



Course Outline: Game Theory

Instructor: Dr. Shubhro Sarkar

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Phone: 6909-6543.

Office Hours: By Appointment.

Course Objectives

The focus of the course will be on Game Theory and its applications. While the course will be theoretical in emphasis, its coverage will be at the intermediate graduate level. We will spend some time discussing the intuition behind the various concepts, while we define the same with formal, precise statements.

Textbooks

1. Game Theory for Applied Economists, Gibbons, Princeton.
2. Game Theory, Fudenberg and Tirole, MIT Press.
3. A Course in Game Theory, Osborne and Rubinstein, MIT Press.
4. Microeconomic Theory, Mas-Colell, Whinston and Green, Oxford University Press.

Additional readings will be assigned in class. There will be many of these.

Grading

40% will be on the final examination, 40% on a mid-sem examination and the remaining 20% on assignments handed out in class.

As a general policy there will be no make-up midterm exams. If you miss a midterm exam and have a valid excuse, your grade will be based on the remaining elements of the course. Students should plan to be on campus till the end of the semester. Travel plans do not constitute a valid excuse for missing an exam.

Outline of Topics

Introduction

Additional Readings:

(1) Aumann, Robert, "What Is Game Theory Trying to Accomplish?", *Frontiers of Economics*, edited by K. Arrow and S. Honkapohja, Basil Blackwell, Oxford, 1985, 28-76.

(2) Rubinstein, Ariel, "Comments on the Interpretation of Game Theory", *Econometrica*, Volume 59, Issue 4 Jul., 1991, 909-924.

1. Static Games of Complete Information

1.1 Normal/Strategic form games and Nash Equilibrium

1.2 Pure and Mixed Strategies

1.3 Iterated Elimination of Strictly Dominated Strategies; Rationalizability

1.4 Existence of Nash Equilibrium

1.5 Correlated Equilibrium

1.6 Trembling-hand Perfection

1.7 Coalition-Proof Nash Equilibrium

2. Dynamic Games of Complete Information

2.1 Complete and Perfect Information

2.2 Game Trees/Extensive form Representation

2.3 Backwards Induction

2.4 Complete and Imperfect Information

2.5 Subgame Perfection

2.6 Repeated Games

3. Static Games of Incomplete Information

3.1 Bayesian Nash Equilibrium

3.2 Mixed Strategies Revisited

3.3 Auctions; Optimal Auctions

3.4 Bargaining Models

3.5 Public Goods Contribution Games

3.6 Revelation Principle

4. Dynamic Games of Incomplete Information

4.1 Perfect Bayesian Equilibrium

4.2 Signaling Games

4.3 Job Market Signaling

4.4 Cheap-Talk Games

4.5 Sequential Bargaining under Asymmetric Information

4.6 Reputation in the Finitely Repeated Prisoner's Dilemma

4.7 Chain-Store Paradox

5. Coalitional Games

5.1 Core

5.2 Shapely Value

5.3 Nash Bargaining Solution

6. Experimental Evidence

6.1 ERC - A Theory of Equity, Reciprocity, and Competition, Bolton and Ockenfels, American Economic Review, 2000.

6.2 A Theory of Fairness, Competition, and Cooperation, Fehr and Schmidt, Quarterly Journal of Economics, 1999.

6.3 Auctions with Anticipated Regret: Theory and Experiment, Filiz and Ozbay, American Economic Review, 2007.

Expectations

I believe that learning is a team effort. Students are the most vital part of this effort. There is a lot that students can do to help create a good learning environment. This includes coming to lectures on time, handing in assignments on time and participating actively in class discussions.

Applied General Equilibrium Models

Prof. A. Ganesh-Kumar

January - June, 2024

Office Hours:

Monday and Tuesday, 4:00 pm to 5:00 pm, by appointment via email

Course classification:

Course Code: 6206

Field(s): 1) Microeconomics theory and Applications.
2) Macroeconomics, Finance and Growth.
5) Development Theory and Policy.

Course objective:

Applied General Equilibrium (AGE) models are widely used for analysing the economy-wide effects of various policies, such as tax reforms, trade liberalisation, distribution policies, energy and environmental issues, etc. These models are useful for analysing issues where inter-sectoral and inter-agent linkages are crucial. This course is intended as an introduction to AGE models. The course lays emphasis on model building and application in the areas of students' interest.

Target group of students:

The Course is primarily for Ph.D. students; M.Sc. students are welcome to take it.

Pre-requisites:

Microeconomics-II offered in IGIDR covering General Equilibrium Theory, including its assumptions, proof of existence, welfare properties, etc. This course **WILL NOT** cover the theory.

Grading:

Term paper based on computer application (50%) + Final written exam (50%).

Course rules:

Students are expected to meet the Institute norms on class attendance. Dateline for various course milestones will be given in the class within a couple of weeks. Requests for extensions **WILL NOT** be entertained.

Course outline:

- **Introduction:**
 - Introduction to AGE models, their features & uses;
 - A simple 2 x 2 x 2 AGE model by Shovan & Whalley;
- **GAMS software:**
 - Introduction to GAMS programming language;
 - Demonstration using the Shoven & Whalley model;
- **Model formulation:**
 - Fixed price linear CGE models: I-O models; I-O multiplier analysis; SAM multiplier model;
 - Endogenous price linear CGE models: Walras-Cassel (W-C) model; W-C model with intermediate inputs;
 - Neo-classical closed-economy static CGE model;
 - Neo-classical open-economy static CGE model via the Armington specification; Incorporating large country effects in a CGE model; Modelling of production / supply;
 - Modelling multiple households, income distribution, their consumption and savings behaviour;
 - Government in a CGE model;
- **Implementation aspects – Model closure:**
 - Macroeconomic closure;
 - Factor markets – demand; supply; disaggregation; mobility;
 - Product markets – market clearance with imperfect substitutes; price rigidity – variable tax / subsidy; price rigidity – government procurement and stocks; price rigidity – rationing;
- **Implementation aspects – Parameters, database and scenarios:**
 - Parameter calibration;
 - SAM construction and datasets;
 - Scenario development;
 - Assessment of policy alternatives;
- **Implementation aspects – Alternative solution methods:**
 - Linear programming formulation;
 - Solution in the CGE formulation;
 - Excess-demand formulation;
 - Negishi formulation;

