



STRATEGY: AN INTRODUCTION TO GAME THEORY

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INTENDED AUDIENCE : Students: Engineering, Management, Economics, Mathematics Professionals: Engineers, Scientists, Managers, Economists, Academicians, Policy Makers

INDUSTRIES APPLICABLE TO : This is a undergraduate core course required as a foundation to other courses in Microwave, Optical, and Antenna engineering.

COURSE OUTLINE :

Games or 'Strategic Interactions' can be found in all walks of life. Examples of such scenarios are two firms competing for market share, politicians contesting elections, different bidders participating in an auction for wireless spectrum, coal blocks etc. Game theory provides a convenient framework to model and interpret the behaviour of participants in such strategic interactions. Hence it can be applied to solve a wide variety of problems involving diverse areas such as Markets, Auctions, Online Retail, Cold War, Paying Taxes, Bargaining, Elections, Portfolio Management etc. Therefore, both undergraduate and postgraduate students and professionals from diverse backgrounds such as Scientists, Engineers, Managers, Politicians and Political Scientists, Economists, Mathematicians etc will find the course content useful. Examples and exercises will be motivated by problems close to real life scenarios.

ABOUT INSTRUCTOR :

Prof. Aditya K. Jagannatham received his Bachelors degree from the Indian Institute of Technology, Bombay and M.S. and Ph.D. degrees from the University of California, San Diego, U.S.A. From April '07 to May'09 he was employed as a senior wireless systems engineer at Qualcomm Inc., San Diego, California, where he was a part of the Qualcomm CDMA technologies (QCT) division. His research interests are in the area of next-generation wireless cellular and WiFi networks, with special emphasis on various 5G technologies such as massive MIMO, mmWave MIMO, FBMC, NOMA, Full Duplex and others. He has contributed to the 802.11n high throughput wireless LAN standard and has published extensively in leading international journals and conferences. He was awarded the CAL(IT)2 fellowship at the University of California San Diego and the Upendra Patel Achievement Award at Qualcomm. He is currently a Professor in the Electrical Engineering department at IIT Kanpur, where he holds the Arun Kumar Chair Professorship, and is also associated with the BSNL-IITK Telecom Center of Excellence (BITCOE). He has been twice awarded the P.K. Kelkar Young Faculty Research Fellowship for excellence in research, the Qualcomm Innovation Fellowship (QInF) and the IIT Kanpur Excellence in Teaching Award. His popular video lectures for the NPTEL (National Programme on Technology Enhanced Learning) course on Advanced 3G and 4G Wireless Mobile Communications can be found at the following YouTube link (NPTEL 3G/4G). He has also successfully conducted several Massive Open Online Courses (MOOCs) on various topics such as Applied Game Theory, MIMO OFDM Wireless Systems, Probability and Random Processes, Signals and Systems, Principles of Communication Systems, which have been widely adopted and appreciated. A book authored by him titled Principles of Modern Wireless Communications Systems has been published by McGraw Hill Education and comprehensively covers several key aspects of modern wireless technologies.

Prof. Vimal Kumar received his Ph.D. in Economics from the University of California Irvine in 2008 and B. Tech. in Mechanical Engineering and M. Tech in Thermal Fluid Engineering under a dual degree program from the Indian Institute of Technology Bombay in 2003. After finishing his Ph.D. program in July 2008, he joined the Delhi office of Watson Wyatt Worldwide, a multinational consultancy organization. He worked for one year as a Consultant/Economist in the Global Research Division of the firm. In June 2009, he joined the Indian Institute of Technology (IIT) Kanpur as Assistant Professor. In June 2015, he became Associate Professor, and in December 2019, he became a Professor. Currently, he is the head of the Department of Economic Sciences at IIT Kanpur. He is also a coordinator for NPTEL program at IIT Kanpur.

He is the recipient of several awards and fellowships, including the class of 1982 research fellowship given by IIT Kanpur, the best research paper award for the year 2011 by the American Political Science Association, the Social Science Merit fellowship from the University of California Irvine for years 2003 to 2008, and National Talent Search Scholarship (NTSE) from NCERT, India.

He has participated in 5 sponsored research grants and organized more than 15 workshops in Game Theory and Power System Economics. He has delivered more than 25 guest lectures.

COURSE PLAN :

Week 1: Normal Games and Nash Equilibrium.

Week 2: Mixed Strategies.

Week 3: Sequential Games.

Week 4: Games with Incomplete Information.

Week 5: Auctions

Week 6: Repeated Games

Week 7: Cooperative Games

Week 8: Bargaining and Negotiation