University of Delhi

Master of Arts (Economics)

Syllabus for Year 1 of the 2-year programme

Effective from Academic Year 2025-26

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Contents

1

Department of Economics

The Department of Economics of the Delhi School of Economics is one of the oldest departments of the University of Delhi. The Delhi School of Economics was established in 1949 as an institution for advanced studies and research in economics, on the initiative of the Founder-Director Professor V. K. R. V. Rao, with Prime Minister Jawaharlal Nehru as its President. Since then, the Department has been at the forefront of postgraduate teaching and research in economics. At present, it is one of the three constituent departments of the Delhi School of Economics, the other two being Geography and Sociology.

The Department is proud of its alumni and past and present faculty members who have made significant contributions to the Economics discipline. Among them is the Nobel laureate Amartya Sen and many Fellows of the Econometric Society, a much coveted honour in the field of Economics. Department alumni can be found in most major Economics, Business, and Public Policy departments worldwide, as members of the faculty and as doctoral students. Department alumni have traditionally found jobs and attained considerable eminence in academia, the civil services, NGOs, international organisations and the media, the number of alumni in finance, consultancy and other areas of the private sector has grown manifold in the past two decades.

Apart from purely academic distinctions, members of the Department have contributed to the task of institution-building in various capacities. The founder, Professor Rao, went on to become the Vice Chancellor of Delhi University, served as the Education minister in the central government, and also founded other important academic institutions. Another former member of the Department, Professor Manmohan Singh, served as Governor of the Reserve Bank of India, union Finance Minister, and later Prime Minister of India. Numerous other members of the Department served the nation as high-level economic officials or advisers to the government and international bodies, as members of the Planning Commission, and as regulators or members of important government Commissions and committees. Others have served as public intellectuals and as public-spirited activists.

In 1965, the Department was the first economics department in the country to be recognised by the University Grants Commission as a Centre for Advanced Studies, a distinction that it continues to hold to the present day. The present Department is building on this evolving tradition and continues to perform the functions of academic research, teaching and

public service. Current faculty have published their research in leading Indian and international professional journals, and have won prestigious international and Indian awards and fellowships. Their specialisations span a wide range of areas in economics. For many years, the Department has been ranked the highest amongst university economics departments in India by RePEc (Research Papers in Economics), a global electronic archive of working papers and publications in Economics and Finance (`http://ideas.repec.org/top/top.india.html`). Apart from pursuing their individual research programmes, several members of the faculty also serve on committees of various government departments and public sector organisations, and on the governing bodies or academic councils of important academic institutions.

The Department currently offers postgraduate programmes (M. A. and Ph. D.) in Economics. These programmes have a strong theoretical and quantitative focus with an emphasis on empirical applications. Their hallmark is the dynamic curriculum offered, which is continuously reviewed and updated in line with the latest developments in the discipline and with changes in curricula brought in by the University.

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Postgraduate Curriculum Framework

Starting in July 2025, the Master of Arts (M. A.) programme for entering students is based on the Postgraduate Curriculum Framework (henceforth, PGCF) which is guided by the National Education Policy (NEP) introduced in 2020. Students can enrol in a two-year degree similar to the one offered in the department currently, or a one-year degree if they have completed a four-year undergraduate degree. Requirements include core, elective, and skill-based courses, according to the structure outlined below. In addition, there are possibilities of undertaking guided research.

Each year is divided into two semesters. A student is required to complete a minimum of 44 credits each year for the award of the M. A. Economics degree. The two-year M. A. degree therefore requires a total of 88 credits and the one-year degree requires 44 credits. Course readings are based on current developments in the field and include journal articles. The readings provided are illustrative and will be regularly updated as considered appropriate.

The appropriate mode of assessment for a course is chosen by the course instructor. Depending on the nature of the course, instruction consists of lectures combined with computer labs and tutorials. The labs provide students the opportunity for hands-on learning of programming, statistical, and econometric techniques. Tutorials complement the lectures with discussions and problem-solving sessions. A student's choice of elective courses in each semester will be limited to those announced by the Department at the beginning of that semester.

The faculty of the Department is responsible for organising lecture and tutorial work for the M. A. programme with some support from doctoral students and college teachers. The academic calendar, admission criteria and other rules are as per the ordinances of the University of Delhi. The semester-wise distribution of courses and credits for the first year of the 2-year programme is given below.

Core Courses

Semester	Courses	Credits per course	Semester credits
I	EC001, EC002, EC003	4	12
II	EC004, EC005, EC006	4	12

Discipline Specific Electives

Semester	Courses	Credits per course	Semester credits
I	2 DSEs	4	8
II	2 DSEs	4	8

Generic Electives and Skill-Based Courses

Semester	Courses	Credits per course	Credits per semester
I	1 SBC	2	2
II	1 SBC	2	2
I-II	1 GE per semester can replace a DSE	4	

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Core courses

Year 1 of the 2-year programme

3.1 Microeconomics: EC001

Course title	Credits	Credit Distribution			Eligibility Criteria	Prerequisite
		Lecture	Tutorial	Practical		
Microeconomics	4	3	1	0		

Objectives

The purpose of this course is to provide students with a rigorous introduction to modern microeconomic theory of choices, market and welfare. The core concepts will be illustrated with the aid of applications to real-world problems. This course will also familiarize students with the mathematical techniques that economists routinely use in their analysis.

Learning Outcomes

1. Student should develop a sound understanding of the core concepts that economists use to understand the world of business, trade and public policy.
2. They will be able to apply the abstract ideas and concepts introduced in the course to real world problems.

Content

Unit 1 **Choice theory and consumer Demand**
Utility representation; demand and expenditure functions; duality; Slutsky decomposition; expected utility theory. **(10 hours)**

Unit 2 **Production, Costs and the firm**
Production possibility sets; cost minimization and profit maximization; input demand and output supply; non-profit motives. **(10 hours)**

Unit 3 **Market**
Monopoly, price discrimination; monopolistic screening; general equilibrium in exchange economy; core of an exchange economy; competitive equilibrium and its stability; general equilibrium models of exchange and production. **(15 hours)**

Unit 4 **Welfare**
Pareto optimality; two fundamental theorems of welfare economics; efficiency and fairness of market wage; factor price equalization theorem; cost-benefit analysis; social choice; Arrow's impossibility theorem.**(10 hours)**

Readings

Laffont, J-J, and D. Martimort (2002): *The Theory of Incentives - the Principal Agent Model*, Princeton University Press.

Feldman, A. M. and Serrano, R. (2006): *Welfare Economics and Social Choice Theory* (2nd Edition), Springer, New York, USA.

Jehle, G. and P. Reny (2001): *Advanced Microeconomic Theory*, Addison Wesley.

Kreps, D. M. (2013): *Microeconomic Foundations I: Choice and Competitive Markets*, Princeton university press.

