# List of Semester Wise Courses for Dual Degree Programme in Economics

| | | | Credits |
|---|---|---|---|
| Semester III | 1 | Intermediate Microeconomics (Optional)* | 4 |
| Semester IV | 1 | Intermediate Macroeconomics (Optional)* | 4 |

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| Semester VII | 1 | Microeconomics I# | 4 |
| | 2 | Macroeconomics I# | 4 |
| | 3 | Introduction to Statistics and Econometrics# | 4 |
| | 4 | Mathematical Methods of Economics# | 4 |

**Master Core (Economics)**

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|---|---|---|---|
| Semester VIII | 5 | Microeconomics II# | 4 |
| | 6 | Macroeconomics II# | |
| | 1 | Optional Courses Economics I | 4 |
| | 2 | Optional Courses Economics II | 4 |

**Master Specialisation**

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|---|---|---|---|
| Semester IX | 3 | Optional Courses Economics III | 4 |
| | 4 | Optional Courses Economics IV | 4 |
| | | Dissertation | 9 |

**Master Specialisation**

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|---|---|---|---|
| Semester X | | **Dissertation OR 4 Optional Courses in Economics** | 16 |
| | 5 | Optional Courses Economics V | 4 |
| | 6 | Optional Courses Economics VI | 4 |
| | 7 | Optional Courses Economics VII | 4 |
| | 8 | Optional Courses Economics VIII | 4 |

**\*** Two newly designed Intermediate Courses of Economics (Bridge Courses) are required to be passed through BOS.

**#** These are the core courses that are required to pursue MS in Economics. These courses are identical to course number IE401, EC402, IE402, EC401, IE408, EC404, IE404, EC407, IE405, and IE406 approved by Academic Council for M.A. degree in Economics at SSS and SIS.

[#]As per the rules, approval from course in-charge and centre chair-person is needed for students to credit a course.

## A.  List of Optional Courses in CESP and CITD[%]

1.  Advanced General Equilibrium
2.  Production Conditions in Indian Agriculture
3.  Structure and Growth of Indian Industries
4.  Foreign Trade, Aid and Investment Policies
5.  Econometric Methods I
6.  Econometric Methods II
7.  Banking and Monetary Institutions
8.  Public Finance
9.  Labor Economics
10. Optimization Theory and Economic Analysis I
11. Social Choice I
12. International Monetary Systems
13. Theory of Industrial Organization
14. Game Theory with Application to Economics
15. Economics of Health
16. Database on Indian Economy
17. Issues in the contemporary International Economy
18. Experimental Methods in Economics
19. Auction Theory and its Application
20. Environmental Economics
21. Classical Theories of Value and Distribution
22. General Equilibrium Analysis
23. Evolution of the Indian Economy
24. Analysis of Indian Planning (with special reference to Sectoral Problems)
25. Analysis of Indian Planning (with special reference to Resource Mobilization)
26. Problems and Techniques of Planning
27. Topics in Mathematical Economics **

28. Environmental Economics
29. Natural Resource Economics**
30. Investment Finance and Economic Policy**
31. Advanced Econometrics
32. Applied Econometrics**
33. Economics of Technology and Development
34. Transnational Corporations, Technology Transfer and R&D**
35. Recent Developments in Trade Theory**
36. Introduction to the World Economy**
37. Public Economics
38. Economic Regulation
39. Law and Economics
40. Information Economics and its Application
41. International Trade, Environment and Multilateral Institutions
42. Topics in Development Microeconomics
43. Topics in Financial Econometrics
44. Economic Development II
45. Economic of Labour Markets & Education


<sup>%</sup> The optional courses are identical to course number EP506, EP509, EP514, EP516, EP519, EP520, EP521, EP524, EP526, EP527, EP529, EP531, EP532, EP534, EP537, EP540, EP541, EP542, EP543, EP544, EP406, EP407, EP501, EP502, EP503, EP504, IE 410, IE510, IE 515, IE511, IE504, IE514, IE521, IE516, IE502, IE513, IE522, IE524, IE520, IE525, IE526, IE528, IE527, IE509, IE530. These course numbers are approved by Academic Council for M.A. degree in Economics at SSS and SIS. As per the rules, approval from course in-charge and centre chair-person is needed for students to credit a course.

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**Course Title: Intermediate Microeconomics***

**No. of Credit – 4**

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**Course Description**

The emphasis of this course is to thoroughly orient the students towards a systematic learning of fundamentals of Microeconomic theory, by developing conceptual clarity coupled with the use of mathematical tools. The course is supposed to act as building blocks and is critically important for understanding many sub disciplines of economics, like development economics, labour economics, industrial organization, network economics, financial economics, international trade, public economics, health economics, environmental economics etc. The course is designed to formally analyze the individual consumer choice under certainty and uncertainty and the behaviour of the producers and also covers the behaviour of a competitive firm. It extends to cover general equilibrium and welfare, markets imperfections and interdependence, basic premises of market failures, public goods externalities and topics under information economics.

**Course Outline**

I.   **Consumer Theory**

Preference; utility; budget constraint; choice; Ordinal utility function, Utility Maximization problem and Expenditure Minimization Problem, Different utility functions and their properties; Demand; Marshallian and compensated demand functions; Slutsky equation; Price consumption curve, income consumption curve and Engel Curve. Homogeneous and Homothetic tastes. Properties of demand function; Gross and net substitutes and complements, Compensating and equivalent variation; buying and selling; choice under uncertainty and intertemporal choice; Revealed preference.

II.  **Production, Costs and Perfect Competition**

Technology; isoquants; production with one and more variable inputs; Cost Minimization and Profit Maximization; External economies and diseconomies of scale and the industry supply curve; Short run and long run costs; Short run and long run equilibria; review of perfect competition.

III. **Games and Information**

Game theory - Non-cooperative Games - Static and Dynamic games under Complete Information

Asymmetric information and Market Failure, Adverse selection and moral hazard: Lemon's problem; Credit Market, Insurance Market.

**IV.    Market Structure**

Monopoly; pricing with market power; price discrimination; Natural Monopoly, peak-load pricing; two-part tariff; monopolistic competition; Oligopoly and strategic behaviour of firms - Cournot and Bertrand models as pure strategy Nash equilibria; Stackelberg duopoly and price leadership models as backward induction solution; repeated games and collusive oligopoly.

**V.    General Equilibrium, Efficiency**

Equilibrium and efficiency under pure exchange and production; overall efficiency.

**Readings:**

  **I.** Hal R. Varian, *Intermediate Microeconomics, A Modern Approach*, W.W. Norton and Company/Affiliated East-West Press (India), 8th edition, 2010. The workbook by Varian and Bergstrom may be used for problems.
  **II.** C. Snyder and W. Nicholson, *Fundamentals of Microeconomics,* Cengage Learning (India), 2010.
  **III.** B. Douglas Bernheim and Michael D. Whinston, *Microeconomics,* Tata McGraw- Hill (India), 2009.
  **IV.** The Core team, The Economy: Economics for a Changing World. Oxford.2017
  **V.** Gravelle and Rees, Microeconomics. Prentice Hall (UK); 3rd edition (2004)

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**Course Title: Intermediate Macroeconomics\***

**No. of Credit – 4**

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**Course Description**

This course introduces the students to formal modelling of a macro-economy in terms of analytical tools. It discusses various alternative theories of output and employment determination in a closed economy in the short run as well as medium run, and the role of the public policy in this context. Moreover, it is extended to introduce the students to various theoretical issues related to an open

economy. It also provides the micro-foundations to the various aggregative concepts. Further, the students are introduced to the long run dynamic issues like growth and technical progress.