- Further topics:
 - Global CGE model – Database and modelling issues; Introduction to the GTAP model;
 - Recursive dynamics;
 - Extensions to imperfect competition in product markets;
 - Increasing returns to scale in production;
 - Quantitative restrictions on trade flows;
- Some existing applications:
 - Armington assumption and trade-focused models; trade liberalization applications; agricultural trade; price policies; distributional analysis; environmental applications;
- Term paper using prototype model: Prototype model – structure and GAMS code;

References

A) Essential readings

- Aydin, H. 2007. “An Analysis of Input-Output Inter Industry Linkages in the Turkish Economy”. Paper presented at the 16th International Input-Output Conference, July 02-06, 2007, Istanbul.
- Breisinger, C., M. Thomas and J. Thurlow (2010): “Social Accounting Matrices and Multiplier Analysis”, IFPRI, Washington D.C.
- D’Heroncourt, J., M. Cordier and D. Hadley. 2011. *Input Output Multipliers – Specification Sheet and Supporting Material*. Spicosa Project Report, Université Libre de Bruxelles – CEESE, Brussels.
- Dawkins, C., T. N. Srinivasan and J. Whalley (2001). “Calibration”, Chapter 58 in J. J. Heckman and E. Leamer (ed.) *Handbook of Econometrics*, Vol. 5. North Holland, pp. 3653-3703.
- de Melo, J., and S. Robinson (1989). “Product differentiation and treatment of foreign trade in computable general equilibrium models of small economies”, *Journal of International Economics*, Vol. 27, No. 1-2, pp. 47–67.
- Devaragan, S., J. D. Lewis and S. Robinson (1990). “Policy Lessons from Trade-Focused, Two-Sector Models”, *Journal of Policy Modelling*, Vol. 12, No. 4, pp. 625–657.
- Dewatripont M. and G. Michel (1987). “On closure rules, homogeneity and dynamics in applied general equilibrium models”, *Journal of Development Economics*, Vol. 26, No. 1, pp. 65–76.
- Dorfmann R., P. A. Samuelson and R. Solow (1958). *Linear Programming and Economic Analysis*. McGraw Hill.
- Ginsburgh, V. and M. Keyzer (1997). *The Structure of Applied General Equilibrium Models*, MIT Press.
- Ghosh, A. 1958. “Input-Output Approach in an Allocation System.” *Economica*, 25: 58-64.

- Hosoe, N., K. Gasawa and H. Hashimoto (2010). *Textbook of Computable General Equilibrium Modelling: Programming and Simulations*. Palgrave Macmillan, U.K.
- Jones, L. P. 1976. "The measurement of Hirschmanian Linkages." *Quarterly Journal of Economics*, XC, pp. 323-333.
- Leontief, W. (1936). "Quantitative Input-Output Relations in the Economic System of the United States," *The Review of Economics and Statistics*, Vol. 18, pp.105-125
- Rattso, J. (1982). "Different macroclosures of the original Johansen model and their impact on policy evaluation", *Journal of Policy Modeling*, Vol. 4, No. 1, pp. 85–97.
- Robinson, S. (1989). "Multisectoral models", Chapter 18 in H. B. Chenery and T. N. Srinivasan (ed.) *Handbook of Development Economics*, Vol. 2. North Holland, pp. 885–947.
- Sen, A. K. (1963). "Neo-Classical and Neo-Keynesian Theories of Distribution", *Economic Record*, Vol. 39, No. 85, pp. 53–64.
- Shoven, J. B. and J. Whalley (ed.) (1984). "Applied general equilibrium models of taxation and international trade: An introduction and survey", *Journal of Economic Literature*, Vol. 22, No. 3, pp. 1007–1051.

B) Additional readings

- Burfisher, M. E. (2011). *Introduction to Computable General Equilibrium Models*, Cambridge University Press.
- Dervis K., J. de Melo and S. Robinson (1982). *General Equilibrium Models for Development Policy*, Cambridge University Press.
- Fischer, G., Froberg, K., Keyzer M. A. and Parikh K. S. (1988), "Linked National Models: A Tool for International Food Policy Analysis", Kluwer Academic Publishers, Dordrecht.
- Hertel, T. W. (1997). *Global Trade Analysis: Modeling and Applications*, Cambridge University Press, Cambridge.
- Leontief, W. (1951). *The Structure of American Economy, 1919-1939*, Oxford University Press, New York.
- McDonald, S. and K. Thierfelder (2013). *Globe: A SAM Based Global CGE Model using GTAP Data*, <http://www.cgemod.org.uk/>.
- Mercenier, J. and T. N. Srinivasan (1994). *Applied General Equilibrium and Economic Development*, University of Michigan Press.
- Narayana N.S.S., Parikh K.S. and Srinivasan T.N. (1990) *Agriculture, growth and redistribution of income: Policy analysis with a general equilibrium model of India*. North Holland / Allied Publishers, New Delhi.
- Pradhan, B. K., M. R. Saluja and S. K. Singh (2005). *Social accounting matrix for India: Concepts, construction and applications*. Sage Publications, New Delhi.

Rasmussen, P. N. 1958. *Studies in Intersectoral Relations*. Amsterdam: North-Holland Publishing.

Shoven, J. B. and J. Whalley (ed.) (1986). *General Equilibrium Trade Policy Modelling*, MIT press.