Mas-Collel, A., M. Whinston and J. Green (1995): *Microeconomic Theory*, 2nd ed. Oxford University Press

Sen, A. (2017): *Collective Choice and Social Welfare*, Penguin.

Tutorial Activities

Group discussion; problem solving exercises

3.2 Mathematical Methods: EC002

Course title	Credits	Credit Distribution			Eligibility Criteria	Prerequisite
		Lecture	Tutorial	Practical		
Mathematical Methods	4	3	1	0		

Objectives

This course aims to provide a selection of basic mathematical techniques required for various economic theory and econometrics courses. Methods such as constrained optimization and implicit function theorem are used to derive and interpret economic insights.

Learning Outcomes

1. Students will be able to model and solve optimization problems in a variety of economic applications.
2. Students acquire sophistication in understanding and writing formal mathematical proofs.

Content

Unit 1 **Preliminaries**
Sets, relations, functions, topological properties of sets in Euclidean spaces (open, closed, compact sets), continuous functions over Euclidean spaces and their characterisations, sequences and their convergence **(10 hours)**

Unit 2 **Linear Algebra**
Vector spaces, subspaces. Convex sets, concave and quasiconcave functions. Linear independence. Linear mappings and matrix representation. Rank-nullity theorem. Solutions of linear equations. Inner product and normed spaces. Orthogonality. Symmetric matrices. Quadratic forms. Spectrum of matrix, diagonalisation. **(13 hours)**

Unit 3 **Differentiation**
Differentiability of Euclidean-valued functions over Euclidean spaces, properties of their derivatives, directional and partial derivatives, chain rule, implicit function theorem **(10 hours)**

Unit 4 **Optimisation**
Optimisation of functions on Euclidean spaces, existence of solutions, characterisation of solutions of unconstrained problems and of problems with multiple equality constraints. **(12 hours)**

Readings

Corbae, D., Stinchcombe, M., and Zeman, J. (2009): *An Introduction to Mathematical Analysis for Economic Theory and Econometrics*, Princeton University Press.

Güler, O. (2010): *Foundations of Optimization*, Vol. 258, Springer Science & Business Media.

Luenberger, D. G. (1997): *Optimization by vector space methods*, John Wiley & Sons.

Ok, E. A. (2011): *Real analysis with economic applications*, Princeton University Press.

Simmons, G. and Krantz, S. (2006): *Differential Equations*, McGraw-Hill.

Simon, C. and Blume, L. (1994): *Mathematics for Economists*, Norton.

Sundaram, R. (1996): *A First Course in Optimization Theory*, Cambridge University Press.

Tutorial Activities

Problem solving exercises

3.3 Statistical Methods: EC003

Course title	Credits	Credit Distribution			Eligibility Criteria	Prerequisite
		Lecture	Tutorial	Practical		
Statistical Methods	4	3	1	0		

Objectives

This course covers basic concepts in probability theory, and parametric statistical inference. Where possible, theoretical results are simulated using statistical software. Some popular non-parametric methods for distributional comparisons are introduced at the end of the course.

Learning Outcomes

1. Students will be able to scientifically approach and analyze data to arrive at statistical conclusions. They will also acquire the necessary foundation for the study of econometrics.
2. They will learn to simulate numerical counterparts of the theoretical results.

Content

Unit 1 **Probability Theory**
Random variables and their distributions. expectations, conditional expectations and other moments. **(10 hours)**

Unit 2 **Sampling and sampling distributions**
Properties of random samples, laws of large numbers, and limit theorems. **(10 hours)**

Unit 3 **Estimation and hypothesis testing**
Properties of estimators, sufficient statistics, maximum likelihood estimation; size, significance, and power of statistical tests; likelihood ratio tests and the Neyman Pearson lemma; uniformly most powerful tests, tests for moments of a distribution. **(20 hours)**

Unit 4 **Categorical Data and Nonparametric Methods**
Tests of goodness of fit; tests of differences in proportions, and tests of distributional equality. **(5 hours)**

Readings

Casella, G., and Berger, R. (2024): *Statistical Inference*, CRC press.

DeGroot, Morris H. and Schervish, Mark. J. (2012): *Probability and Statistics*, 4th edition, Addison-Wesley.

Grimmett, G., and Stirzaker, D. (2020): *Probability and Random processes*, Oxford university press.

Hogg, Robert V.; Makean, J and Craig, Allen T. (2014): *Introduction to Mathematical Statistics*, Prentice Hall, 7th edition

Hwang, Jessica and Blitzstein, Joseph (2014): *Introduction to Probability*, CRC Press.

Tutorial Activities

Problem solving exercises, Numerical simulations using statistical software such as Stata and R

3.4 Macroeconomic Theory: EC004

Course title	Credits	Credit Distribution			Eligibility Criteria	Prerequisite
		Lecture	Tutorial	Practical		
Macroeconomic Theory	4	3	1	0		

Objectives

This course aims to provide a rigorous foundation in modern macroeconomic theory, focusing on consumption, investment, labour market and economic growth. It evaluates the effects of fiscal policy within modern macroeconomic models, with an emphasis on intertemporal decision-making,

Learning Outcomes

1. This course will provide the students with a deeper understanding of macroeconomic factors in the real economy.
2. It will enable them to evaluate various fiscal policies and their implications on the basis of coherent theoretical frameworks.

Content

Unit 1 **Introduction**
Historical background to modern macroeconomics; mathematical preliminaries. **(5 hours)**

Unit 2 **Growth with exogenous and endogenous savings**
The Solow-Swan model; The Ramsey-Cass-Koopmans model; and Diamond's overlapping generations model. **(18 hours)**

Unit 3 **Endogenous growth models**
The AK model; learning-by-doing and knowledge spillovers. Models with public goods and human capital. **(12 hours)**

Unit 4 **Fiscal policies**
Effects of government expenditure and taxes in the Ramsey-Cass-Koopmans and OLG models; an open economy extension of the Ramsey model with applications. **(10 hours)**

Readings

Acemoglu, D. (2009): *Introduction to Modern Economic Growth*, Princeton University Press.

Alogoskoufis, G. (2019): *Dynamic Macroeconomics*, MIT Press.

Barro, R.J. and X. Sala-i-Martin (2004): *Economic Growth*, Prentice Hall, India.

Dornbusch, R. (1980): *Open Economy Macroeconomics*, Basic Books Inc. New York.

Gandolfo, G. (2016): *International Finance and Open Economy Macroeconomics*, Springer-Verlag Berlin Heidelberg.

Heijdra, B.J. (2019): *Foundations of Modern Macroeconomics*, OUP.

Ljungqvist, L., and Sargent, T. J. (2018): *Recursive Macroeconomic Theory*, MIT press.

