UNIVERSITY OF CALICUT

POST GRADUATE PROGAMME IN ECONOMETRICS

(M A ECONOMETRICS)

CHOICE BASED CREDIT SEMESTER SYSTEM (CBCSS)

SCHEME & SYLLABUS BASED ON
OUTCOME BASED EDUCATION

(2020-21 Academic Year onwards in Affiliated Colleges)

University of Calicut

M.A. ECONOMETRICS (CBCSS)
2020-21 ADMISSION ONWARDS SCHEME OF THE PROGRAMME
PREFACE

The Master of Arts (M.A.) in Econometrics is a two-year full-time Post graduate programme, each year comprising of two semesters. The course is one of the new generation courses being introduced in the higher educational institutions across the state of Kerala. Econometrics is the quantitative application of statistical and mathematical models using data to develop economics theories or empirically test existing economic theories. This programme is expected serve the purpose of data analyais with a theoretical grounding.

The programme suits anyone who intends to work in a data analysis environment or pursue research degrees leading to academic positions in institutes of excellence in India and abroad. Today Econometric and statistical tools are employed by all disciplines including engineering, medicine and the natural and physical sciences. It offers great employment potential in a data driven world. The course aims to fill the gap in the supply of trained data analysts in South India. The entire schemes and syllabus of the programme is presented in Outcome Based Education format, spelling out objectives of the programme and programme outcomes so also the course specific objectives and outcomes.

Shyjan D, PhD

Chairperson, Board of Studies in Economics (PG)
University of Calicut

MEMBERS OF THE PG BOARD OF STUDIES (ECONOMICS), UNIVERSITY OF CALICUT

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10. Dr. Jayasree Paul, Assistant Professor, Government College, Chalakudy
11. Dr. Zabeena Hameed P, Assistant Professor, Department of Economics, University of Calicut

Eligibility for admission to the course

Under Mark System

BA degree of this university with Economics/Foreign Trade/Development Economics (Main)/Business Economics or equivalent degree with at least 45% marks for Part III (excluding subsidiaries) with overall CGPA of 70% or BSc degree of this University with Statistics/Mathematics (Main) or equivalent degree with at least 70% marks for Part III (excluding subsidiaries). OBC/OEC candidates are eligible to relaxation up to 5%. SC/ST candidates need only to get a pass.

Under Grade System

BA degree of this university with Economics/Foreign Trade/Development Economics (Main) or equivalent degree with Overall CGPA, at least equivalent to 50% degree of this university with overall CGPA of 70% or BSc degree of this University with Statistics/Mathematics (Main) or equivalent degree with equivalent grade to 70%. OBC/OEC candidates are eligible for relaxation up to 5%. SC/ST candidates need only to get a pass.

Mode of Teaching and Examination is English

M.A. ECONOMETRICS (CCSS) 2020-21 ADMISSION ONWARDS SCHEME OF THE PROGRAMME

Semester	Name of the Course	Credit	Hours per week*	Total Weightage	
				External	Internal
I	ECM1 C01 Mathematical Methods for Economic Analysis	5	7	30	5
	ECM1 C02 Micro Economic Theory	5	7	30	5
	ECM1 C03 Macroeconomic Theory	5	7	30	5
	ECM1 C04 Basic Statistics and Sampling Theory	4	4	30	5
	Ability Enhancement Course*	4**			
II	ECM2 C05 Econometric Theory I	5	7	30	5
	ECM2 C06 Indian Economy: Problems and Policies	5	7	30	5
	ECM2 C07 Financial Markets	5	7	30	5
	ECM2 C08 Probability and Probability Distributions	5	4	30	5
	Professional Competency Course*	4*			
III	ECM3 C09 Econometric Theory II	5	7	30	5
	ECM3 C10 International Finance	5	7	30	5
	ECM3 C11 Statistical Inference	5	4	30	5
	Elective 1 #	4	7	30	5
IV	ECM4 C12 Time Series Econometrics	3	7	30	5
	ECM4 C13 Linear Programming and its Applications in Economics	3	4	30	5
	Elective 2#	4	7	30	5
	Elective 3#	4	6	30	5
	ECM4 P14 Dissertation	4	1	4	1
	ECM4 V15 Comprehensive Viva Voce	4			
	Total credits	**80**			

 # One Elective course in Semester 3 and two elective courses (one each from the two lists) in semester 4 are to be selected from the appended lists of elective courses.