C) Applications

- Ganesh-Kumar, A., B. K. Ghosh, K. Mate and P. S. Rawat (2017). "Some macroeconomic impacts of different types of public expenditure in India: Analysis using a computable general equilibrium model". Development Research Group (DRG) Study No. 43, Department of Economic and Policy Research (DEPR), Reserve Bank of India (RBI), Mumbai.
- Ganesh-Kumar, A. and N. Harak (2015). "Oil and Natural Gas Price Reforms and its Impacts on Indian Agriculture". In S. Mahendra Dev (Ed.) *India Development Report–2015*, Oxford University Press, New Delhi.
- Ganesh-Kumar, A. and M. Panda (2009). "Global Economic Shocks and Indian Policy Response: An Analysis Using a CGE model" in K. S. Parikh (Ed.) *Macro-Modeling for the Eleventh Five Year Plan of India*, Planning Commission, Government of India / Academic Foundation, New Delhi.
- Panda, M. and A. Ganesh-Kumar (2009). "Trade Liberalization, Poverty and Food Security in India". Discussion Paper 00930, International Food Policy Research Institute, Washington, D. C.
- Panda, M. and A. Ganesh-Kumar (2008). "Global Oil Price Rise and Policy Options for the Indian Economy: An Analysis Using a CGE Model", IGIDR, Mumbai.
- Panda, M. and J. Quizon. (2001). "Growth and distribution under trade liberalization in India" in A. Guha, K. L. Krishna, A. K. Lahiri (eds.) *Trade and Industry: Essays by NIPFP-Ford Foundation Fellows*, Vikas, New Delhi.
- Parikh, K. S., N. S. S. Narayana, M. Panda and A. Ganesh-Kumar (1995). *Strategies for Agricultural Liberalization: Consequences for Growth, Welfare and Distribution*. Report submitted to the World Bank, PP-16, Indira Gandhi Institute of Development Research, Mumbai.
- Xie, J. (1996). *Environmental Policy Analysis: A General Equilibrium Approach*, Avebury, London.

D) GAMS software

- Brooke, A. et al. (1988). GAMS: A user`s guide (Release 2.25). Chapter 1 (*available from GAMSIDE-HELP menu*).
- Rosenthal, R. E. Chapter 2 Introduction: A GAMS Tutorial.



INDIRA GANDHI INSTITUTE OF DEVELOPMENT RESEARCH

SEMESTER: JAN-MAY, 2024

COURSE TITLE: SOCIO-ECONOMIC & POLICY ISSUES IN ENERGY AND ENVIRONMENT – I and II (SPEE-I & II):
(Course I- Basic Concepts; Course II - Advance Concepts)

INSTRUCTOR: VINOD KUMAR SHARMA

TEACHING ASSISTANT: AJAY / NISHANT

COURSE DESCRIPTION: Eligibility Only Ph.D. Students

COURSE OBJECTIVES: To create human resources for enhancing academic and research in the Area of Energy & Environment

COURSE OUTCOMES:

CO1: Learning the basic concepts and generating interest in various topics of EE

CO2: Exposure to Advanced concepts in EE

CO3: Hands on experience of conducting a good quality research in the area of EE

COURSE REQUIREMENTS: Good computer knowledge (command over MS Office, at least); good English writing / reading / speaking skills; Research Aptitude

COURSE CONTENTS:

Introduction: Technological, Social, Economic and Policy issues related to energy and environment; Ecology-Environment and Human Relationships; Social, Economic and Environmental Indicators – EQI, AQI, WQI, GDP, HDI, etc.; Consumption Patterns and Environmental Stress; Population and Environment; Health and Environment; Urbanisation- Housing infrastructure, Growth of Slums, Poverty; Problems of Encroachment; Stress on Urban Infrastructure - Various Modes of Transport (Rails, Road, Air, Water), Ports and Inland Water Transport; Industrialisation, Economic Development and Pollution; Land Resources and Degradation, Land utilisation and its statistics, Wasteland Development, Soil Degradation; Agriculture Sector - Land Use, Fertilizer and Pesticides, Livestock Population, Fisheries Development, Forests and Biodiversity, Forest Cover, Forest Produce, NTFPs. Management of Forests; State of Biodiversity; Anthropocentric View point; Extinction of animal and plant species.; Concepts of zero-waste, pollution, emissions, etc.; Effect of Anthropogenic Activities; Effect of Socio-economic determinants on Energy and Environment- Age, Gender, Income, Employment, Education, etc.

Energy and Environment Relationship- Environmental Impacts; Economically Viable and Environmentally Sustainable Innovations in Energy Science and Technology; Environmentally Clean Energy Technologies; Energy security and sustainability; Various Forms of Energy- Conventional, Non-conventional and Renewable; Environmentally Clean Energy Sources- Solar, Geothermal, Wind, Wave and Tidal Energy, Bio-mass Energy; Waste-to-Energy Conversion- Energy from Incineration, Gases from Landfills; Wastes and Biogas Plants; Energy Conservation and Management- Supply and Demand Side; State-of-the-art and Future Energy Scenario for India; Fossil and Non-fossil energy.

Local Environmental Issues- Problems of Air, Water, Solid Waste, Noise, Radiation, Land degradation, etc.; Sources and Effects of Pollution; Scientific/ Technological and Socio-Economic Concepts; Monitoring and Modelling of Pollution; Abatement measures- source/ receptor control; technological and economic measures; Sustainability and Tools for its Assessment - CBA, EIA and LCA; Natural and Environment Resource Accounting, SEEA of the UN; Resources' Conservation and Environmental protection.

Global Environmental Issues- Global and trans-boundary issues in Energy and Environment; Comparison of Environmental Problems in Developed and Developing Countries; Climate Change and its Possible Impact - Problem of Food Security; Impact on Water Resources - Changes in Monsoon Patterns; Socio-Economic Impacts- Sea Level Rise, Land Submergence and Shifting of Coastal Communities, Impact on Shore line Infrastructure and Coastal Resources; International Efforts for protecting global environment – UNFCCC; IPCC, GEF, UNDP, WB, COPs, IPCC, etc.

Environmental Laws and Policies: History of EE Legislation; Trade and Environment Linkages- Product, Process and Packaging Standards; Trade of Waste; Eco-labels and EE issues as NTTBs.;

EVALUATION: Based on – 1) Mid Term Exam = 30-40%; 2) Weekly progress on Research Paper (RP) = about 20-10%; and 3) Presentation of RP and submission of hard and soft copies of RP = 50%.