**Course Outline**

I. **The Closed Economy in the Short Run**
National Income - definitions and accounting relations - three ways of measuring national income-savings-investment in closed and open economy,
Classical and Keynesian systems; Simple Keynesian model of income determination; ISLM Model; Fiscal and Monetary Multipliers, Comparative Statics.

II. **Aggregate Demand and Aggregate Supply Curves**
Derivation of aggregate demand and aggregate and supply curves; Interaction of aggregate demand and supply, Explanation of aggregate supply curve with and without price or wage rigidity - Imperfect information model - Worker misperception model; Solution of Complete Keynesian model; Comparative Statics.

III. **Inflation, Unemployment and Expectations**
Phillips curve; adaptive and rational expectations; policy ineffectiveness debate.

IV. **Open Economy Models**
Classical approach to open economy - role of the real exchange rate; Exchange rate determination; Short-run Keynesian approach - Mundell-Fleming model; purchasing power parity; asset market approach; Dornbusch's overshooting model; monetary approach to balance of payments; Effect of devaluation, tariff and export subsidy on output and trade balance; Macro policy in an open economy.

V. **Macroeconomic Policy making in India**
Fiscal Monetary and Exchange Rate Policy

VI. **Microeconomic Foundations**
a. Consumption: Keynesian consumption function; Fisher's theory of optimal intertemporal choice; life-cycle and permanent income hypotheses; rational expectations and random-walk of consumption expenditure.
b. Investment: determinants of business fixed investment; residential investment and inventory investment.
c. Demand for money.

VII. **Economic Growth**
Harrod-Domar model- and knife-edge instability; Neoclassical theory of growth - Solow model; golden rule; technological progress and elements of endogenous growth.

**Readings:**

1. Dornbusch, Fischer and Startz, *Macroeconomics*, McGraw Hill, 11th edition, 2010.
2. N. Gregory Mankiw. *Macroeconomics,* Worth Publishers, 7th edition, 2010.
3. Olivier Blanchard, *Macroeconomics*, Pearson Education, Inc., 5th edition, 2009.
4. Steven M. Sheffrin, *Rational Expectations*, Cambridge University Press, 2nd edition, 1996.
5. Andrew B. Abel and Ben S. Bernanke, *Macroeconomics*, Pearson Education, Inc., 7th edition, 2011.
6. The Core team, The Economy: Economics for a Changing World. Oxford.2017
7. Frederic S Mishkin, *Macroeconomics Policy and Theory*. Second Edition. Pearson Global Edition.2017
8. Charles I. Jones, *Introduction to Economic Growth*, W.W. Norton & Company, 2nd edition, 2002.
9. Paul R. Krugman, Maurice Obstfeld and Marc Melitz, *International Economics*, Pearson Education Asia, 9th edition, 2012
10. Saumen Sikdar, Principles of Macroeconomics, Oxford University Press, 2nd edition, 2011.
11. Errol D'Souza, *Macroeconomics*, Pearson Education, 2009.

**Course Name: Microeconomics I[#]**

**Number of credits: 4**

I. Theory of the consumer Preference ordering, utility functions and their properties, consumer behaviour, Walras law and its implications, comparative statics, Slutsky and Hicks decomposition, duality theory, the envelope theorem and its applications, expenditure and indirect utility functions, demand functions and their properties, revealed preference, integrability, welfare evaluation of economic changes employing money-metric utility functions, separable preferences, the aggregate demand function and its properties.

II. Theory of the firm Production technologies and their properties, functional representations of production technologies, cost functions, profit maximization in a competitive firm, supply function, aggregate supply function, production efficiency.

III. General equilibrium and welfare economics Introduction to general equilibrium, pure exchange economy, the general equilibrium implications of Walras law, contract curves, economies with exchange and production, pareto optimality, the first and second welfare theorems, social choice, introduction to second-best economies, existence of a general equilibrium, uniqueness and stability of a general equilibrium, comparative statics in a general equilibrium.

IV. Market equilibrium and market failure Competitive markets, partial equilibrium analysis, externalities, public goods

**Main references**

1. Mas Colell, Whinston and Green, Microeconomic Theory
2. Hall Varian, Microeconomic Analysis
3. Jehle and Reny, Advanced Microeconomic Theory

## Course title: Macroeconomics I [#]

## Number of credits: 4

1. **Basic Building Blocks: Aggregate Demand, Aggregate Supply and Business Cycles**
   Concepts covered: aggregate labour market -demand for labour and the supply of labour; aggregate supply under adaptive expectations and perfect foresight; aggregate demand: The IS-LM Model and the AD curve; effectiveness of monetary and fiscal policy.

2. **Dynamics in Aggregate Demand and Supply**
   Concepts covered: the adaptive expectations and stability analysis; investment, capital stock and stability; wealth effects and the government budget constraints

3. **IS-LM Model, Keynes vis-à-vis Classics, Phillips Curve**
   Concepts covered: comparative statics, stabilization policy, wage-price rigidity, involuntary unemployment, expectations-augmented Phillips curve, core inflation, cyclical behaviour of the real wage.

4. **New Classical Economics**
   Concepts covered: imperfect information, certainty equivalence behaviour, rational expectations, Lucas supply curve, random walk with drift, white noise, Lucas Critique, anticipated and unanticipated money.

5. **New Keynesian Economics**
   Concepts covered: long term and short-term wage contracts, rational expectations, optimal money supply rule, coordination failures, reaction function, sunspots, unique equilibrium and multiple equilibria, fragile equilibrium.

6. **Consumption**
   Sections 7.1, 7.2, 7.4, 7.5 and 7.6 in Romer (3 lectures = 4.5 hours)

7. **Investment**

Section 8.7 in Romer Blanchard, O.J. and Fischer, Stanley (1989) section 5.1, p. 213-224, and section 9.6, p. 478-487 (2 lectures = 3 hours)

8. **Unemployment**

Chapter 9 in Romer (2 lectures = 3 hours)

Concepts: efficiency wage, implicit contracts, insiders and outsiders, and hysteresis.

9. **Inflation and Monetary Policy**

Sections 10.1, 10.2, 10.3, 10.4, 10.5, 10.8, 10.9 in Romer (3 lectures = 4.5 hours)

Concepts covered: Fisher effect, liquidity effect, term structure of interest rates, expectations theory of the term structure, term premium, dynamic inconsistency, sub-game perfect, reputation, delegation, inflation targeting, seignorage, inflation-tax Laffer curve, hyperinflation, costs and benefits of inflation, steady inflation and variable inflation, deflation.

10. **Budget Deficits and Fiscal Policy**

Chapter 11 in Romer, except sections 11.6 and 11.8, and Heijdra, section on Ricardian equivalence. (3 lectures = 4.5 hours)

Concepts and issues: The government inter-temporal budget constraint, primary deficit, some measurement issues, Ricardian equivalence, tax smoothing, deficit bias in fiscal policy, delayed stabilization, effects of sustainable and non-sustainable deficits, and debt crises.


**Textbooks**

1. Advanced Macroeconomics by David Romer, Third Edition, McGraw Hill Publishers, 2006.
2. The Foundation of Modern Macroeconomics by Ben J. Heijdra, Second edition, Oxford University Press, 2009.
3. Lectures on Macroeconomics by Blanchard, O.J. and Fischer, Stanley), Cambridge: MIT Press, 1989
4. Select additional teaching material may be prescribed as the course progresses.

**Course Name: Introduction to Statistics and Econometrics[#]**

**No. of Credit – 4**

I. **Probability and Random Variables:** Definitions and axioms of probability, probability set functions; random variables and probability distributions, transformation of random variables, moments and moment generating function; characteristic functions (briefly); Well-known probability distributions - Binomial, Poisson, Geometric, Uniform, exponential, Normal etc.; Bivariate and Multivariate random vectors, Distribution of functions of random variables, Chi-square, t-, F distributions.