Romer, D. (2018): *Advanced Macroeconomics*, McGraw-Hill International Edition (Economics Series).

Stokey, N. L., and Lucas Jr, R. E. (1989): *Recursive Methods in Economic Dynamics*, Harvard University Press.

Wickens, M. (2008): *Macroeconomic Theory: A Dynamic General Equilibrium Approach*, Princeton University Press.

Tutorial Activities

Group discussion, Problem solving exercises

3.5 Game Theory: EC005

Course title	Credits	Credit Distribution			Eligibility Criteria	Prerequisite
		Lecture	Tutorial	Practical		
Game Theory	4	3	1	0		

Objectives

Game Theory provides the foundation of modern Microeconomics by analysing strategic interactions. Applications of game theory in market, social interactions, and institutions will be extensively discussed.

Learning Outcomes

1. Students will apply Nash equilibrium and its refinements to analyse strategic interactions.

2. They will become familiar with important market mechanisms, such as auctions, bargaining, contracts and signaling.

Content

Unit 1 **Static games of complete information**
Pure and mixed strategy Nash equilibrium, iterated strict dominance and rationalizability; market games. **(13 hours)**

Unit 2 **Sequential games of complete information**
Sequential rationality and subgame perfection; one stage deviation and backward induction algorithm; repeated games; bargaining. **(10 hours)**

Unit 3 **Static games of incomplete information**
Bayes-Nash equilibrium; auctions. **(10 hours)**

Unit 4 **Sequential games of incomplete information**
Perfect Bayesian equilibrium; contracts, information transmission. **(12 hours)**

Readings

Fudenberg D. and J Tirole (1991), *Game Theory*, MIT Press.

Gibbons R. (1992), *A Primer in Game Theory*, Pearson Academic.

Kreps, D. M. (2023): *Microeconomic Foundations II: Imperfect Competition, Information, and Strategic Interaction*, Princeton University Press.

Osborne M. and A. Rubinstein (1994), *A Course in Game Theory*, MIT press.

Steven Tadelis (2013), *Game Theory: An Introduction*, Princeton University Press.

Tutorial Activities

Group discussion, Problem solving exercises

3.6 Econometric Methods I: EC006

Course title	Credits	Credit Distribution			Eligibility Criteria	Prerequisite
		Lecture	Tutorial	Practical		
Econometric Methods I	4	3	1	0		

Objectives

This course introduces basic econometric techniques along with their theoretical underpinnings. It applies regression techniques to real-world economic data, interpreting coefficients, assessing goodness-of-fit, and performing hypothesis tests to draw economic conclusions.

Learning Outcomes

1. Students will be able to utilize empirical data and statistical software to inform evidence-based economic analysis.
2. Students will be able to select econometric models depending on the data type. The course will enable students to undertake empirical research in economics.

Content

Unit 1 **Least square methods**
Best linear predictor; the algebra of least squares; large sample properties. **(8 hours)**

Unit 2 **Classical Linear Regression**
The classical regression model; biases due to omitted variables and measurement errors; hypothesis testing and construction of confidence intervals for regression coefficients under random sampling. **(12 hours)**

Unit 3 **Conditional Expectations and Functional Forms**
Common functional forms of conditional expectation function, including those relevant for binary dependent variables. **(15 hours)**

Unit 4 **Panel Data Methods**
Regression with entity and time fixed effects. **(10 hours)**

Readings

Goldberger, A. S. (1991): *A Course in Econometrics*, Harvard University Press.

Greene, W. H. (2018): *Econometric Analysis* , Pearson India Education Services, 2018.

Hansen, B. (2022): *Econometrics* , Princeton University Press.

Hayashi, F. (2011): *Econometrics*, Princeton University Press, .

Wooldridge, J. M. (2019): *Introductory Econometrics: A Modern Approach*, South-Western.

Wooldridge, J. M. (2010): *Econometric Analysis of Cross Section and Panel Data*, MIT press.

Tutorial Activities

Problem solving exercises. Estimation of empirical models using real world datasets.

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Elective Courses

4.0.1 Mathematical Economics

Course title	Credits	Credit Distribution			Eligibility Criteria	Prerequisite
		Lecture	Tutorial	Practical		
Mathematical Economics	4	3	1	0		

Objectives

This course is designed for students who plan to do further graduate level work in economic theory, especially those with a keen interest in creating, as opposed to consuming, pure theory.

Learning Outcomes At the end of this course, students will be able to

1. Develop a deep understanding of the mathematical structure of economic theory using set theory, topological concepts, and lattice theory to analyze existence, optimality, and comparative statics in a variety of economic settings
2. Apply advanced mathematical tools to formulate and analyze fundamental economic models such as the Arrow-Debreu general equilibrium model and Nash's existence result.

Content

Unit 1 **Set theory and preliminaries (4 hours)**

Unit 2 **Topological Spaces**
Metric spaces, topological spaces and continuous functions; various useful constructions, e.g. projective and inductive topologies. Countability and separability properties: Compactness, completeness, connectedness, etc. Topologies on function spaces; linear spaces, weak topologies; topologies on a space of probability measures. Convex analysis; separation theorems. Set-valued mappings, fixed point theorems **(27 hours)**

Unit 3 **Applications**

(a) Arrow-Debreu model – existence and optimality
(b) Debreu-Scarf theorem
(c) Duality theory
(d) Nash's existence theorem

(12 hours)

Unit 4 **Further topics**
Lattices, supermodularity and comparative statics **(2 hours)**

Readings

Aliprantis, C., Brown, D. and Burkinshaw, O. (1990): *Existence and Optimality of Competitive Equilibria*, Springer-Verlag.

Berge, C. (1963): *Topological Spaces*, Macmillan.

Debreu, G. (1959): *Theory of Value*, Yale University Press.

Hildenbrand, W. and Kirman, A. (1988): *Equilibrium Analysis*, North-Holland (1988).

Munkres, J. (1975): *Topology: A First Course*, Prentice-Hall.

Tutorial Activities

Project Activity (Group), Group discussion, Problem solving exercises

4.0.2 Contemporary Issues in Historical Perspective

Course title	Credits	Credit Distribution			Eligibility Criteria	Prerequisite
		Lecture	Tutorial	Practical		
Contemporary Issues in Historical Perspective	4	3	1	0		

Objectives

This course explores major contemporary economic issues—such as environmental change, discrimination, and group inequality—through a historical lens. It examines long-run trends in population, economic growth, and resource use, as well as the evolution of environmental regulation and international agreements. The course also analyzes models of discrimination and inequality, incorporating empirical evidence and historical context.

Learning Outcomes

1. Students will interpret long-run economic and environmental trends and evaluate the historical development of regulatory responses, including debates over policy instruments and international cooperation.
2. Students will analyze theoretical and empirical models of discrimination and group inequality, and assess the historical effectiveness and policy implications of interventions such as affirmative action.