REFERENCES:

- Divan S. and Rosencranz A. (2001): Environmental Law and Policy in India, OUP, New Delhi.
- George T., Hilary T. and Samuel A(1993): Intergarted Solid Waste Management, McGRAW-Hill Inc.
- H. C. Perkins (1981): Air Pollution, John Willey.
- Handouts, PPTs, etc. provided to the student by the instructor.
- MetCalf and Eddy (2002), Wastewater treatment – collection, treatment and disposal, Tata McGraw Hill Publishers.
- Perkins, HC (1974): Air Pollution, McGraw Hill Publishing Co., New York., 1974
- Pearce D., A. Markandya and E. Barbier (1989): Blueprint for a Green Economy, Earthscan Publications Ltd., London.
- Pearce, D (1994): Environmental Economics: An Elementary Introduction, Harvester Wheatsheaf, New York, 1994
- Report on "Trade and Environment Linkages," IGIDR, 2005
- Report on "Natural Resource Accounting," IGIDR, 2003
- Sharma V. K.(1994): Atmospheric Pollution by Aerosols, Scientific Publishers, Jodhpur.
- Sharma Vinod K. and Beukering P. V.(1997): Waste paper Trade and Recycling in India, Scientific Publishers, Jodhpur.
- Sharma Vinod. K (2000): Environmental Problems of Coastal Areas in India, Bookwell, Delhi.
- Sharma Vinod. K (2004): Handbook of Environment, Bookwell, Delhi.
- Sharma Vinod K. (2007): Maharashtra State Development Report, Oxford University Press and Plannaing Commission.
- Thomann, RV (1987): Principles Of Surface Water Quality Modeling and Control: Harper and Row Publishers, NY., 1987
- Turner R.K., D. Pearce and I. Batman (1994): Environmental Economics, Harvester Wheatsheaf.
- Tietenberg, Tom (2003): Environmental and Natural Resource Economics (6th ed), Addison Wesley, Boston, 2003 .
- Various Policy Reports and Websites of International / National Organizations, suggested by the instructor.

INDIRA GANDHI INSTITUTE OF DEVELOPMENT RESEARCH

SEMESTER: January – May 2024

COURSE TITLE: Oligopoly Theory **INSTRUCTOR:** Prof. Rupayan Pal

Office Hours of the Instructor: Open Door Policy & TBA timings

TEACHING ASSISTANT: TBA

COURSE DESCRIPTION: This course will cover some selected topics of Oligopoly Theory. Usefulness of insights drawn from oligopoly theory in analysing various issues, including transnational pollution, corruption, lobbying, and resource exploitation will be specially emphasized. The focus of this course will be on reading research papers and discussing those in-depth, not just to gain a fair understanding of the state of the art in below mentioned topics, but also to gain a fair understanding of *decision making in strategic environments* in general. It would also highlight some of the unanswered/un-researched questions. Concepts developed in this course will be very useful to analyse a wide range of issues of economics, business and public policy.

COURSE OBJECTIVES: Students will (i) read and analyze original research articles published in leading journals, (ii) gain thorough understanding of issues pertaining to oligopolistic market structure and their implications, (iii) gain in-depth understanding of workings of partial equilibrium models dealing with strategic interactions (static and repeated) among economic agents under complete information and under asymmetric information, (iv) acquire skill to apply tools and insights drawn from oligopoly theory to analyze other issues.

COURSE OUTCOMES:

CO1 Students will be able to develop relevant micro-theoretic models (partial equilibrium framework) to analyse issues involving strategic interactions among agents.

CO2 Students will have an appreciation of the usefulness of theory models and limitations of existing models. They will be able to identify workable research problems of importance.

CO3 Students will be able to write theory research papers and make effective seminar presentations.

COURSE REQUIREMENTS: (Prerequisites) Microeconomics I & II

COURSE CONTENTS:

0. Recaps and Preliminaries
1. Multimarket Oligopoly: Introduction
2. Bargaining Theory: Introduction
3. Strategic Delegation and Divisionalization
4. Price Discrimination in Oligopoly

5. Competition and Innovation
6. Mixed Oligopoly
7. Vertical Relations
8. Union-Oligopoly
9. Entry Deterrence, Excess Competition, Excess Entry
10. Externalities in Oligopoly and Two Sided Markets

EVALUATION:

You need to make a class presentation (counts 35%) and write a Term Paper (counts 75%).

- Class Presentation: You will be expected to present a research paper in the class and submit a written critique (about 600 words) of that research paper *at least five working days* before your presentation. You will have the freedom to choose the research paper from any leading international journal. However, you need to take prior approval for that.
- Term Paper: The term paper should be based on an original idea, or extension of a well-known model, or a survey of a class of models.

REFERENCES:

Readings:

- A. Research papers published in recent years constitute the major part (more than 80%) of the main readings. The list of research papers will be given in the class.
- B. Selected Chapters of the following books will be useful as background readings.
 1. Paul Belleflamme and Martin Peitz: *Industrial Organization – Markets and Strategies*, 2010, Cambridge Uni Pr.
 2. Xavier Vives: *Oligopoly Pricing: Old Ideas and New Tools*, 1999, MIT Press.
 3. Jean Tirole: *The Theory of Industrial Organization*, (MIT Pr.) Prentice Hall India.
 4. Drew Fudenberg and Jean Tirole: *Game Theory*, 1993, MIT Press.
 5. Ines Macho-Stadler and David Perez-Castrillo: *An introduction to the Economics of Information; Incentives and Contracts*, 2001, Oxford University Press
 6. Patrick Bolton and Mathias Dewatripont: *Contract Theory*, 2005, MIT Press
 7. Martin J. Osborne and Ariel Rubinstein: *Bargaining and Markets*, Version: 2005_3_2 [Freely downloadable from [Ariel Rubinstein: Books \(tau.ac.il\)](http://arielrubinstein.tau.ac.il) and [osborne90a.pdf \(sc.edu\)](#)]
 8. Alison Booth: *The Economics of The Trade Union*, 1995, Cambridge Uni Pr.