II. **Asymptotic Theory:** Convergence in Probability, Convergence in Distribution, Law of Large Numbers, Central Limit Theorem.

III. **Statistical Inference:** Sampling and associated concepts, Concept of sampling distribution; Estimation - Unbiasedness, asymptotic unbiasedness, consistency, and efficiency of estimators. Method of maximum likelihood and properties of MLE estimators; Testing of hypotheses, errors of first and second kind, power of the test, and likelihood ratio test.

IV. **Simple Linear Regression:** Method of least squares, properties of OLS estimators and goodness of fit. Gauss Markov Theorem.

V. **Multiple Linear Regression Analysis**: General case (k-explanatory variables); examples with k=2 & 3; multiple correlation coefficient coefficient and goodness of fit. Problem of multicollinearity.

VI. **Inference in the Multiple Regression Model:** Hypothesis testing for significance of a subset of coefficients; and overall significance.

VII. **Generalized Least Squares and Feasible Least Squares:** Violation of assumption on spherical errors (problems of autocorrelation and heteroscedasticity), GLS and FGLS. Tests to detect autocorrelation and heteroskedasticity. Problem of autocorrelation in lagged dependent variable models.

**References:**

1. Robert Hogg, Joseph W. McKean and Allen T. Craig: Introduction to Mathematical Statistics (6th edition, 2005), Pearson Education
2. John A. Rice: Mathematical Statistics and Data Analysis (3rd Edition, 2007), Cengage Learning.
3. Robert Hogg and Eliot Tanis: Probability and Statistical Inference (7th edition, 2006)

4. James Stock and R.W. Watson: Introduction to Econometrics (International edition 2007)
5. Jeffrey Wooldridge: Introductory Econometrics: A Modern Approach (2006).
6. Additional reading list will be provided in class as and when required.

## Course: Mathematical Methods of Economics[#]

### No. of Credit – 4

**Course outline**

A. **Real Analysis --** Introduction to set theory; the real number system, closed and open sets, bounded sets, compact sets, convex set; sequences; functions, limit and continuity; concavity, convexity, quasiconcavity, quasiconcavity; mean value theorems; fixed point theorem

B. **Linear Algebra** -- Matrices and vectors; subspaces; systems of equations; eigenvalues and eigenvectors; quadratic forms

C. **Static Optimization --** Optimization without constraints, optimization with equality constraints, optimization with inequality constraints, the Kuhn-Tucker Theorem; comparative statics – Envelope theorems

D. **Exponential & Logarithmic Functions** – Nature of exponential functions; natural exponential function and the problem of growth; logarithms; logarithmic functions; derivatives of exponential and log functions; Optimal timing; some applications

E. **Economic Dynamics & Integral Analysis** – Dynamics and integration; indefinite integrals; definite integrals; improper integrals; some applications; Domar growth model

F. **Differential equations** – ordinary differential equations of the first order – basic concepts, solving some simple types of equations; higher order differential equations with constant coefficient; homogeneous and nonhomogeneous equations; Exact Differential Equations; some applications; Discrete time and continuous time differential equations; phase diagrams

G. **Difference Equations** – Difference equations – basic concepts; linear first order and higher order equations with constant coefficients; Analysis of stability of equilibria in two dimensional systems; extension to n-dimensional systems.

**Reading list:**

1. Mathematics for Economists by Carl P. Simon and Lawrence Blume, Viva Books, 2006.

2. Mathematical Analysis by Binmore, K. (1999), Cambridge University Press (Only for Topic I)
3. Mathematics for Economics by Hoy, Livernois, McKenna, Rees & Stegnos, MIT Press

# Course title: Micro Economics II[#]

# Number of credits: 4

**Course outline**

I. **Choice Under Uncertainty :** Expected Utility Theorem, Monetary Lottery and Risk Aversion, Arrow Pratt Measure of Absolute Risk Aversion

   Applications: Insurance and portfolio choice, Comparing risk: First order and second order stochastic dominance

II. **Non-Cooperative Game Theory :** Representation of a game: normal form, extensive form , Static Games of Complete Information, Prediction of an outcome: Dominant strategies; Iterated elimination of dominant strategies; Nash equilibrium: pure strategies, mixed strategies, existence, Dynamic Games of Complete Information, Backward induction and subgame perfect equilibrium, Sequential bargaining-Rubinstein model, Repeated games: finite and infinite, Static Games of Incomplete Information, Bayesian games and Bayesian Nash equilibrium

III. **Industrial Organization**

   Monopoly: Pricing and quantity; Deadweight loss; non-linear pricing; two part tariff, Price discrimination, discriminating monopoly, screening, perfect discrimination, natural monopoly Ramsey pricing; contestable markets; multi-product monopoly, multi plant monopoly, durable good monopoly, Lerner index, quality distortion (Tirole ch 1, ch 3, ch 5),

   Duopoly: Bertrand paradox, Cournot analysis Entry, accommodation and exit: No. of firms endogenous; Bain Sylos Postulate, Dixit Spence model, limit pricing Monopolistic competition, Product differentiation and product selection

IV. **Asymmetry of Information :** Principal agent models, Adverse selection, Moral hazard

**Suggested Readings**

1. Jehle and Reny, Advanced Micro-economic Theory
2. Gibbons, R (1992), A Primer in Game Theory.
3. Mas-Colell, Whinston and Green (1995), Microeconomic Theory, The MIT Press.
4. Kreps, D (1990) A Course in Microeconomic Theory, Princeton University Press.
5. Fudenberg and Tirole (1991), Game Theory, The MIT Press.
6. Dixit and Skeath (2004), Games of Strategy, Norton and Company.
7. Osborne and Rubinstein (1994), A course in Game Theory, The MIT Press.
8. Osborne (2003), An introduction to Game Theory, Oxford University Press.
9. Tirole (1988), Industrial Organization, The MIT Press.
10. Oz Shy (1996), Industrial Organization, The MIT Press.
11. Belleflamme, Paul and Martin Peitz (2010), Industrial Organization Markets and Strategies, Cambridge University Press.

## Course title: Macroeconomics II[#]

## Number of credits: 4

I. **Introduction to growth theory** : Importance and motivation to study growth; empirical regularities about economic growth, history of modern growth theory. Introduction (B&SM)

II. **Growth models with exogenous saving rates**
The Solow-Swan model Basic structure; model solutions without and with markets, steady state, golden rule of capital accumulation and dynamic inefficiency, transitional dynamics, comparative statics, extensions to technical progress and physical and human capital, application to convergence, poverty traps and growth accounting Chp 1 (B&SM), Chp 1 (DR).
The A-K model Motivating the precincts of endogenous growth, basic structure of the A-K model with exogenous savings; endogenous growth and transitional dynamics Chp 1 (B&SM)

III. **Growth models with endogenous savings**
Dynamic optimization in continuous time: optimal control theory in the context of growth models Appendix A.3 (B&SM), Part 3 Chp 7 (AC), Part II Sections 1-7 (K&S)
The Ramsey-Cass-Koopman's model of consumer optimization Basic model structure for the decentralized market economy; transitional dynamics; balanced growth path and golden rule capital stock, comparative statics, comparison with social

planner's solution; extension to include government purchases and open economy context. Chps 2 & 3 (B&SM), Chp 2 Part 1 (DR), Chp 2 Sections 2.1-2.2 (B&F).

The Diamond's overlapping generations model Model setup, dynamics of the decentralized economy, balanced growth path, possibility of dynamic inefficiency of the market economy, extending the model to include government and characterizing the command optimum. Chp 2 Part B (DR), Chp 3 Section 3.1 (B&F), Appendix 3.8 Chp 3 (B&SM), Chp 6 Section 6.3 (MW).