Content

Unit 1 **Historical facts about our changing environment**
Trends in population, GDP, energy use and pollution. **(15 hours)**

Unit 2 **Environment**
Milestones in environmental regulation since the early twentieth century. The commons problem: Community institutions and collective action. Environmental regulation: The prices vs. quantities debate. International agreements and an analysis of their stability **(10 hours)**

Unit 3 **Discrimination**
Models of statistical and preference-based discrimination and mpirical tests of these models **(10 hours)**

Unit 4 **Group Inequality**
Measures of difference. Affirmative action in historical and cross-national perspective. **(10 hours)**

Readings

Adida,Claire; Laitin, David D. and Valfort, Marie-Anne (2010): "Identifying barriers to Muslim integration in France." PNAS 107(52), 22384-22390.

Dirks, Nicholas (2001): *Castes of Mind: Colonialism and the making of modern India*, Princeton University Press .

Barrett, Scott (2006): *Environment and statecraft: the strategy of environmental treaty-making.* Oxford University Press

Guha, Ramachandra (2001): *The unquiet woods: ecological change and peasant resistance in the Himalaya.*

Henderson, Vernon J. (1996) "Effects of air quality regulation." *The American Economic Review* pp. 789-813.

McNeil, J.R. (2000): *Something new under the sun: An environmental history of the twentieth- century world.* W.W. Norton.

Ostrom, Elinor (2010): *Governing the commons: The evolution of institutions for collective action.* Cambridge University Press.

Loury, Glenn C. (2002): *The anatomy of racial inequality.* Harvard University Press.

Galanter, Mark (2004): "Competing equalities: law and the backward classes in India," University of California Press

Weisskopf, Thomas E.(2004): *Affirmative action in the United States and India: a comparative perspective.* Routledge

Tutorial Activities

Book Review, Research cum presentation, Group discussion

4.0.3 Topics in Economic and Social History

Course title	Credits	Credit Distribution			Eligibility Criteria	Prerequisite
		Lecture	Tutorial	Practical		
Topics in Economic and Social History	4	3	1	0		

Objectives

This course examines major themes in 19th-century economic and social history, focusing on global migration, colonial labor systems, and gendered labor dynamics. Students will explore how different labor contracts and institutions shaped economic development and social hierarchies across regions during the period of imperial expansion and industrialization.

Learning Outcomes

At the end of this course students will be able to

1. Analyze historical patterns of global migration and labor organization in the 19th century, with emphasis on colonial plantations, indentured labor, and alternative labor contracts.
2. Evaluate the economic and social roles of women workers in 19th-century labor markets, using historical data and institutional analysis.

Content

Unit 1 **Global migration flows in the 19th century (15 hours)**

Unit 2 **Plantations in the colonies**
Indentured labour; role of plantations in the colonial economy **(15 hours)**

Unit 3 **Other types of labour contracts (8 hours)**

Unit 4 **Women workers in the 19th century (7 hours)**

Readings

Breman, J. (1990): *Taming the Coolie Beast: Plantation Society and the Colonial Order in Southeast Asia*, Oxford University Press.

Carter, M. (1994): Lakshmi's legacy: the testimonies of Indian women in 19th century Mauritius, *Editions de l'océan Indien*

Carter, M. (1996): *Voice from Indenture: Experiences of Indian Migrants in the British Empire*, Leicester University Press

Lal, B. (1983): Girmitiyas: the origins of the Fiji Indians, *Journal of Pacific History*

Mintz, S. (1985): *Sweetness and Power: The Place of Sugar in Modern History*, Penguin

Tinker, H. (2001): *A New System of Slavery: The export of Indian labour overseas 1830-1920*, Hansib Educational Books

Tutorial Activities

Literature Review, Book Review, Project Activity (Group), Research cum presentation, Paper writing, Group discussion

4.0.4 History of Economic Analysis

Course title	Credits	Credit Distribution			Eligibility Criteria	Prerequisite
		Lecture	Tutorial	Practical		
History of Economic Analysis	4	3	1	0		

Objectives

This course traces the development of the ideas that have led to the methods of economic analysis that are considered best practice in the discipline. It also exposes students to non-mainstream paradigms that have emerged in the discipline.

Learning Outcomes

1. Students will become familiar with the historical evolution of key economic theories and be able to critically evaluate them.
2. Students will be able to evaluate the role of economic thinking in guiding policy responses to major historical events and also understand how actual events bring about intellectual shifts in the discipline.

Content

Unit 1 **Classicals vs. Neoclassicals**
The emergence of nations and the distribution of income across the owners of labour, capital and land. Adam Smith's theory of division of labour and the 'Invisible hand', Malthusian theories of demographic change, Ricardo's theory of rent, Marx's theory of surplus value. The Marginalist theory of price determination. General equilibrium and welfare **(12 hours)**

Unit 2 **The evolution of macroeconomics**
Keynes and the role of government policies. Rational expectations and its implication for minimalist government. The revival of Keynes in recent times in New Keynesian and Post Keynesian models **(12 hours)**.

Unit 3 **The development of empirical methods**
Statistical thinking and causal inference in economics. Experimental methods and the spread of randomized control trials in the social sciences **(12 hours)**.

Unit 4 **Capitalism in a Globalized World**
The challenges of rising world inequality, climate and sustainability. The need for new theories of change in an inter-connected world **(9 hours)**.

Readings

J. Angrist and J. S. Pischke (2010): "The credibility revolution in empirical economics: How better research design is taking the con out of econometrics", *Journal of Economic Perspectives*, 24(2): 3-30.

Blaug, M. (1987): *Economic Theory in Retrospect.* Cambridge, Cambridge University Press (1987).

Bowles, S.: *Microeconomics: Behavior, Institutions, Evolution.* New Delhi, Oxford University Press (2004).

Galbraith, J.: *The Affluent Society.* Boston, Houghton Mifflin (1958).

R. L. Heilbroner: *The Worldly Philosophers.* New York, Simon & Schuster (1986).

J. R. Hicks (1946). *Value and Capital.*

J. M. Keynes (1936). *The general theory of employment, interest and money.*

Krugman, P.: *The return of depression economics and the crisis of 2008.* WW Norton & Company (2009).

Mankiw, N. (1990): "A Quick Refresher Course in Macroeconomics." *Journal of Economic Literature*, 28(4): 1645-1660.

O. Rogeberg and H. O. Melberg (2011). "Acceptance of unsupported claims about reality: a blind spot in economics." *Journal of Economic Methodology*, 18(01): 29-52.