Advanced Mathematical Methods For Economics And Finance

Course Outline

Dilip Nachane

1. **Abstract Algebra** : Group theory –Abelian groups- Klein’s V-group-Cyclic groups.
Rings- Left, Right and Two sided Ideals, Modules
Fields and Integral Domains –Fermat’s Little Theorem-Primes and Coprimes- Totient Functions-Euler’s theorem
2. **Measure Theory & Real Analysis** : Sigma-fields - Borel sigma-fields on the real line and real hyperplanes-Outer measures –Measurable sets-Lebesgue and Borel measures on the real line-sets of zero measure-Cantor set – Lebesgue integration-Radon-Nikodym theorem- Kolmogorov’s axiomatic probability-Independence and exchangeability- Random variables and Distribution functions-Lebesgue Decomposition theorem
3. **Functional Analysis** : Metric spaces-Holder & Minkowski Inequalities- Contraction mapping –Banach Fixed Point theorem- Norm and Semi-norm- Completeness- Banach spaces- l_p and L_p spaces- Linear operators-Bounded and Continuous operators-Inner product spaces-Orthogonality- Gram-Schmidt procedure-Projection-Hilbert spaces-Bessel’s Inequality-Parseval and Plancherel theorems- Riesz-Fischer theorem- Laguerre, Chebyshev, Bessel, Legendre and Hermite polynomials.
4. **Fourier Series & Fourier Transforms** : Types of convergence-Abel & Cesaro convergence-Poisson, Jordan and Dirichlet theorems-Gibbs’ phenomenon- Fourier transforms-Continuous and Discrete Fourier Transforms- Convolution of transforms-Laplace transform and Inverse Laplace transform-Solution of differential equations by Laplace transform-z transforms.

References

1. Jacobson, N. (1974) : *Basic Algebra Vol 1, (Chapters 1-3)* W.H. Freeman, San Francisco, USA
2. Herstein, I.N. (1996)(3rd edition) : *Abstract Algebra*, Wiley, Hoboken, New Jersey, USA
3. Fraleigh, J.B. (7th edition) (2003) : *A First Course in Abstract Algebra*, Pearson Education, Delhi, India
4. Munroe, M.E. (1959) : *Introduction to Measure and Integration*, Addison-Wesley, Reading, Mass.
5. Nachane, D.M.(2006) : *Econometrics : Theoretical Foundations and Empirical Perspectives*, Oxford University Press, Delhi, India
6. Royden, H.L. and P.M. Fitzpatrick (2010) : *Real Analysis (4th edition)*, Pearson, Noida, India.
7. Brown, A.L. and A. Page (1970) : *Elements of Functional Analysis*, Van Nostrand Reinhold Co. London, UK
8. Goffman, C. and G. Pedrick (1995) : *First Course in Functional Analysis*, Prentice-Hall of India, New Delhi
9. Limaye, B.V.(1995) : *Functional Analysis (2nd Edition)*, New Age International Publishers, New Delhi
10. Lusternik, L.A. and V.J.Sobolev (2020) : *Elements of Functional Analysis (3rd Edition)*, Hindustan Publishing Corporation, New Delhi
11. Katznelson, Y. (2002) (3rd edition) : *An Introduction to Harmonic Analysis*, Cambridge University Press, Cambridge
12. Churchill, R.V. and J.W. Brown (1987) : *Fourier Series and Boundary Value Problems (4th Edition)*, Mcgraw-Hill Inc. New York
13. Bhatia, R. (2003) (2nd edition) : *Fourier Series*, Hindustan Book Agency, New Delhi.
14. Folland, G.B. (1992) : *Fourier Analysis and Its Applications*, Wadsworth , Belmont, USA
15. Schiff, J. L. (2013) : *The Laplace Transform : Theory and Applications*, Springer Science and Business Media, Berlin

Political Economy of Institutions and Development

Course outline: This course provides an introduction to some of the important questions asked in the field of Political Economy and focuses on empirical approaches to answering those questions. The course heavily relies on studies based in India though seminal papers looking at other contexts are also covered.

Course evaluation: Students will be evaluated based on two referee reports which will carry a weightage of 20%, assignments/class presentation with a weightage of 20%, a replication exercise and a final term with 30% weightage each.

Texts:

* Resources with D in brackets will be covered in detail in lectures.

[PT] Persson, Torsten, and Guido Enrico Tabellini. *Political economics: explaining economic policy*. MIT press, 2002. (D)

[Be] Besley, Timothy. "Principled agents? The political economy of good government." *OUP* (2007)

Week 1-2-3:

Introduction

[PT] Chapter 1 and 2

[Be] Chapter 1 and 2

Electoral Competition

[PT] Chapter 3

Osborne, Martin J., and Al Slivinski. "A model of political competition with citizen-candidates." *The Quarterly Journal of Economics* (1996): 65-96.

Political Agency

[PT] Chapter 4

Partisan Politicians

[PT] Chapter 5

Empirical Methods in Political Economy

Week 4:

Voting

Spenkuch, Jörg L. "Expressive vs. strategic voters: An empirical assessment." *Journal of Public Economics* 165 (2018): 73-81. (D)

Eggers, Andrew C., and Nick Vivyan. "Who votes more strategically?." *American Political Science Review* 114.2 (2020): 470-485. (D)

Choi, Jungug. "Strategic voting in India: Its extent and determinants in the 2004 general election." *Asian Survey* 49.4 (2009): 609-624.

Fujiwara, Thomas. "A regression discontinuity test of strategic voting and Duverger's law." *Quarterly Journal of Political Science* 6.3-4 (2011): 197-233. (D)

Diwakar, Rekha. "Voter turnout in the Indian states: An empirical analysis." *Journal of elections, public opinion and parties* 18.1 (2008): 75-100.

Week 5:

Downsian Convergence

Lee, David S., Enrico Moretti, and Matthew J. Butler. "Do voters affect or elect policies? Evidence from the US House." *The Quarterly Journal of Economics* 119.3 (2004): 807-859. (D)

Jones, Benjamin F., and Benjamin A. Olken. "Do leaders matter? National leadership and growth since World War II." *The Quarterly Journal of Economics* 120.3 (2005): 835-864. (D)

Chattopadhyay, Raghobendra, and Esther Duflo. "Women as policy makers: Evidence from a randomized policy experiment in India." *Econometrica* 72.5 (2004): 1409-1443. (D)

Pande, Rohini. "Can mandated political representation increase policy influence for disadvantaged minorities? Theory and evidence from India." *American Economic Review* 93.4 (2003): 1132-1151.

Besley, Timothy, et al. "The politics of public good provision: Evidence from Indian local governments." *Journal of the European Economic Association* 2.2-3 (2004): 416-426.

