Korea University International Summer Campus (KU ISC) 2023

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June 27, 2023 ~ August 3, 2023

ISC230A – Introduction to Game Theory

Ⅰ. Instructor

Professor	:	Piotr Swistak
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Home Institution	:	University of Maryland
Class Time	:	9:00am-10:40am
Office	:	TBA
Office Hours	:	TBA

Ⅱ. Textbook

Required Textbook	:	Avinash Dixit, Susan Skeath and David McAdams, *Games of Strategy 5th edition,* ISBN-13: 978-0-393-42219-1, ***or any of the earlier editions)***, Norton, 2021.
Recommended Additional Readings	:	The following readings will all be posted online: Joel Watson, *Strategy (3rd edition)*, Norton, 2013 (excerpts from the 1st edition posted online.) Robert Axelrod, *The Evolution of Cooperation*, Basic Books, 2006 (excerpts posted online.) Other readings: David Kreps, *Notes on the Theory of Choice*, Westview Press, 1988, Raymond Wilder "The Axiomatic Method," pages 1621-1640 in *The World of Mathematics*, Simon and Schuster, 1956, Kenneth Williams, *Game Theory a Behavioral Approach,* Oxford University Press, 2013 and papers by Bendor and Swistak.

Ⅲ. Course Description and Objectives

This is an introductory course in game theory, a branch of applied mathematics. Game theory is a general theory of behavior and, as such, it is a part of social science. Its impact of the last three decades has been extraordinary. This class is a reasonably comprehensive introduction to modern game theory. We will cover theory of preferences, expected utility theory, and a variety of solutions concepts including iterated dominance, Nash equilibria, subgame perfect equilibria, evolutionary equilibria and others.

I strongly recommend that you watch *A Beautiful Mind* (winner of 4 Oscars in 2002 including the best picture) a thriller about John Nash, a game theorist. It watches like a

James Bond movie, and Russell Crowe and Jennifer Connelly are brilliant as John Nash and his wife.   I will refer to characters featured in this movie throughout the class since many of them made important contributions to game theory.   The class will cover results of many prominent game theorists including John Nash, Tom Schelling, a colleague of mine at the University of Maryland, Reinhard Selten, and others.   Nash, Schelling and Selten have all received Nobel Prizes for their contributions to game theory.

Ⅳ. Grading

Tests (five)	:	60%
Final Exam	:	optional
Assignments	:	20%
Participation	:	20%

Ⅴ. Class Outline

Date	Topic	Readings
June 27 (Tue)	Orientation Day	
June 28 (Wed)	Introduction: Examples of Topics, Methods, and Solutions	Wilder, pp. 1621-40.
June 29 (Thu)	Examples of Topics, Methods, and Solutions (cont.)	ibid.
June 30 (Fri)	Choice under Certainty: Theory of Preferences	Dixit et al, Ch. 1 and Kreps, pp. 7-11 or Williams, pp. 47 and 49-50.
July 3 (Mon) July 4 (Tue)	Choice under Risk: Von Neumann-Morgenstern Expected Utility Theory and the Foundations of Game Theory	Kreps, pp. 1-6 or Williams, pp. 63-68.
July 5 (Wed) July 6 (Thu)	Game Theory: Primitive Terms, their Properties and Interpretations	Dixit et al, Ch. 2.
July 10 (Mon) July 11 (Tue)	Simultaneous-Move Games: Dominance Solvability and Nash Equilibria	Dixit et al, Ch. 4.
July 12 (Wed) July 13 (Thu)	Sequential Games and Rollback Equilibria	Dixit et al, Ch. 3.
July 17 (Mon) July 18 (Tue)	Simultaneous-Move Games: Mixed Strategies	Dixit et al, Ch. 7. (Watson Ch. 14, 15, 16)
July 19 (Wed) July 20 (Thu)	Sequential versus Simultaneous-Move Games and Subgame-Perfect Equilibria; Repeated Games	Dixit et al, Ch. 7 & 10.
July 24 (Mon) July 25 (Tue)	Repeated Games and Folk Theorems	Axelrod (excerpts), Watson, Ch. 22.
July 26 (Wed) July 27 (Thu)	Evolutionary Games	Dixit et al, Ch. 12; Bendor and Swistak (1997)

July 31 (Mon) Aug 1 (Tue)	The Evolutionarily Stable Strategies and the Evolution of Cooperation	Bendor and Swistak (2001)
Aug 2 (Wed)	Optional final exam	
Aug 3 (Thu)	No class / Graduation Day (Available both Online / Offline)	