N. Scheiber (2007). "Freaks and geeks: How freakonomics is ruining the dismal science." *The New Republic*, 2: 27-31.

T. Scitovsky (1986). *Human Desire and Economic Satisfaction.* New York, Wheatsheaf.

Shleifer, A. (2000). *Inefficient markets: an introduction to behavioral finance.* Oxford University Press.

A. Smith. (1776). *An Inquiry Into the Nature and Causes of the Wealth of Nations.*

J. E. Stiglitz. *Whither Socialism?* Cambridge, Massachusetts, MIT Press.

Tutorial Activities

Group discussions and presentations.

4.0.5 Financial Markets

Course title	Credits	Credit Distribution			Eligibility Criteria	Prerequisite
		Lecture	Tutorial	Practical		
Financial Markets	4	3	1	0		

Objectives

This course aims to familiarize the students with the concepts and theories related to financial markets. The course focuses on the money market, credit market, stock market, financial derivatives and foreign exchange market. The course also includes a discussion on the interlinkages between the various financial markets.

Learning Outcomes

At the end of this course students will be able to

1. Apply asset pricing models to analyze risk, returns, and market behavior across various financial markets
2. Understand financial derivatives pricing and the implications of exchange rate dynamics and global financial crises on foreign exchange markets.

Content

Unit 1 **Asset pricing overview**
Stochastic discount factors, risk and uncertainty, Arrow-Debreu state prices. **(10 hours)**

Unit 2 **Credit markets**
Imperfect information in the credit market; market failures. Stock markets: Portfolio selection, capital asset pricing model, arbitrage pricing; consumption capital asset pricing, equity premium puzzle. Recursive preferences and habit formation. Fixed income and yields, expectation hypothesis of term structure, bond pricing and consumption growth. **(15 hours)**

Unit 3 **Financial derivatives**
Options and futures and models of their pricing such as the Black-Scholes and Binomial Pricing models. **(15 hours)**

Unit 4 **Foreign exchange markets**
Exchange rate-portfolio balance model, Dornbusch model of overshooting exchange rates; Asian financial crisis; global financial crisis.**(5 hours)**

Readings

Bernanke, B. and Blinder, A. (1998): "Credit Money and Aggregate Demand", *American Economic Review.*

Blanchard, O. and Fischer, S.: *Lectures on Macroeconomics*, MIT Press (1989).

Campbell, J. (2017): *Financial decisions and markets: a course in asset pricing*, Princeton University Press.

Cochrane, J. and Piazzesi (2005): "Bond Risk Premia", *American Economic Review*, 95(1), 138-160.

Dornbusch, R. (1976): "Expectations and Exchange Rate Dynamics", *Journal of Political Economy.*

Gandolfo, G.: *International Finance and Open Economy Macroeconomics*, Springer (2016).

Jaffee, D. and Stiglitz, J. (1990): "Credit Rationing" in *Handbook of Monetary Economics*, vol. 2, Friedman, B. and Hahn, F. (ed.) North Holland.

Pilbeam, K. (2013): *International Finance*, 4th Edition, Macmillan.

Romer, D.(2018): *Advanced Macroeconomics*, 5th Edition McGraw-Hill.

Stiglitz, J. and Guzman, M. (ed.) (2016): *Contemporary Issues in Macroeconomics: Lessons from the Crisis and Beyond*, Palgrave Macmillan.

Tutorial Activities

Book Review, Project Activity (Group), Research cum presentation

4.0.6 Law and Economics

Course title	Credits	Credit Distribution			Eligibility Criteria	Prerequisite
		Lecture	Tutorial	Practical		
Law and Economics	4	3	1	0		

Objectives

This course examines how the legal and regulatory rules shape rules of the game in a market economy which, in turn, shape the incentive structure for private individuals, firms and other economic agents, and affect the allocation of resources, efficiency and equity.

Learning Outcomes

At the end of this course, students will be able to

1. Develop critical thinking and an inter-disciplinary approach towards law and economics
2. Critically evaluate the role of law and regulatory rules in actions of the private citizens as well as various official and regulatory agencies and their influence on the functioning of the market and the government

Content

Unit 1 **Introduction**
Efficiency criteria in Law and Economics. Contract Law: Need for a contract; Legal contract; Role of Contracts for functioning of markets; Efficient contracts; Complete and Incomplete Contracts; Reliance; Damage measures and their efficiency properties; Contracts as instruments of risk-allocation and information revelation; Regulatory Contracts; Contracts and Courts. **(12 hours)**

Unit 2 **Property Law and Eminent Domain**
Property Rights and their role in resource allocation; Transaction costs and Coase theorem; Legal remedies for breach of property rights; Intellectual Property Rights; Eminent Domain and Compulsory acquisition of land and other private property. **(12 hours)**

Unit 3 **Civil Liability and Criminal Law**
Tort law; liability rules versus property rights; accident law; product liability; efficiency properties of liability rules; efficiency-compensation trade-off; Rational crimes; Crime and Punishment; Severity versus Certainty of punishment **(11 hours)**

Unit 4 **Litigation and Arbitration**
Litigation and Arbitration; Litigation under asymmetric information; Litigation over compensation under eminent domain; Topics in Law and Economics in India: Debt Contracts; Insurance Contracts; Insolvency and Bankruptcy Code. **(10 hours)**

Readings

Jain, S K and Ram Singh (2002), 'Efficient liability rules: Complete characterization', *Journal of Economics*, 2002, Vol. 75, pp. 105-124.

Miceli, Thomas J.: *The Economic of the Law*, Oxford University Press (1997)

Polinsky, A. Mitchell and Steven Shavell (Editors) (2007), *Handbook of Law and Economics*, Volumes 1 and 2, North Holland, Amsterdam.

Schäfer, H-B and Singh Ram. (2018) 'Takings of Land by Self-interested Governments: Economic Analysis of Eminent Domain', Journal of *Law and Economics*, pp 427-459.

In addition to the above readings, the course will use several research papers.

Tutorial Activities

Literature Review, Project Activity (Group), Paper writing, Group discussion, Problem solving exercises

4.0.7 Welfare Economics

Course title	Credits	Credit Distribution			Eligibility Criteria	Prerequisite
		Lecture	Tutorial	Practical		
Welfare Economics	4	3	1	0		

Objectives

Welfare economics provides the normative and analytical foundation of economic comparisons. It asks a set of interrelated questions: How do we formulate and measure social objectives? How do we aggregate individual preferences for collective decision? How do we compare policies? This paper brings together, concepts of moral philosophy and analytical tools of economics.

Learning Outcomes

1. Students will learn to use normative comparisons in different economic contexts.
2. They will also be able to develop new measures of policy impact.

Content

Unit 1 **Consequentialist approaches to comparison**
Welfarism, utilitarianism, ordinal preference aggregations **(12 hours)**.

Unit 2 **Other approaches to comparison**
Justice, capability, opportunity **(12 hours)**.