Week 6:

Accountability

Cole, Shawn, Andrew Healy, and Eric Werker. "Do voters demand responsive governments? Evidence from Indian disaster relief." *Journal of Development Economics* 97.2 (2012): 167-181. (D)

Besley, Timothy, and Anne Case. "Does electoral accountability affect economic policy choices? Evidence from gubernatorial term limits." *The Quarterly Journal of Economics* 110.3 (1995): 769-798.

Besley, Timothy, and Robin Burgess. "The political economy of government responsiveness: Theory and evidence from India." *The quarterly journal of economics* 117.4 (2002): 1415-1451.

Week 7:

Clientalism

Bardhan, Pranab, et al. "Political participation, clientelism and targeting of local government programs: analysis of survey results from rural West Bengal, India." *Boston: Department of Economics, Boston University* (2008).

Bardhan, Pranab, and Dilip Mookherjee. *Political clientelism and capture: Theory and evidence from West Bengal, India*. No. 2012/97. WIDER Working Paper, 2012. (D)

Bardhan, Pranab, and Dilip Mookherjee. "Determinants of redistributive politics: An empirical analysis of land reforms in West Bengal, India." *American Economic Review* 100.4 (2010): 1572-1600.

Anderson, Siwan, Patrick Francois, and Ashok Kotwal. "Clientelism in Indian villages." *American Economic Review* 105.6 (2015): 1780-1816. (D)

Bardhan, Pranab, et al. "Local democracy and clientelism: implications for political stability in rural West Bengal." *Economic and Political Weekly* 44.9 (2009): 46-58.

Khemani, Stuti. *Partisan politics and intergovernmental transfers in India*. The World Bank, 2003.

Das, Upasak. "Does political activism and affiliation affect allocation of benefits in the rural employment guarantee program: Evidence from West Bengal, India." *World Development* 67 (2015): 202-217.

Week 8:

Political connections

Aidt, Toke S., Miriam A. Golden, and Devesh Tiwari. "Incumbents and criminals in the indian national legislature." (2011).

Vaishnav, Milan, and Reedy Swanson. "Does good economics make for good politics? Evidence from Indian States." *India Review* 14.3 (2015): 279-311.

Faccio, Mara. "Politically connected firms." *American economic review* 96.1 (2006): 369-386. (D)

Khwaja, Asim Ijaz, and Atif Mian. "Do lenders favor politically connected firms? Rent provision in an emerging financial market." *The Quarterly Journal of Economics* 120.4 (2005): 1371-1411. (D)

Lehne, Jonathan, Jacob N. Shapiro, and Oliver Vanden Eynde. "Building connections: Political corruption and road construction in India." *Journal of Development Economics* 131 (2018): 62-78.

Prakash, Nishith, Marc Rockmore, and Yogesh Uppal. "Do criminally accused politicians affect economic outcomes? Evidence from India." *Journal of Development Economics* 141 (2019): 102370. (D)

Banerjee, Abhijit V., and Rohini Pande. "Parochial politics: Ethnic preferences and politician corruption." *Vol* (2007). (D)

Week 9:

Suffrage

Card, David, and Enrico Moretti. "Does voting technology affect election outcomes? Touch-screen voting and the 2004 presidential election." *The Review of Economics and Statistics* 89.4 (2007): 660-673.

Fujiwara, Thomas. "Voting technology, political responsiveness, and infant health: Evidence from Brazil." *Econometrica* 83.2 (2015): 423-464. (D)

Miller, Grant. "Women's suffrage, political responsiveness, and child survival in American history." *The Quarterly Journal of Economics* 123.3 (2008): 1287-1327. (D)

Week 10:

Identity

Bhavnani, Rikhil R. "Do electoral quotas work after they are withdrawn? Evidence from a natural experiment in India." *American Political Science Review* 103.1 (2009): 23-35. (D)

Beaman, Lori, et al. "Female leadership raises aspirations and educational attainment for girls: A policy experiment in India." *science* 335.6068 (2012): 582-586.

Dunning, Thad, and Janhavi Nilekani. "Ethnic quotas and political mobilization: caste, parties, and distribution in Indian village councils." *American political Science review* 107.1 (2013): 35-56.

Week 11:

Capture

Bardhan, Pranab K., and Dilip Mookherjee. "Capture and governance at local and national levels." *American economic review* 90.2 (2000): 135-139. (D)

Bardhan, Pranab, and Dilip Mookherjee. "Decentralizing antipoverty program delivery in developing countries." *Journal of public economics* 89.4 (2005): 675-704. (D)

Panda, Sitakanta. "Political connections and elite capture in a poverty alleviation programme in India." *The Journal of Development Studies* 51.1 (2015): 50-65.

Beath, Andrew, Fotini Christia, and Ruben Enikolopov. "Direct democracy and resource allocation: Experimental evidence from Afghanistan." *Journal of Development Economics* 124 (2017): 199-213. [NEW D]

Week 12:

Corruption

Muralidharan, Karthik, Paul Niehaus, and Sandip Sukhtankar. "Building state capacity: Evidence from biometric smartcards in India." *American Economic Review* 106.10 (2016): 2895-2929. (D)

Bertrand, Marianne, et al. "Obtaining a driver's license in India: an experimental approach to studying corruption." *The Quarterly Journal of Economics* 122.4 (2007): 1639-1676.

Niehaus, Paul, and Sandip Sukhtankar. "Corruption dynamics: The golden goose effect." *American Economic Journal: Economic Policy* 5.4 (2013): 230-69. (D)

Duflo, Esther, et al. "The value of regulatory discretion: Estimates from environmental inspections in India." *Econometrica* 86.6 (2018): 2123-2160.

Week 13:

Bureaucrats

Nath, Anusha. "Bureaucrats and Politicians: How Does Electoral Competition Affect Bureaucratic Performance?." *Institute for Economic Development (IED) Working Paper* 269 (2015): 00016. (D)

Bertrand, Marianne, et al. "The costs of bureaucratic rigidity: Evidence from the Indian Administrative Service." *Unpublished working paper. University of Chicago* (2016).