**IV.    Models of endogenous growth**
The A-K model (with endogenous savings) Model structure; market equilibrium; transitional dynamics.

The learning-by-doing and knowledge spillovers model Motivating the role of learning-by-investing and knowledge spillovers; characterizing the balanced growth path and the transitional dynamics; Pareto non-optimality and policy implications.

Model of public good/ infrastructure and endogenous growth.

Models with human-capital (one-sector and two-sector models) Basic one sector model with both physical and human capital; models with two sectors of production (with differing technologies for production and education); the Uzawa-Lucas model; steady state analysis; transitional dynamics. Chp 4-5 (B&SM), Chp 3 (MW).

**V.    Investment and Saving in the Open Economy**
Application of the basic Ramsey model to investment and savings in the open economy; q-theory of investment; characterizing the steady state and the dynamics with respect to behavior of consumption, investment, capital stock, and current account balance; effect of productivity shocks to the current account. Chp 2 Section 2.4 (B&F), Chp 2, Section 2.7 (MW)

**VI.    Altruism, Social Security and Capital Accumulation**
Application of Diamond's market economy model to incorporate altruism; application to social security (fully funded schemes versus pay-as-you go systems) and implications for capital accumulation. Chp 3 Sections 3.1 and 3.2 (B&F), Chp 6 Section 6.3 (MW)

**VII.    Demand for Money** The overlapping generations model without and with money; cash-in-advance model of demand for money; money in the utility function (Sidrauski model); money as an intermediate good (Ljungqvist and Sargent model). Chp 4 (B&F), Chp 8 Sections 8.1-8.8 (MW), Lecture notes by Blanchard at the MIT Open courseware site http://ocw.mit.edu/NR/rdonlyres/4A31EDC7-DD5F-46AC-8A3A8A522A44367D/0/slides06.pdf.

**VIII.    Real business cycle dynamics** Basic theory of fluctuations; a baseline real-business cycle model; intertemporal substitution in labor supply by households, intra-temporal trade-off between consumption and labor supply; consumption and labor supply with uncertainty; explanation for output and employment fluctuations for special and general cases of the model Chp 5 (DR), Chp 2 Section 2.5 (MW).

**Readings**

1. Barro, Robert J and Sala-i-Martin, Xavier (B&SM). Economic Growth. Second Edition. Prentice Hall, India. 2004. Introduction, Chps 1, 2, 3, 4, 5, Appendix A.3.
2. Blanchard, Olivier Jean and Fischer, Stanley (B&F). Lectures on Macroeconomics. 1996. Prentice Hall of India. Chps. 2, 3 & 4.
3. Blanchard, Olivier. Introducing Money. Lecture notes at the MIT Open courseware site http://ocw.mit.edu/NR/rdonlyres/4A31EDC7-DD5F-46AC-8A3A8A522A44367D/0/slides06.pdf
4. Chiang, Alpha C (AC). Elements of Dynamic Optimization. 1992. Waveland Press Inc. USA. Part III, Ch7.
5. Kamien, Morton I, and Schwartz, Nancy L (K&S). Dynamic Optimization: The Calculus of Variations and Optimal Control in Economics and Management. Second Edition. North Holland, London. 1993. Part II: Sections 1-7.
6. Romer, David (DR). Advanced Macroeconomics. Second Edition. McGraw-Hill International Edition (Economics Series). 2001. Chp 1, 2 &5.
7. Wickens, Michael (MW). Macroeconomic Theory: A Dynamic General Equilibrium Approach. 2008. Princeton University Press. Princeton and Oxford. Chps 2, 3, 6 & 8.

**Environmental Economics[%]**
**Number of credits: 4**

I. Introduction
   - The environment and economics
   - Genesis of environmental problems: market failures, public goods and externalities
II. Environmental Regulation
   - Command and control methods: standards, technology mandates,
   - Market based incentives: taxes and tradable permits, property rights, liability rules
   - Incentives and market structure
   - Voluntary mechanisms
III. Role of Information in Environmental Decision Making and Regulation
   - Asymmetric information
   - Uncertainty
   - Public disclosure
IV. Economic Growth, Technical Change, and Environmental Pollution
   - Economic growth and environment
   - Incentives for technological development

**V.** Transboundary Environmental Issues
- Economics of climate change: causes; possible effects; costs of mitigating green house gas emissions; adaptation measures.
- Design of international agreements
- Environmental conflict, bargaining and cooperation
- International trade, FDI and the environment

## Main and Supplementary Text Books

1. Nick Hanley, Jason F Shogren and Ben White. Environmental Economics in Theory and Practice. MacMillan 1997.
2. Kolstad Charles D. Environmental Economics. Oxford University Press. 2003.
3. Baumol William J. and Oats Wallace E. The Theory of Environmental Policy. Second Edition. Cambridge University Press. 1994.
4. Sterner Thomas. Policy Instruments for Environmental Protection. RFF. 2002
5. Stavins Robert N. Economics of the Environment: Selected Readings. Fourth Edition. W.W. Norton and Company. 2000.
6. Jeroen C.J.M. van den Bergh, Handbook of Environmental and Resource Economics
7. Maler Karl-Goran and Jeffrey R Vincent. Handbook of Environmental Economics. Environmental Degradation and Institutional Responses. Volume I. North-Holland, 2003. Ch 11.
8. Carroro, Carlo, and Siniscalco, Domenico, New Directions in the Economic Theory of the Environment, 1997, Cambridge.

## Advanced Econometrics[%]

### No. of Credit – 4

**I.** Review of OLS and GLS
**II.** Use of dummy variables in econometrics
**III.** Models with discreet dependent variables:
    a. Binary
    b. Multinomial, Ordered, Sequential, Randomised
**IV.** Models of limited dependent variables and duration a.Censored model b.Truncated models c.Duration Data
**V.** Models for Panel data a.Fixed effect versus random effects models

**VI.** Simultaneous equation models: a.Introduction: endogeneity and causality b.Problems of identification c.Instrumental Variable method and 2 SLS d.3SLS

**VII.** Randomization in Economics Research

**Readings:**

Core Text

1. W. Greene, Econometric Analysis, Prentice Hall, 2018.

Other Texts

1. J. Johnston and J. DiNardo, Econometric Methods. McGraw Hill, 2007
2. Jeffrey M. Wooldridge Introductory Econometrics, South Western Cengage Learning, 2009
3. G.S.Maddala, Limited Dependent and Qualitative Variables in Econometrics, Cambridge University Press, 1997
4. Joshua D. Angrist & Jörn-Steffen Pischke, Mostly Harmless Econometrics: An Empiricist's Companion, Princeton University Press, 2009

## Economics of Technology and Development[%]

### No. of Credit – 4

**I.** Introduction:
   a. Locating Technology in a discourse on development
   b. Definitions and concepts:
      i. Technological change and its biases
      ii. Various classifications and nomenclatures:
      iii. R&D – alternative views
      iv. Non-R&D sources of technological change

**II.** Firms, Innovation and Market Structure
   a. The Schumpeterian hypothesis

      b.  Incentives to innovate under alternative market forms: neoclassical models

      c.  Empirical validation of the Schumpeterian hypothesis

**III.**    Appropriability and Patents

      a.  Problems of appropriability, market failure and solutions

      b.  Knowledge flows and spillovers

      c.  Economics of Patents

          i.  History, Justification

          ii.  Economic models of patent races and optimal patents

          iii.  Nuts and bolts of patents and other forms of IPR

          iv.  Uses and misuses of patenting

**IV.**    Diffusion of Innovation

      a.  Models of diffusion for standalone technologies

      b.  Multiple technologies and network externalities

      c.  Strategic adoption of technologies

**V.**    Learning and Technological Capability in Developing Countries

      a.  R&D for learning

      b.  Stages of Technological Capability (TC)

      c.  Evolution of TC: The role of IPR

      d.  Importance of TC for competitiveness and exports

      e.  Understanding India's emergence through TC

**VI.**    Science and Innovation

      a.  Importance of Public Funded Research

      b.  University-industry knowledge transfer

**Readings:**

Books (selected chapters)

- Tirole, J (1988), The Theory of Industrial Organisation, Chapter 10, MIT Press: Cambridge, MA.
- Schumepter, J. (1943), Capitalism, Socialism and Democracy, Chapters 7 and 8, Unwin: London.
- Stoneman, Paul (ed.) (1995), Handbook of Economics of Innovation and Technological Change, Chapters 1, 4, Blackwell: Oxford.