Unit 3 **Fairness**
Inequality, vulnerability, mobility, sustainability **(12 hours)**.

Unit 4 **Allocation**
Cost and surplus division, axiomatic bargaining **(9 hours)**.

Readings

Feldman, A. and R. Serrano (2005), Welfare Economics and Social Choice Theory.

Moulin, H. (2004), Fair Division and Collective Welfare, MIT Press.

Sen, A. (1999), Choice, Welfare and Measurement, Harvard University Press.

Tutorial Activities

Problem-solving sessions for the revision of preliminary mathematical tools, paper presentations, group projects

4.0.8 Environment and Development

Course title	Credits	Credit Distribution			Eligibility Criteria	Prerequisite
		Lecture	Tutorial	Practical		
Environment and Development	4	3	1	0		

Objectives

This course examines the complex relationship between environment and development. It explores the dynamics of poverty, population, and sustainability. It also examines the environmental impacts of growth and the difficulty of achieving cooperation to mitigate global environmental problems.

Learning Outcomes

1. Students will be able to see interconnections between economic development, environmental quality, and poverty.
2. Students will be able to evaluate institutional and policy responses to environmental challenges such as deforestation, water management and climate change.

Content

Unit 1 **Overview**
Basic theoretical concepts. Derivation of market from individual demand curves for public and private goods, and of supply curves. The Pareto criterion. The pros and cons of the Modified Pareto Criterion **(9 hours)**

Unit 2 **Economic growth and environment**
Correlation between economic growth and environmental degradation. Valuation of Environmental Benefits and Damages. Incorporating environmental goods into growth models. **(12 hours)**

Unit 3 **Institutions and Instruments for Regulations**
Formal and informal institutions for the management of common pool natural resources; applications in the context of deforestation and water. The relative advances of price vs. quantity instruments in the face of uncertainty. **(12 hours)**

Unit 4 **Global public goods**
Different types of global public goods. The evidence on climate changes. International treaties. Environmental justice. **(12 hours)**

Tutorial activities: Problem solving exercises and group discussions and presentations on environmental issues.

Readings

Stevenson, G.G. (1991): *Common Property Economics: General Theory and Land Use Applications*, Cambridge University Press.

Baland, J-M. and Platteau, J-P. (1996): *Halting Degradation of Natural Resources: Is there a Role for Rural Communities?* Clarendon Press, Oxford.

Greenstone, M., and Jack, B. (2015): "Envirodevonomics: A research agenda for an emerging field", *Journal of Economic Literature*, 53(1), 5-42.

Ostrom, E. (2000): "Collective Action and the Evolution of Social Norms", *Journal of Economic Perspectives*, 14(3): 137-158.

Perman, R., Ma, Y., McGilvray, J. and Common, M. (2013): *Natural Resource and Environmental Economics*, Pearson, 4th edition.

Articles from journals and working papers.

4.0.9 Agricultural Economics

Course title	Credits	Credit Distribution			Eligibility Criteria	Prerequisite
		Lecture	Tutorial	Practical		
Agricultural Economics	4	3	1	0		

Objectives

The aim of this course is to provide students with an in-depth understanding of the issues relating to Indian agriculture. The focus is on analyzing structural patterns in Indian agriculture and examining how policy changes influence farm choices, incomes and welfare. The course will incorporate current themes and policy debates.

Learning Outcomes

1. Students will be able to assess the impact of climate change on agricultural productivity and evaluate strategies for improving input-use efficiency and risk mitigation.
2. They will understand agricultural insurance mechanisms, market infrastructure, and price policies, and their impact on agricultural markets and nutritional outcomes.

Content

Unit 1 **Productivity**
Agricultural productivity trends and climate change. Input-use efficiency and climate-related risk-mitigation strategies. **(10 hours)**

Unit 2 **Agricultural insurance, risk and diversification**
The nature of agricultural risks and the role of insurance mechanisms and diversification strategies. Risk management tools and their impact on the stability of farm incomes. **(15 hours)**

Unit 3 **Market infrastructure and pricing**
The structure and efficiency of agricultural markets. The role of rural credit, public investment, and institutional support in agricultural development. **(10 hours)**

Unit 4 **Agriculture and nutrition**
Linkages between agricultural production, food systems, and nutritional outcomes. Policy interventions for promoting nutrition-sensitive agriculture and food security.**(10 hours)**

Readings

Given the nature of the course, readings may be updated annually.

Binswanger, H. (2012): "Is There Too Much Hype about Index-based Agricultural Insurance?" *Journal of Development Studies.*

Chand, R.; Saxena, Raka and Rana, S. (2015): "Estimates and Analysis of Farm Income in India", *Economic and Political Weekly*, May 30.

Chatterjee, S. and Kapur, D. (2016): "Understanding Price Variation in Agricultural Commodities in India: MSP, Government Procurement, and Agriculture Markets", *India Policy Forum.*

Emerick, K.; de Janvry, A.; Sadoulet, E. and Dar, M. (2016): "Technological Innovations, Downside Risk and the Modernization of Agriculture", *American Economic Review.*

Fishman, R. (2018): " Groundwater Depletion Limits the Scope for Adoption to Increased Rainfall Variability in India", Climatic Change.

Fishman, R.; Kishore, A.; Rothler, Y.; Ward, P.; Jha, S. and Singh, R.K.P. (2016): "Can Information Help Reduce Imbalanced Application of Fertilizer in India? Experimental Evidence from Bihar".

Gill, S.S. and Nehra, K.(2018): "Subsidy and Efficiency of Groundwater Use and Power Consumption in Haryana". *Economic and Political Weekly*, December 2018.

Ministry of Agriculture (2018): Report of the Committee for Doubling Farmer Incomes, selected section.

Negi, D.S. and Ramaswami, B. (2019): Basis Risk in Index Insurance: Lower Tail Dependence and the Demand for Weather Insurance.

Ramaswami, B.C. and Lalitha, N. (2012): "The Spread of Illegal Transgenic Cotton Varieties in India: Biosafety Regulation, Monopoly and Enforcement", *World Development*.

Roy, D.; Joshi, P.K. and Chandra, R. (2017): Pulses for Nutrition in India: Changing Patterns from Farm to Fork.

Sekhri, S. (2013): Sustaining Groundwater: Role of Policy Reforms in Promoting Conservation in India.? In Shekhar Shah, Barry Bosworth and Arvind Panagariya, editors, India Policy Forum, volume 9.

Vargas, R.; Hill, M. Robles and Ceballos, F. (2016): "Demand for a Simple Weather Insurance Product in India: Theory and Evidence", *American Journal of Agricultural Economics*.

Tutorial Activities

Paper writing and presentation, group discussions on policy relevant themes.