Iyer, Lakshmi, and Anandi Mani. "Traveling agents: political change and bureaucratic turnover in India." *Review of Economics and Statistics* 94.3 (2012): 723-739. (D)

Gulzar, Saad, and Benjamin J. Pasquale. "Politicians, bureaucrats, and development: Evidence from India." *American Political Science Review* 111.1 (2017): 162-183. (D)

Week 14:

Conflict

Miguel, Edward, Shanker Satyanath, and Ernest Sergenti. "Economic shocks and civil conflict: An instrumental variables approach." *Journal of political Economy* 112.4 (2004): 725-753. (D)

Mitra, Anirban, and Debraj Ray. "Implications of an economic theory of conflict: Hindu-Muslim violence in India." *Journal of Political Economy* 122.4 (2014): 719-765. (D)

Khanna, Gaurav, and Laura Zimmermann. "Guns and butter? Fighting violence with the promise of development." *Journal of Development Economics* 124 (2017): 120-141. (D)

Berman, Eli, Jacob N. Shapiro, and Joseph H. Felter. "Can hearts and minds be bought? The economics of counterinsurgency in Iraq." *Journal of Political Economy* 119.4 (2011): 766-819.

Crost, Benjamin, Joseph Felter, and Patrick Johnston. "Aid under fire: Development projects and civil conflict." *American Economic Review* 104.6 (2014): 1833-56.

Week 15:

Collective Action

Banerjee, Abhijit, and Rohini Somanathan. "The political economy of public goods: Some evidence from India." *Journal of development Economics* 82.2 (2007): 287-314. (D)

Chaudhary, Latika. "Determinants of primary schooling in British India." *The Journal of Economic History* 69.1 (2009): 269-302. (D)

Alesina, Alberto, Reza Baqir, and William Easterly. "Public goods and ethnic divisions." *The Quarterly Journal of Economics* 114.4 (1999): 1243-1284.

Miguel, Edward, and Mary Kay Gugerty. "Ethnic diversity, social sanctions, and public goods in Kenya." *Journal of public Economics* 89.11-12 (2005): 2325-2368.

INDIRA GANDHI INSTITUTE OF DEVELOPMENT RESEARCH

SEMESTER: JANUARY – JUNE 2024

COURSE TITLE: Topics in Applied Econometrics (6806)

INSTRUCTOR: Disha Gupta

COURSE OBJECTIVES: The objective of this course is to introduce the students to applied econometric methods and research designs that are useful in conducting empirical microeconomic research. Since most applied economic research examines questions with direct policy implications, this course will focus on methods for estimating causal effects. The course will cover research designs and applications through several examples and published journal articles.

COURSE OUTCOMES:

CO1 The students will be able to apply basic tools and research designs for estimating causal effects in microeconomic research.

CO2 They will learn the practical application of these methods using classic literature and more recent paper in applied research.

CO3 They will be able to critically think and apply these research methods in their own research.

COURSE REQUIREMENTS: Students are expected to be well-versed in graduate-level mathematics for economists, statistics, and econometrics. It would be helpful if students have already credited Econometrics I (5301). Note that this course will not cover basic econometrics and statistics.

COURSE CONTENTS:

The teaching will cover various econometric techniques for undertaking causal analyses and their applications. Specifically, the following topics would be discussed in this course:

Potential Outcomes Framework

Randomized Control Trials

Instrumental Variables

Clustering and standard errors

Panel Data (Fixed Effects Estimation)

Difference-in-differences

Regression Discontinuity Design

*As part of this course, introductory sessions on Stata and R will be conducted to help students get started with the statistical packages commonly used by economists in their research.

EVALUATION:

The weightage of several components of the evaluation for this course are as follows:

1. Paper Presentations and referee report (20%)
2. Research paper (20%)*
3. Quizzes (20%)
4. Final Exam (40%)

Paper presentations will be scheduled at the beginning of the semester so that students get sufficient time to work in groups and prepare for the presentation. Students are required to select papers of their choice from the given list on a first-cum-first-served basis.

There will be no retake of the quizzes. Retake of final exam is only possible in rare case of a medical emergency where the student should inform me within one week of the exam.

REFERENCES:

Suggested Textbooks:

1. Angrist, J. D., & Pischke, J.-S. (2008). *Mostly harmless econometrics*. Princeton University Press.
2. Cunningham, S. (2021). *Causal Inference: The Mixtape*. Yale University Press.
3. Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data*. MIT press.

Papers:

Angrist, J. D., & Krueger, A. B. (1991). Does compulsory school attendance affect schooling and earnings?. *The Quarterly Journal of Economics*, 106(4), 979-1014.

Angrist, J. D., & Lavy, V. (1999). Using Maimonides' rule to estimate the effect of class size on scholastic achievement. *The Quarterly Journal of Economics*, 114(2), 533-575.

Avvisati, F., Gurgand, M., Guyon, N., & Maurin, E. (2014). Getting parents involved: A field experiment in deprived schools. *Review of Economic Studies*, 81(1), 57-83.

Bleemer, Z., & Mehta, A. (2022). Will studying economics make you rich? A regression discontinuity analysis of the returns to college major. *American Economic Journal: Applied Economics*, 14(2), 1-22.

Braghieri, L., Levy, R. E., & Makarin, A. (2022). Social media and mental health. *American Economic Review*, 112(11), 3660-3693.

Burlig, F., & Preonas, L. (2024). Out of the darkness and into the light? Development effects of rural electrification. *Journal of Political Economy*. Forthcoming.

Card, D., & Krueger, A. B. (1994). Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania. *The American Economic Review*, 772-793.

Chakravorty, U., Pelli, M., & Marchand, B. U. (2014). Does the quality of electricity matter? Evidence from rural India. *Journal of Economic Behavior & Organization*, 107, 228-247.

Chakravorty, U., Dar, M. H., & Emerick, K. (2023). Inefficient water pricing and incentives for conservation. *American Economic Journal: Applied Economics*, 15(1), 319-350.

Cornwell, C., & Rupert, P. (1997). Unobservable individual effects, marriage and the earnings of young men. *Economic Inquiry*, 35(2), 285-294.

Debnath, S., Nilayamgode, M., & Sekhri, S. (2023). Information Bypass: Using Low-cost technological innovations to curb leakages in welfare programs. *Journal of Development Economics*, 164, 103137.