- Greenhalgh, C. and M. Rogers (2010), Innovation, IP and Growth, Chapter 2, 6, Princeton University Press: Princeton.
- Machlup, F. (1958), "An Economic review of the patent system", US Senate Committee Report, Washington DC: US Govt.
- Stoneman, P. (2002), The Economics of Technological Diffusion, Chapters 1 – 5, Blackwell: Oxford.
- Lall, S (1987), Learning to Industrialise, Chapters 1,2,8,9, London: MacMillan.
- Stewart, F. (1977), Technology and Underdevelopment, Chapters 1-5, MacMillan: London.

# Public Economics[%]

## No. of Credit – 4

I. Basics of general equilibrium theory and welfare economics. First-best versus second-best economies, equity-efficiency trade-offs.

II. Indirect (linear) commodity taxation:Ramsey taxation (Diamond and Mirrlees 1971 model); optimal tax rules – inverseelasticity rule, many person Ramsey rule, second-best production efficiency; value-added taxation

III. Non-linear income (direct) taxation – information constraints, marginal and averagetax rates, characterising optimal non-linear income tax schedule (Mirrlees 1971 model)

IV. Some issues in designing direct and indirect taxes: optimal tax mix, using elasticitiesto derive optimal income and commodity tax rates, uniform taxation, labour supplyand taxes

V. Second-best corrective taxation for environmental externalities – violation of produc-tion efficiency, decomposition into many person Ramsey rule and Pigouvian compo-nents, non-uniqueness of optimal tax mix

**Readings**

- Atkinson, A., and J. Stiglitz.Lectures on Public Economics.Mcgraw-Hill, 1980.
- Myles, G.Public Economics.Cambridge University Press, 1995.
- Weymark, J. "Redistributive nonlinear income taxation." Lecture notes, 2012.
- Guesnerie, R.A contribution to the pure theory of taxation.Cambridge UniversityPress, 1998.
- Piketty, T.Capital in the twenty-first century.Harvard University Press, 2013.
- Auerbach, A., and M. Feldstein.Handbook of Public Economics.Vol 1, 2, 3, 4, 5.North Holland, 1985, 1987, 2002, 2002, 2013.
- Institute for Fiscal Studies.The Mirrlees Review.Oxford University Press, 2010.

- Arrow, K., and M. Intriligator. Handbook of Mathematical Economics.Chapter 24:Theory of Optimal taxation by J. Mirrlees, Vol 3, North Holland, 1986
- Institute for Fiscal Studies.The Mirrlees Review.Oxford University Press, 2010.

## Economic Regulation[%]

### No. of Credit – 4

  I.   Introduction to Economics of Regulation: Rationale for economic regulation, common regulatory instruments and incentive schemes, and overview of regulatory processes.
 II.   Theory and Regulation of Natural Monopoly: Conventional theory of regulation covering optimal policies for natural monopolies, problems of natural monopoly and policy solutions.
III.   Rate of Return Regulation: Regulating rate of return on capital (Averch-Johnson model and its critique and extensions by Baumol and Klevorick)
 IV.   Optimal Regulation under Asymmetric Information: Pricing and incentives for a single and multi-product firm when the effort levels and technology type of the firm are not known to the regulator. Theory of yardstick competition.
  V.   Pricing and Competition: Regulation under competition, access pricing and bypass (in the context of telecommunications and energy (power, gas) sectors
 VI.   Dynamics of Regulation
       Ratchet effect in the two-type case.
VII.   Politics of Regulation and Regulatory Capture
       Revisiting the capture theory, comparison of capture-free regulation and regulation with producer protection, multiple interest groups.

### Readings

1. Kahn, A. (1988). The Economics of Regulation, Chapter 1 Viscusi, K, Vernon, J. and Harrington, J. (1992). Economics of Regulation and Antitrust, Chapters 1 and 10.
2. Viscusi, K, Vernon, J. and Harrington, J. (1992). Economics of Regulation and Antitrust: Chapters 11 and 12.

3. Averch, H. and Johnson, L. (1962) Behaviour of the Firms under Regulatory Constraint, American Economic Review, 52, 1052-1069.
4. Baumol, W.J. and Klevorick, A.K. (1970). Input Choices and Rate-of-Return Regulation, Bell Journal of Economics and Management Science, 1, pp. 162-90.
5. Laffont, J-J. and Tirole, J. (1993). A Theory of Incentives in Procurement and Regulation. Chapters 1-3, 5, 6, 9 and 11.
6. Baron, D and Myerson R. (1982). Regulating a Monopolist with Unknown Cost. Econometrica, 50: 911-930.
7. Shleifer, A. (1985) "A Theory of Yardstick Competition", RAND Journal of Economics, 16: 319-327.
8. Laffont, J.-J. and Tirole, J. (1994) "Access pricing and competition", European Economic Review, 38: 1672-1710.
9. Laffont, J.-J. and Tirole, J. (1996) "Creating competition through interconnection: theory and practice", Journal of Regulatory Economics, 10: 227-256.
10. Armstrong, M., Doyle, C. and Vickers, J. (1996) "The access pricing problem: a synthesis", The Journal of Industrial Economics, 44: 131-150.
11. Vickers, J. (1997) "Regulation, Competition, and the Structure of Prices", Oxford Review of Economic Policy, 13, Spring: 15-26.

## Law and Economics[%]

### No. of Credit – 4

**I.** The Coase theorem and its implications for law and economics:
Ch 5-6 DW, Ch 4 DF
*Raid or Trade? An Economic Model of Indian-White Relations,* Anderson T.L and Mc Chesney F.S, Journal of Law and Economics (1994), 37(1): 39-74.

**II.** Property rules, liability, communal rights, and regulations:
Ch 11, 12-14 DW
Torts (ch 16 DW, ch 14 DF)

**III.** Spontaneous order:
(a) Emergence of order in stateless/quasi-stateless societies:
    (i)    In societies with potential for (nonviolent) cheating –
        *The Role of Institutions in the Revival of Trade: the Law Merchant, Private Judges, and the Champagne Fairs,* Milgrom P.R, North, D. and Weingast, B, Economics and Politics (1990), 2(1): 1-23.

(ii)      In societies with violence –

*Trading with Bandits,* Leeson, P, <u>Journal of Law and Economics</u> (2007), 50: 303-321.

*\*An-arrgh-chy: the Law and Economics of Pirate Organization,* Leeson, P, <u>Journal of Political Economy</u> (2007), 115(6): 1049-1093.

(b) Evolution of the common law:

*Why is the Common Law Efficient?* Rubin, P, <u>Journal of Legal Studies</u> (1977), 6: 51- 63.

**IV.**    Economics of the legal process and dispute resolution:

(a) Early legal institutions:

In ancient Athens (class notes)

*\*Trial by Battle,* Leeson, P, <u>Journal of Legal Analysis,</u> (2011), 3(1): 341-375.