4.0.10 Ethics and Economics

Course title	Credits	Credit Distribution			Eligibility Criteria	Prerequisite
		Lecture	Tutorial	Practical		
Ethics and Economics	4	3	1	0		

Objectives

This course is designed to highlight the relevance of moral concerns to the practice of both positive and normative economics. It will also sensitize students to the influence of economic theory and its tools on moral philosophy.

Learning Outcomes

1. Students will take away an understanding of, and the ability to, think about fundamental categories such as rights, justice, equality, and their relationship to Economics.
2. Students will develop skills in making philosophical arguments while assessing real-world economic problems and policies.

Content

Unit 1 **Morality and economic rationality**
The economic importance of morality; morality and economic outcomes; ethics and the market; preferences vs rights; norms and economic behaviour; adaptive preferences. **(9 hours)**

Unit 2 **Morality and welfare**
The Pareto principle and its critics; outcomes vs procedures. **(12 hours)**

Unit 3 **The doctrines of equality**
Types of equality; critics of equality.**(12 hours)**

Unit 4 **Theories of justice; liberty and rights**
(12 hours)

Readings

Isaiah Berlin, Four Essays on Liberty, Oxford University Press 1969.

R. Dworkin, Taking rights seriously, Harvard University Press, 1977.

Jon Elster, Sour Grapes: Studies in the Subversion of Rationality, Cambridge University Press, 1983.

R. Nozick, Anarchy, State, and Utopia, Basic Books, 1974.

John Rawls, A Theory of Justice, Harvard University Press, 1972.

A. K. Sen, Ethics and Economics, 5/e, Oxford University Press, 2001

A. K. Sen, Inequality Reexamined, Harvard University Press, 1992.

A. K. Sen, and B. Williams, eds, Utilitarianism and Beyond, Cambridge University Press, 1982.

B S Frey and A Stutzer, What Can Economists Learn from Happiness Research? Journal of Economic Literature, Vol. XL, June 2002, 402-435.

R A Easterlin, Income and Happiness: Towards A Unified Theory, Economic Journal, 2001, 465-84.

Amartya Sen, "The idea of Justice (Cambridge MA: Belknap Press of Harvard University Press, 2009).

John Rawls, Political Liberalism, 2nd Revised Edition (New York: Columbia University Press, 1996).

John Broome, Ethics Out of Economics, Cambridge University Press 1999.

Amartya Sen, Development as Freedom, Oxford University Press 2000.

Tutorial Activities

Group Discussions, Group Projects, Problem Solving, Paper Writing, Literature Review

4.0.11 Economics of Discrimination

Course title	Credits	Credit Distribution			Eligibility Criteria	Prerequisite
		Lecture	Tutorial	Practical		
Economics of Discrimination	4	3	1	0		

Objectives

This course familiarises students with theories and empirical tools to understand and measure economic discrimination based on social group identities, such as caste, race, gender, tribal status, ethnicity and so on. The course will also deal with policy options targeting group-based disparities and discrimination, with a focus on affirmative action policies. This component will outline the various types of affirmative action, including quotas or reservation, and discuss debates around affirmative action, focusing on evidence-based research gauging its impact.

Learning Outcomes

1. Students will develop an understanding of discrimination from economic and other perspectives, get a good handle on theoretical and empirical tools to study related research questions.
2. Students will be able to critically examine the effectiveness of policies designed to reduce discrimination, including affirmative action in the workplace and education.

Content

Unit 1 **Introduction**
How economists think about discrimination; overlap with related sub-disciplines; types and causes of discrimination. **(12 hours)**

Unit 2 **Theories**
Taste for discrimination; statistical discrimination; signaling models **(12 hours)**

Unit 3 **Measurement methods**
Probability measures; regression; reverse regression; decomposition; experimental methods; quasi-experiments; audit studies and correspondence studies. **(12 hours)**

Unit 4 **Affirmative action**
Types of affirmative action policies and a comparison of India's affirmative action policy with those of the other countries; evaluation of affirmative action policies. **(9 hours)**

Readings

Angrist, J., Autor, D. and Pallais, A.: Marginal effects of merit aid for low-income students, The Quarterly Journal of Economics 137.2 (2022).

Anwar, S., Bayer, P., & Hjalmarsson, R.: The impact of jury race in criminal trials. The Quarterly Journal of Economics (2012).

Becker, G.: Economics of Discrimination, University of Chicago Press (1957)

Bertrand, M. and Mullainathan, S.: Are Emily and Greg more employable than Lakisha and Jamal. A field experiment on labour market discrimination, American Economic Review (2004).

Friebel G, Lalanne M, Richter B, Schwardmann P, Seabright P.: Gender differences in social interactions. Journal of Economic Behavior & Organization (2021).

Goldberg, M. S.: Discrimination, nepotism, and long-run wage differentials, The quarterly journal of economics, (1982).

Loury, G.: Anatomy of Racial Inequality, Harvard University Press (2002)

Neal, D. A., & Johnson, W. R.: The role of premarket factors in black-white wage differences, Journal of political Economy (1996)

Oaxaca, Ronald: Male-Female Wage Differentials in Urban Labor Markets, International Economic Review (1973).

Tutorial Activities

Literature Review, Book Review, Movie Review, Project Activity (Group), Research cum presentation, Paper writing

4.0.12 Behavioural Economics

Course title	Credits	Credit Distribution			Eligibility Criteria	Prerequisite
		Lecture	Tutorial	Practical		
Behavioural Economics	4	3	1	0		

Objectives

This course will introduce the field of Behavioural Economics. It extends and refines standard economic analysis by incorporating evidence from empirical work and including insights from other areas of social sciences like Psychology, Sociology, etc. It is a fertile area with a goal to make the field of Economics better predict behaviour, and provide policy prescriptions.

Learning Outcomes

1. Students will learn the leading examples of departures in behaviour from that predicted by earlier economic theory, as well as the main models formulated to explain these departures.

2. Students will be able to use behavioural models for designing innovative policies.

Content

Unit 1 **Individual choice behaviour**
Errors in probabilistic reasoning; decision-making under risk and uncertainty; reference dependence and loss aversion; intertemporal decision-making. **(20 hours)**

Unit 2 **Cognitive constraints**
Limited attention, salience, and focusing **(10 hours)**

Unit 3 **Social aspects**
Social preferences; identity and norms; behavioural game theory. **(10 hours)**

Unit 4 **Impact**
Behavioural macroeconomics; behavioural development economics. **(5 hours)**

Readings

Akerlof, G. A., and Kranton, R. E. (2000). Economics and identity. The quarterly journal of economics, 115(3), 715-753.

Baron, J. (2023). Thinking and deciding. Cambridge University Press.

Bernheim, B. D., DellaVigna, S., and Laibson, D. (2019). Handbook of behavioral economics-foundations and applications 1. Elsevier.

