



# STRATEGY: AN INTRODUCTION TO GAME THEORY

## PROF. ADITYA K JAGANNATHAM

Department of Department of Electrical Engineering

## PROF. VIMAL KUMAR

Department of Department of Department of Humanities and Social Sciences

IIT Kanpur

**PRE-REQUISITES :** Familiarity with Fundamentals of Calculus and Probability.

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

**INDUSTRIES APPLICABLE TO :** Management Consulting Companies Technology Development Companies

## 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 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. His research interests are in the area of next-generation wireless communications and networking, sensor and ad-hoc networks, digital video processing for wireless systems, wireless 3G/4G cellular standards and CDMA/OFDM/MIMO wireless technologies. At IIT Kanpur he has been awarded the P.K. Kelkar Young Faculty Research Fellowship (June 2012 to May 2015) for excellence in research. His popular video lectures for the NPTEL (National Programme on Technology Enhanced Learning) course on Advanced 3G and 4G Wireless Mobile Communications can found at the following YouTube link ( NPTEL 3G/4G ).

Prof. Vimal Kumar received Ph.D. in Economics from University of California Irvine in 2008 and B. Tech. degree in Mechanical Engineering and M. Tech degree in Thermal Fluid Engineering under dual degree program from Indian Institute of Technology Bombay in 2003 His research interests include Game Theory, Political Economics and Applied Microeconomics. For last two year, he has been the chairman, student placement office. He is recipient of several awards and fellowship including the class of 1982 research fellowship, the best research paper award for year 2011 by American Political Science Association, Social Science Merit fellowship from University of California Irvine for years 2003 to 2008, and National Talent Search Scholarship (NTSE) from NCERT, India.

## 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