(b) Court cases and disputes:

Settlements and nuisance suits (class notes)

Malice in disputes and disputes over allocation of indivisible objects:

*Reinterpreting King Solomon's Problem: Malice and Mechanism Design,* Guha, B, <u>Journal of Economic Behavior and Organization</u> (2014), 98: 125-132.

*Malicious Litigation,* Guha, B, <u>International Review of Law and Economics</u> (2016), 47, 24-32.

Jury size: the Condorcet theorem (class notes)

*Jury size and the free rider problem,* Mukhopadhaya, K, <u>Journal of Law, Economics, and Organization</u> (2003), 19(1): 24-44.

**V.**    Economics of crime:

(a) Determinants of crime:

(i)      Becker's theory and the endogeneity problem in assessing the effects of policing (class notes)

(ii)      Penalties – deterrence and incapacitation effects

*\*Crime, Punishment and Myopia,* Lee, D.S, and McCrary, J, (2005), NBER Working Paper 11491 (for deterrence effects)

*\*More Time, Less Crime? Estimating the Incapacitative Effect of Sentence Enhancements,* Owens, E, <u>Journal of Law and Economics,</u> (2009), 52: 551-579. (for incapacitation effects)

(iii)      Legalized abortion and crime rates

*\*The Impact of Legalized Abortion on Crime,* Donohue, J, and Levitt, S, <u>Quarterly Journal of Economics,</u> (2001), 116(2): 379-420.

(b) Incentives of (potential) victims:

*Guns and Crime Revisited,* Guha, B, <u>Journal of Economic Behavior and Organization,</u> (2013), 94: 1-10.

*Inferiority" Complex? Policing, Private Precautions and Crime,* Guha, B, <u>European Journal of Law and Economics</u>, (2015), 39(1): 97-106.

*Pirates and Traders: Some Economics of Pirate-Infested Seas,* Guha, B, and Guha, A.S, <u>Economics Letters,</u> (2011), 111(2): 147-150.

(c) Incentives of criminals and criminal organizations:

    (i)      Criminals:

        *Pirates and Fishermen: Is Less Patrolling Always Bad?* Guha, B, <u>Journal of Economic Behavior and Organization</u>, (2012), 81(1): 29-38.

    (ii)     Criminal organizations:

        *An Economic Analysis of a Drug Selling Gang's Finances*, Levitt, S, and Venkatesh, S, <u>Quarterly Journal of Economics</u>, (2000), 115(3): 755-789.

## Readings

1. D. Wittman, "Economic Foundations of Law and Organization", chapters 5-6, 11, 12-14, 16, and
2. D. Friedman "Law's Order", chapters 4, 12, 14

## Information Economics<sup>%</sup>

### No. of Credit – 4

1. Introduction to Information Economics
2. Games with incomplete information: Static Bayesian games, Bayesian Nash equilibrium; dynamic Bayesian games, Perfect Bayesian equilibrium and sequential equilibrium.
3. The Principal Agent Problem: Hidden actions (Moral hazard) problem, hidden information problems, monopolistic screening
4. Adverse Selection Concept, lemons problem, game theoretic approach
5. Signaling Separating and Pooling equilibrium, Insurance market, cheap talk
6. Screening Second degree price discrimination (From Tirole, Industrial Organization Ch 3 Section 3.3 and the supplementary section., also see Fudenberg and Tirole, Game Theory, pages 246 to 250.) Screening in Competitive Insurance Market, Monopoly screening in insurance Market
7. Introduction to Mechanism design Basic concepts, revelation principle, truthful implementation, Groves Clarke mechanisms

8. Applications of mechanism design to bargaining and auctions Bidding behavior in the four standard auctions: First price sealed bid, second price sealed bid, Dutch auction, English auction. Revenue equivalence theorem
9. Applications to Finance Credit market rationing
10. Applications to Environmental Economics

**Readings:**

1. Gibbons (1992), APrimer in Game Theory, Chapters 3 and 4.
2. Jehle and Reny (2001), Advanced Micro Economic Theory, Pearson Education. Chapter 7, 8, 9.
3. Fudenberg and Tirole (1991), Game Theory, Chapter6.
4. Mas Collel Whinston and Green(1995), Microeconomic Theory (MWG), Oxford University Press. Chapter 13,14.
5. Kreps A Course in Microeconomic Theory, Chapter 16,17.
6. Varian (Third edition), Microeconomic Analysis Ch 25.
7. Hart, O., and B. Holmstrom, (1987) "The Theory of Contracts." In T. Bewley (ed.), Advances in Economic Theory Fifth World Congress. Cambridge University Press.
8. Milgrom, P. (1981). Good news or bad news: Representation theorems and applications. Bell Journal of Economics 12: 38091.
9. Akerlof, G.(1970) "The market for lemons: Qualitative uncertainty and the market mechanism" Quarterly Journal of Economics 84, 3,488 −500.
10. Spence, A. M. "Job Market Signaling." Quarterly Journal of Economics 87 (1973).
11. Grossman, S.(1981), "The Informational Role of Warranties and Private Disclosure about Product Quality" Journal of Law and Economics, Vol. 24, No. 3, 461483.
12. Milgrom, P. and J. Roberts(1982), "Limit Pricing and Entry under Incomplete Information: An Equilibrium Analysis." Econometrica 50, 44359.
13. Cho and Kreps (1987), "Signaling games and stable equilibria" Quarterly Journal of Economics 102, 179221.
14. Rothschild, M., and J. Stiglitz. (1976),"Equilibrium in Competitive Insurance Markets: An Essay on the Economics of Imperfect Information." Quarterly Journal of Economics 90, no.4 : 629649.
15. Bester and Helwig (1987) 'Moral hazard and equilibrium credit rationing: An overview of the issues,' discussion paper A125, Bonn.
16. Spulber, D. (1988)"Optimal Environmental Regulation under Asymmetric Information" Journal of Public Economics 35, 163-181.
17. Foulo, J., P. Lanoie and B. Laplante (2002) Incentives for Pollution Control: Regulationor Information?Journal of Environmental Economics and Management 44, 169187.

# International Trade, Environment and Multilateral Institutions[%]

## No. of Credit – 4

**I.** Introductiono
- Daly, Herman (1968)"On economics as a life science", The Journal of Political Economy, Volume 76(3): 392-406.
- d'Arge, Ralph C. (1975)"On the Economics of Transnational Environmental Externalities", in Edwin S. Mills ed. Economic Analysis of Environmental Problems, National Bureau of Economic Research.
- d'Arge, Ralph C. and Allen V. Kneese (1972) "Environmental Quality and International Trade", International Organization, 26 (2): 419-465.
- Stevens, Candice (1993) "The Environmental Effects of Trade"TheWorld Economy, 16(4): 439-451.
- Jayadevappa, Ravishankar and Sumedha Chhatre (2000) "International trade and environmental quality: a survey"Ecological Economics 32: 175-194.

**II.** Theory and Empirics of International Trade-Environment Interface

II.1 Environmental Policy and Comparative Advantage in International Trade
- Pethig, Rüdiger (1976) "Pollution, Welfare, and Environmental Policy in the Theory of Comparative Advantage", Journal of Environmental Economics and Management, 2: 160-169.
- Baumol, William and Wallace Oates (1988) "International Environmental Issues"(chapter 16) in Baumol and Oates The Theory of Environmental Policy, Cambridge University Press.
- Ulph, Alistair (1992) "The Choice of Environmental Policy Instruments and Strategic International Trade" Chapter 5 in Rudiger Pethig ed. Conflicts and Cooperation in Managing Environmental Resources, Springer Verlag: 111-129.