Dhar, D., Jain, T., & Jayachandran, S. (2022). Reshaping adolescents' gender attitudes: Evidence from a school-based experiment in India. *American economic review*, 112(3), 899-927.

Fishman, R., Gin'e, X., & Jacoby, H. G. (2023). Efficient irrigation and water conservation: Evidence from South India. *Journal of Development Economics*, 162, 103051.

Figlio, David, and Umut Ozek. (2024). The Unintended Consequences of Test-Based Remediation. *American Economic Journal: Applied Economics*, 16 (1): 60-89.

Fenske, J., Kala, N., & Wei, J. (2023). Railways and cities in India. *Journal of Development Economics*, 161, 103038.

Krueger, A. B. (1999). Experimental estimates of education production functions. *The Quarterly Journal of Economics*, 114(2), 497-532.

Lundborg, P., Rooth, D. O., & Alex-Petersen, J. (2022). Long-term effects of childhood nutrition: evidence from a school lunch reform. *The Review of Economic Studies*, 89(2), 876-908.

Note: The list of papers is tentative and is subject to change.

INDIRA GANDHI INSTITUTE OF DEVELOPMENT RESEARCH

SEMESTER: January-May 2024

COURSE TITLE: Fiscal Policy

TEACHING ASSISTANT: one

COURSE DESCRIPTION: The course is divided into two distinct but related parts. The first part would discuss how government activities have a profound influence on the well-being of citizens. The course would start with a discussion of the principles that guide our thinking on the question of which activities the government should participate in. The course would not go into the details of tax policies but instead focus on a detailed discussion on government expenditures. This then, leads to the question of the optimal size of the government. The next issue the course would discuss is debt sustainability in both a closed and open economy context.

In the second part this general discussion would be followed by an attempt to understand the working of fiscal policy and its potential contribution to the stabilization of output especially in the context of developing countries. It has recently been empirically established that most developing countries follow a pro-cyclical fiscal policy (in contrast most developed nations follow a counter cyclical fiscal policy) which clearly goes against the prescription suggested by standard Keynesian Macroeconomic models. The course would try and uncover the reasons for this rather surprising outcome. The course would end with a discussion on Fiscal policy in India with the perspective developed earlier in the course.

COURSE OBJECTIVES: The primary objective is to develop a general understanding of how governments affect the economy. The focus would primarily be on two aspects. Firstly, how do governments attempt to influence the general well-being of the population and how this can be achieved in a sustainable way? Secondly, what are the prerequisites that are likely to ensure that government actions that attempt to mitigate welfare losses that arise due to business cycles are successful?

COURSE OUTCOMES:

CO1: Students would be expected to gain an understanding of fiscal policy in a broad international context.

CO2. As a large number of papers taught would involve cross country regressions, students would learn to interpret such regressions correctly.

COURSE REQUIREMENTS:

Course requirements include (i) a mid-term and a final exam, and (ii) a term paper with/without class presentation. This depends on time available and the number of students registering for the course. The course grade will be computed on the basis of the following weights

assigned to the different requirements:

Mid –Term Exam: 30 per cent

Final Exam: 50 per cent

Term paper with presentation: 20 per cent

- Minimum attendance of 85 per cent as per Institute rules.
- Mobile phones to be kept away during class time.
- No late submissions of term paper except for documented medical reasons and emergencies.
- Academic dishonesty in any form, including plagiarism to be subject to disciplinary action as per Institute rules.
- Class participation to be considered for borderline grades

COURSE CONTENTS:

Introduction:

Stiglitz J.E.(1988) Economics of the Public Sector, W.W. Norton & Company New York Chapter 1.

Barlevy B. (2004) “The costs of business cycles and the benefits of stabilization: A survey” NBER working paper no 10926.

Role and Size of the Government

Stiglitz J.E.(1996) “The Role of Government in Economic Development” in Bruno N. and Pleskovic B. (eds) Annual World bank Conference on Development Economics 1996, The World bank, Washington D.C. pp 11-24.

Gwartney J, Lawson R and Holcombe R. (1998) “The size and functions of government and economic growth” Joint Economic Committee, Washington D.C.

Barro R.J. (1991) “Economic Growth in a Cross Section of Countries” The Quarterly Journal of Economics, 106(2) pp 407-443

Fiscal Sustainability

Ley, Eduardo (2009) “Fiscal (and external) sustainability” Munich Personal RePEc Archive, The World Bank

Fiscal Policy and Stabilization

Buchanan J.M. and R.E. Wagner(1978) “Political Biases of Keynesian Economics” in Buchanan J.M and R.E Wagner (eds) Fiscal Responsibility in Constitutional Democracy, Martinus Nijhoff Social Sciences Division, Boston.

Hercovitz Z. and M. Strawzynsky (2004) “Cyclical Ratcheting in Government Spending: Evidence from the OECD” The Review of Economics and Statistics, 86(1) pp 253-361.

Philip R. Lane (2003) “The cyclical behaviour of fiscal policy: evidence from the OECD” Journal of Public Economics 87 (2003) 2661– 2675

Is Fiscal Policy Pro-cyclical in Developing Countries

Gavin M. and R. Perotti (1997) “Fiscal Policy in Latin America” NBER Macroeconomics Annual, 12, pp 11-70.

Kaminsky G.M., Reinhart C.M. and C.A. Vegh (2004) “When it rains, it pours: Pro-cyclical capital flows and macroeconomic policies” NBER Macroeconomics Annual,19, pp 11-53.

Carlos A. Vegh and Guillermo Vuletin (2015) “How Is Tax Policy Conducted Over the Business Cycle?” American Economic Journal: Economic Policy , August 2015, Vol. 7, No. 3, pp. 327-370

The solution to Pro-cyclicality

Jeffrey A. Frankel (2011) “A solution to Fiscal Pro-cyclicality : The Structural Budget Institutions Pioneered by Chile” CID working Paper no. 216.

Jeffrey A. Frankela, Carlos A. Vegh and Guillermo Vuletin (2013) “On graduation from fiscal pro-cyclicality” Journal of Development Economics, 100(1), pp 32-47.

Evaluation: Midterm Examination: 30 marks, Final Examination: 50 marks, Term Paper 20 marks