Bernheim, B. D., DellaVigna, S., and Laibson, D. (2019). Handbook of behavioral economics-foundations and applications 2. Elsevier.

Charness, G., and Rabin, M. (2002). Understanding social preferences with simple tests. The quarterly journal of economics, 117(3), 817-869.

Dhami, S. (2016). The foundations of behavioral economic analysis. Oxford University Press.

Fehr, E., and Schmidt, K. M. (1999). A theory of fairness, competition, and cooperation. The quarterly journal of economics, 114(3), 817-868.

Frederick, S., Loewenstein, G., and O'donoghue, T. (2002). Time discounting and time preference: A critical review. Journal of economic literature, 40(2), 351-401.

Gabaix, X. (2014). A sparsity-based model of bounded rationality. The Quarterly Journal of Economics, 129(4), 1661-1710.

Gabaix, X. (2020). A behavioral New Keynesian model. American Economic Review, 110(8), 2271-2327.

Kagel, J. H., and Roth, A. E. (Eds.). (2020). The handbook of experimental economics, volume 2. Princeton university press.

Kahneman, D., and Tversky, A. (1979). Prospect Theory: An Analysis of Decision under Risk. Econometrica: Journal of the Econometric Society, 263-291.

Kolm, S. C., and Ythier, J. M. (Eds.). (2006). Handbook of the economics of giving, altruism and reciprocity: Foundations. Elsevier.

Kolm, S. C., and Ythier, J. M. (Eds.). (2006). Handbook of the economics of giving, altruism and reciprocity: Applications. Elsevier.

Koszegi, B., and Rabin, M. (2006). A model of reference-dependent preferences. The Quarterly Journal of Economics, 121(4), 1133-1165.

Koszegi, B., and Rabin, M. (2007). Reference-dependent risk attitudes. American Economic Review, 97(4), 1047-1073.

Koszegi, B., and Rabin, M. (2009). Reference-dependent consumption plans. American Economic Review, 99(3), 909-936.

Koszegi, B. (2014). Behavioral contract theory. Journal of Economic Literature, 52(4), 1075-1118.

Kreps, D. M. (2013). Microeconomic foundations (Vol. 1). Princeton university press.

Loewenstein, G., O'Donoghue, T., and Rabin, M. (2003). Projection bias in predicting future utility. the Quarterly Journal of economics, 1209-1248.

O'donoghue, T., and Rabin, M. (1999). Doing it now or later. American economic review, 89(1), 103-124.

Rabin, M. (2000). Risk Aversion and Expected-utility Theory: A Calibration Theorem. Econometrica, 68(5), 1281-1292.

Rabin, M., and Weizsäcker, G. (2009). Narrow bracketing and dominated choices. American Economic Review, 99(4), 1508-1543.

Strzalecki, T. (2025). Stochastic Choice Theory. Cambridge Books.

Yildiz, M. (2015). MIT OCW 14.123 (https://ocw.mit.edu/courses/14-123-microeconomic-theory-iii-spring-2015/)

Tutorial Activities

Literature Review, Project Activity (Group), Research cum presentation, Paper writing, Problem solving exercises

4.1 Generic Electives

The department will offer one of the elective courses in each semester as a generic elective course:

5

Skill Based Courses

5.1 Data Visualization

Course title	Credits	Credit Distribution			Eligibility Criteria	Prerequisite
		Lecture	Tutorial	Practical		
Data Visualization	2	1	0	1		

Objectives

To enable students graph, plot, and map data in a way to better present their work and persuade the reader. Such a skill is highly valuable for both empirical research in academia as well as in public and private sector jobs for economists.

Learning Outcomes

At the end of this course students will be able to

1. Graph, plot, and do exploratory data analysis with data in a way to better present their work and persuade the reader.
2. Use freely available software for data visualization.

Content

1. **Data types**
   An Introduction to data types. Specific data types: spatial data, network data and textual data. Introduction to software **(8 hours)**
2. **General topics**
   Graphs and plots, data wrangling, the art of persuading with data **(7 hours)**

Readings

Healy, K. (2018). Data visualization: a practical introduction. Princeton University Press.

Kabacoff, R. (2024). Modern Data Visualization with R. United States: CRC Press. URL:https://rkabacoff.github.io/datavis/

Kazakoff, M. (2022). Persuading with Data: A Guide to Designing, Delivering, and Defending Your Data. MIT Press.

Kosuke, I. (2018). Quantitative Social Science: An Introduction. Princeton University Press.

Foster, I., and Ghani, R., and Jarmin, R.S., and Kreuter, F., and Lane, J. (2020). Big Data and Social Science: Data Science Methods and Tools for Research and Practice. United States: CRC Press.

Robinson, A.H., and Morrison, J.L., and Muehrcke, P.C., and Kimerling, A.J., and Guptill, S.C. (2009). Elements of cartography, 6TH ED. India: Wiley India Pvt. Limited.

Bolstad, P., Manson, S. (2022). GIS Fundamentals: A First Text on Geographic Information Systems. United States: Eider Press.

Practical Activities

Using programming and software for visualizing data through different types of plots, charts and maps **(30 hours)**

5.2 Basics of Programming

Course title	Credits	Credit Distribution			Eligibility Criteria	Prerequisite
		Lecture	Tutorial	Practical		
Basics of Programming	2	1	0	1		

Objectives

This course is designed for students with little to no prior programming experience, particularly in Python. Upon completion of the course, participants will gain the foundational skills necessary to perform essential Python operations relevant to undergraduate and graduate students in the field of economics. Other programming languages, e.g. R and Julia have similar functionality, so one can learn these in either of them as well.

Learning Outcomes

At the end of this course students will be able to

1. Develop and implement Python programs to perform data analysis and visualization.

2. Apply fundamental statistical methods to interpret data and build basic predictive models using Python.

Content

1. **Introduction to Python**
   Functions. Data Types. Input/Output. Iterations/Looping. Scientific Libraries. Data Visualization **(7 hours)**

2. **Statistics**
   Diving into univariate and multivariate statistical methods. Simple Linear Regression. Estimation, hypothesis testing, and model selection **(8 hours)**

Readings

Matthes, Eric. Python crash course: A hands-on, project-based introduction to programming. no starch press, 2023.

Ramalho, Luciano. "Fluent Python: Clear, concise, and effective programming." O'Reilly Media, Inc.", 2015.

T. Sargent, J. Stachurski: QuantEcon.lectures-python3, https://quantecon.org (2018)

J. Unpingco: Python for Probability, Statistics and Machine Learning, Springer (2016)

Lutz, Mark. Learning python: Powerful object-oriented programming. "O'Reilly Media, Inc.", 2013.

Practical Activities

Using programming language(s) to clean data and implement statistical and econometric estimation via controls and scientific libraries **(30 hours)**