II.2 Natural Resource Management and International Trade

- Kemp, MurrayC. and Ngo Van Long (1984) "The Role of Natural Resources in Trade Models" in R. W. Jones & P. B. Kenen (ed.) Handbook of International Trade, Volume 1(1), Elsevier.
- Copeland, Brian (2005) "Policy Endogeneity and the Effects of Trade on the Environment", Agricultural and Resource Economics Review, Volume 34(1): 1-15.

II.3 Empirics on Environmental Stringency and International Trade

- Cole, Matthew and Robert J. R. Elliott (2003) "Do Environmental Regulations Influence Trade Patterns: Testing Old and New Trade Theories", The World Economy: 1163-86.
- Xing, Yuquing and Charles D. Kolstad (2002) "Do Lax Environmental Regulations Attract Foreign Investment?"Environmental and Resource Economics, 21: 1-22.
- Manderson, Edward and Richard Knellar (2012) "Environmental Regulations, Outward FDI and Heterogeneous Firms: Are Countries Used as Pollution Havens?"Environmental and Resource Economics 51: 317-352.
- Levinson, Arik and M. Scott Taylor (2008) "Unmasking the Pollution Haven Effect", International Economic Review 49(1): 223-254.

II.4 International Trade in Waste

- Copeland, Brian R. (1991) "International Trade in Waste Products in the Presence of Illegal Disposal", Journal of Environmental Economics and Management, Volume 20: 143-162.
- Johnstone, Nick (1998) "The implications of the Basel Convention for developing countries: the case of trade in non-ferrous metal-bearing waste", Resources, conservation and recycling, Volume 23: 1-28.
- Baggs, Jen (2009) "International Trade in Hazardous Waste", Review of International Economics, Volume 17(1): 1-16.
- Kellenberg, Derek (2012) "Trading waste", Journal of Environmental Economics and Management, Volume 64: 68-87.

III. Multilateral Trade, Environmental Regime and Negotiations
   III.1 Linking Trade and Environment Negotiations– WTO and the MEAs
- Abrego, Lisandro, C. Perroni, J. Whalley, and R. Wigle (2001) "Trade and Environment: Bargaining Outcomes from Linked Negotiations", Review of International Economics, 9(3): 414-428.
- Hauer, Grant and C. Runge (1999) "Trade-Environment Linkages in the Resolution of Transboundary Externalities", World Economy: 25-39.

- Vogel, David (2002) "The WTO, International Trade, and Environmental Protection: European and American Perspectives", in Norman Vig and Michael Faure ed. Green Giants? Environmental Policy of the United States and the European Union.

III.2 Climate Change, Carbon Trade and Clean Energy Technology

- Yunfeng, Yan and Yang Laike (2010) "China's foreign trade and climate change: A case study of CO2 emissions"Energy Policy 38: 350-356.
- Atkinson, Giles, Kirk Hamilton Giovanni Ruta, Dominique Van Der Mensbrugghe (2011) "Trade in virtual carbon: Empirical results and implications for policy"Global Environmental Change 21: 563-574.
- Newell, Richard G., William A. Pizer and Daniel Raimi (2013) Carbon Market 15 Years after Kyoto: Lessons Learned, New Challenges"Journal of Economic Perspectives, Volume 27 (1): 123-146
- Johnstone, Nick, Ivan Hascic and David Popp (2010) "Renewable Energy Policies and Technological Innovation: Evidence Based on Patent Counts"Environmental and Resource Economics 45: 133-155.
- Constantini, Valeria and Crespi Francesco (2008) "Environmental regulation and export dynamics of energy technologies", Ecological Economics, Volume 66: 447-460.

**Recommended books**

1. Baumol, William and Wallace Oates (1988) The Theory of Environmental Policy, Cambridge University Press.
2. Karl-Goran Maler and Jeffrey R. Vincent ed. (2005) Handbook of Environmental Economics, Volume 3: Economywide and International Environmental Issues, Elsevier.

**Topics in Development Microeconomics**[%]

**No. of Credit – 4**

I. Agricultural household models
   - model with complete markets and separation hypothesis
   - model with missing markets
II. Distribution within households
   - Gender bias and intra household allocations

- Asset ownership, price changes and women's bargaining power
- Unitary versus collective models of the household

**III.** Investment in human capital

(a) Nutrition and health
- supply and demand for health and nutrition
- public and private interventions for health

(b) Education:
- determinants of access to education
- private and social returns to education

**IV.** The rural economy

(a) credit and insurance
- adverse selection and moral hazard
- Microfinance
- Formal and informal risk sharing

(b) Land
- institutional arrangements and markets
- agricultural investments

**Suggested Readings**

I. Bardhan, P and C. Udry. (2000). Development Microeconomics Oxford University Press: New York
II. De Janvry, A., Fafchamps, M., & Sadoulet, E. (1991). Peasant household behavior with missing markets: Some paradoxes explained. TheEconomic Journal, 101(409), 1400-1417
III. Deaton, A. (1997). The analysis of household surveys: a microeconometric approach to development policy. World Bank Publications
IV. Banerjee, A. and E. Duflo. (2006). "The Economic Lives of the Poor", Journal of Economic Perspectives, 21(1), 141-167
V. Ghosh, P., Mookherjee, D. and D. Ray (2000), "Credit Rationing in Developing Countries: An Overview of the Theory," Chapter 11 in Readings in the Theory of Economic Development, edited by D. Mookherjee and D. Ray, London: Blackwell

# Topics in Financial Econometrics[%]

## No. of Credit – 4

I.  Introduction to financial markets; overview of some theoretical models of financial markets (Capital Asset Pricing Model, Efficient market hypothesis, random walk model, Multifactor Pricing Model); Definitions of asset returns, distributional properties and stylized facts of asset returns; Definitions of market risk

Suggested Readings: Ruey S. Tsay (Chap 1); Campbell, Lo and MacKinlay (Chap 1)

II.  Modelling Univariate Financial Time Series
1. Introduction to basic concepts of time series analysis – Stochastic process. Time Series as a discrete stochastic process. Characteristics of a Stochastic process (mean, standard deviation, autocovariation, autocorrelation, partial autocorrelation). Stationary and non-stationary stochastic process. Concept of ergodicity and Wold's decomposition theorem.
Suggested Readings: Hamilton - Chapter 3; Mills and Markellos - Chap 2
2. Modelling and forecasting stationary asset returns – Autoregressive Models AR(p), Moving Average Models MA(q), Autoregressive Moving Average Models ARMA(p,q). Stationarity and Invertibility Conditions. Properties of these models in terms of autocorrelation and partial autocorrelation functions. Yull-Walker equations. Estimation of the parameters of AR(p), MA(q) and ARMA(p,q) process. Box-Jenkins Framework of model building - identification, estimation and diagnostic checks. AIC, SBC Criteria and Portmanteau Statistic.
Suggested Readings: Hamilton – Chap 3,4,5; Ruey S. Tsay (Chap 2); Mills and Markellos (Chap 2);
3. Univariate non-stationary asset returns– Series with deterministic time trend and Unit Root processes. Comparing Trend-Stationary and Unit Root Processes. Unit Root tests – Dickey-Fuller test, Augmented Dickey-Fuller and Philips Perron tests.
Suggested Readings: Hamilton – Chap 15, 16, 17; Mills and Markellos (Chap 3); Ruey S. Tsay (Chap 2)
4. Modelling asset returns volatility – Features of volatility in financial time series; ARCH, GARCH, EGARCH and other variations of conditional heteroscadasticity models.
Suggested Readings: Ruey S. Tsay (Chap3); Mills and Markellos (Chap 5); Hamilton (Chap 21).
III.  Modelling Multivariate Financial Time Series –
1. Weak Stationarity; Cross-Correlation matrices; Vector models for asset returns – Vector Autoregressive Models, Vector Moving-Average Models, Vector ARMA models; Granger Causality; Unit Root non-stationarity and co-integration, Cointegrated Vector Autoregressive Models; Error Correction Models

