlated Equilibrium		
	Strategic-form Games with Incomplete Information		
M4/06	Decision under Uncertainty:	Ch. 8, 9	S8.4-8.8, U8.9-8.10
	(1) Expected Payoffs		
	(2) Prior Beliefs and Factual Information		
W4/08	Promises and Threats: Are they credible?		S9.2-9.4, U9.2-9.4
	Signaling and Screening		U8.11
M4/13 <u>TEST 2</u>	Brinkmanship and Commitment	Ch. 14	S14.1, S14.4, U14.1
	Test covers homework problems from 3/23 through 4/08		
	Repeated Interaction and Social Interaction		
W4/15	Reward and Punishment	Ch. 10	S10.1-10.2, S10.4, S10.6
	Repeated Games & Mutual Sanction		U10.1, U10.3, U10.4
M4/20	*<Holiday; Substitute Monday Schedule on Wednesday 4/22>*		
W4/22	Social Norms & Third-party Sanction		
	Evolution of Behavior and Belief		
M4/27	Population Dynamics:	Ch. 12	S12.2-12.3, S12.7-12.8
	(1) Replication & Statistical Equilibrium		
	(2) Random Perturbation & Selection		S12.9-12.10
W4/29	Evolutionary Stability		U12.1, U12.2, U12.6, U12.8
F5/08 <u>EXAM 2</u> <6-8pm>	*Exam covers material from the whole course*		

*Final exam schedule is subject to confirmation or change by the University Registrar's official announcement later in the semester.