Suggested Readings: Hamilton – Chap 10, 11; Ruey S. Tsay (Chap 8); Mills and Markellos (Chap 8 and 9)

2. Multivariate GARCH models; Constant-Correlation and Time-Varying Correlation Models ; The Dynamic Conditional Correlations (DCC) model

Suggested Readings: Ruey S. Tsay (Chap 10); Mills and Markellos (Chap 8)

IV. Extreme Values, Quantile Estimation and Value at Risk (VaR) *
1. VaR as a quantile risk measure of asset portfolios; econometric approaches to VaR estimation
2. Extreme value theory (EVT) – review of EVT, Fisher Tippette Theorem; generalized extreme value distribution; empirical estimation of extreme values of financial time series; application of EVT in VaR estimation

Suggested readings: Ruey S. Tsay (Chap 7); Mills and Markellos

**Reading List**

1. R. S. Tsay, 2005, Analysis of Financial Time Series, Wiley Series in Probability and Statistics, 2nd edition (RT)
2. J. Y. Campbell, A. W. Lo, and A. C. MacKinlay, 1997, The Econometrics of Financial Markets, Princeton University Press (CLM)
3. T. C. Mills and R. N. Markellos, The Econometric Modelling of Financial Time Series, 2008, Cambridge University Press, 3rd edition (TM) – An earlier Edition of this book is by Terrance Mills which can also be used.
4. J. D. Hamilton, 1994, Time Series Analysis, Princeton University Press (JH).


**Economics of Labor Markets & Education**[%]

**No. of Credit – 4**

I. Recent Empirical Approaches in Labor Economics : Fixed effects, IV, LATE, Randomization techniques, Differences-in-Differences, Regression Discontinuity Design
- J. Angrist and A. Krueger, "Empirical strategies in labor economics" In O. Ashenfelter and D. Card, editors, Handbook of Labor Economics, volume 3A, pages 1277–1366. Elsevier Science, 1999.
- Angrist and Pischke (2009), Mostly Harmless Econometrics, Princeton University Press.
- Alan B. Krueger., "Experimental Estimates of Education Production Functions" Quarterly Journal of Economics, Vol. 114, no. 2 (May 1999): 497-532.

II. Labor supply
a. Static Labor Supply: Introduction, Basic facts and theory

- Blundell and MaCurdy, "Labor Supply: A Review of Alternative Approaches" Handbook, Vol. 3A, Chapter 27
  b.  Intertemporal Labor Supply
    - Blundell and MaCurdy, "Labor Supply: A Review of Alternative Approaches" Handbook, Vol. 3A, Chapter 27
    - Altonji, Joseph. "Intertemporal Substitution in Labor Supply: Evidence from Micro Data" Journal of Political Economy. June 1986
    - MaCurdy, Thomas. "An Empirical Model of Labor Supply in a Life-Cycle Setting." Journal of Political Economy. December 1981.
    - Card, David "Intertemporal Labor Supply: An Assessment." NBER Working Paper #3602, January 1991.
  c.  Empirical estimates of labor supply relationships
    - Angrist, J. D. and W. N. Evans (1998), "Children and Their Parents' Labour Supply: Evidence from Exogenous Variation in Family Size", The American Economic Review, 88(3), pp. 450-77.
    - Gelbach, Jonah B. 2002. "Public Schooling for Young Children and Maternal Labor Supply." American Economic Review 92(1): 307-322.
    - Farber, Henry. "Is Tomorrow Another Day? The Labor Supply of New York City Cab Drivers" Journal of Political Economy 113(1), 2005 pp. 36-82.

III.  Wage Inequality and Technology
  - Di Nardo, J. and Pischke, J., "The Returns to Computer Use Revisited: Have Pencils Changed the Wage Structure Too?" Quarterly Journal of Economics 112, Feb. 1997, 291-303.
  - Katz, Lawrence and Kevin M. Murphy. Changes in Relative Wages, 1963-1987: Supply and Demand Factors." Quarterly Journal of Economics 107 (February 1992): 35-78.
  - Krueger, A., "How Computers Have Changed the Wage Structure: Evidence From Microdata, 1984-1989", Quarterly Journal of Economics, vol. 108, no. 1, February 1993, pp. 33-61
  - Katz, Lawrence. "Technological Change, Computerization, and the Wage Structure." Unpublished Manuscript, Department of Economics Harvard University. September 1999.
  - Card, David and John E. DiNardo. "Skill-Based Technological Change And Rising Wage Inequality: Some Problems And Puzzles," Journal of Labor Economics, 2002, 20(4): 733

IV.  Discrimination
  - Altonji, Joseph and Rebecca Blank, "Race and Gender in the Labor Market," in Ashenfelter, O. and D. Card, eds., Handbook of Labor Economics, Vol. 3C. Amsterdam: Elsevier, 1999.

- Pager, Devah (2007) "The Use of Field Experiments for Studies of Employment Discrimination: Contributions, Critiques, and Directions for the Future," Annals of the American Academy of Political and Social Science 609: 104-133.
- Goldin, Claudia and C. Rouse, "Orchestrating Impartiality: The Impact of Blind Auditions on the Sex Composition of Orchestras." American Economic Review 90(4), 2000, 715-41.
- Neal, Derek A. and William R. Johnson, "The Role of Premarket Factors in Black-White Wage Differences," Journal of Political Economy, 104(5), 1996, 869 – 895.

V.    Returns to education (private and social): Theory and Empirics
- J. Angrist and A. Krueger. "Does Compulsory School Attendance Affect Schooling and Earnings?" The Quarterly Journal of Economics, 106(4):979–1014, 1991.
- E. Duflo. "Schooling and Labor Market Consequences of School Construction in Indonesia: Evidence from an Unusual Policy Experiment" The American Economic Review, 91(4):795–813, 2001.
- Lance Lochner & Enrico Moretti, 2004. "The Effect of Education on Crime: Evidence from Prison Inmates, Arrests, and Self-Reports," American Economic Review, American Economic Association, vol. 94(1), pages 155-189, March. 6

VI.    Signaling approach to education
- Weiss, Andrew, "Human Capital and Sorting Models," Journal of Economic Perspectives, 9(4), Autumn 1995, 133-154.
- Spence, Michael, "Job Market Signaling," Quarterly Journal of Economics, 87(3), August 1973, 355-374.
- Tyler, John, Richard J. Murnane and John Willett, "Estimating the Labor Market Signaling value of the GED," Quarterly Journal of Economics, 115(2), May 2002, 431-468
- Lang, Kevin, and David Kropp, "Human Capital versus Sorting: The Effects of Compulsory Attendance Laws," Quarterly Journal of Economics, 101, 1986, 609-624.
- Weiss, A., (1995), "Human Capital vs. Signaling Explanations of Wages", The Journal of Economic Perspectives, 9(4): 133-154.

VII.    Education Production Functions: School Quality and peer effects
- Hanushek, Eric A., ''The Economics of Schooling: Production and Efficiency in Public Schools,'' Journal of Economic Literature, XXIV (1986), 1141–1177
- B. Sacerdote. "Peer Effects with Random Assignment: Results for Dartmouth Roommates" Quarterly Journal of Economics, 681, 2001.

**Readings:**

1. Cahuc, Pierre and Andre Zylberberg (2004), Labor Economics, MIT Press.
2. Angrist and Pischke (2009), Mostly Harmless Econometrics, Princeton University Press.
3. Handbook of Labor Economics (relevant volumes)
4. Handbook of Economics of Education (relevant volumes)