***The credits will not be counted for evaluating the overall SGPA & CGPA**

EVALUATION SCHEMES

COURSE EVALUATION (INTERNAL)

COMPONENT	WEIGHTAGE
Assignment	1
Seminar	1
Attendance	1
Test Papers (2)	2
Total	5

COURSE EVALUATION (EXTERNAL)

PART	COMPOMENT	WEIGHTAGE
A	**15 Questions x 1/5**	3
B	**5 Questions x 1**	5
C	**7 Questions x 2**	14
D	**2 Questions x 4**	8

Part A (Multiple Choice Questions)

Answer all 15 Questions

(15 x 1/5 Weightage = 3 Weightage)

Part B (Very Short Answer Questions)

Answer any 5 questions out of 8 questions

(5 questions x 1 = 5 Weightage)

Part C (Short Answer Questions)

Answer any 7 questions out of 10 questions

(7 questions x 2 = 14 Weightage)

Part D (Essay Questions)

Answer any 2 questions out of 4questions.

(2 questions x 4 = 8 Weightage)

Total = 30 Weightage

DISSERTATION EVALUATION (INTERNAL AND EXTERNAL)

Sl No	Criteria	Weightage	Weightage External	Weightage Internal
1	Relevance of the Topic and Statement of the Problem	60%	8	2
2	Methodology and Analysis		8	2
3	Quality of Report and Presentation		8	2
4	Viva-voce	40%	16	4
5	**Total Weightage**	**100%**	**40**	**10**

EVALUATION OF AUDIT COURSES

Evaluation and grading of students in audit courses may be done on the basis of a presentation made by the students about Ability Enhancement Course (AEC) and Professional Competency Course (PCC) undertaken. Minimum pass requirement in each audit course is 1.5credits.

LIST OF CORE COURSES

1	Course I	ECM1 C01 Mathematical Methods for Economic Analysis
2	Course II	ECM1 C02 Micro Economic Theory
3	Course III	ECM1 C03 Macroeconomic Theory
4	Course IV	ECM1 C04 Basic Statistics and Sampling Theory
5	Course V	ECM2 C05 Econometric Theory I
6	Course VI	ECM2 C06 Indian Economy: Problems and Policies
7	Course VII	ECM2 C07 Financial Markets
8	Course VIII	ECM2 C08 Probability and Probability Distributions
9	Course IX	ECM3 C09 Econometric Theory II
10	Course X	ECM3 C10 International Finance
11	Course XI	ECM3 C11 Statistical Inference
12	Course XII	ECM4 C12 Time Series Econometrics
13	Course XIII	ECM4 C13 Linear Programming and its Applications in Economics
14	Course XIV	ECM4 P14 Dissertation
15	Course XV	ECM4 V15 Comprehensive Viva Voce

LIST OF ELECTIVE COURSES

SEMESTER III

1	Course I	ECM3 E01 Analysis of Economic Data Using Computer software
2	Course II	ECM3 E02 Banking: Theory and Practice
3	Course III	ECM3 E03 Research Methodology
4	Course IV	ECM3 E04 Environmental Economics

SEMESTER IV

5	Course V	ECM4 E05 Mathematical Economics
6	Course VI	ECM4 E06 Behavioural Economics
7	Course VII	ECM4 E07 Growth and Development
8	Course VIII	ECM4 E08 Industrial Economics
9	Course IX	ECM4 E09 Public Finance: Theory and Policy

AUDIT COURSES

The students will have to undergo two audit courses with 4 credits each. The credits will not be counted for evaluating the overall SGPA &CGPA. Audit courses are not part of the normal workload.

GENERAL GUIDELINES

Semester I: Ability Enhancement Course (AEC) -4 Credits

The student can attempt any one of the following for securing 4 credits.

1. An internship in an academic/research institution or in any related organization suitable to the topic under study, under a supervisor/teacher/official.
2. One seminar presentation of 15 minutes duration, on a relevant topic.
3. One case study analysis approved by the Department Council.
4. Community Linkage Programme in a nearby Local Government.
5. Review of one recently published book related to Economics.

Semester II: Professional Competency Course (PCC) 4 Credits

The student should acquire skill in at least one of the software such as SPSS/R/Econometrics/Python/Stata or any software relevant to Economics and use the software to do any one of the following with the help of a supervising teacher.

1. Calculation of descriptive measures in statistics.
2. Calculation of correlation and regression.
3. Fitting of normal curve and parabola.
4. Perform ANOVA.
5. Multiple regression models.
6. Calculation of growth rate, elasticity etc.
7. Perform *t*, chi square and F-test.
8. Perform any non-parametric test.

M. A. ECONOMETRICS DISSERTATION FORMAT
STRUCTURE OF THE PROJECT

Cover Page and FrontPage

a. Title of the project
b. Degree for which project is submitted.
c. Name of the Candidate & Roll Number
d. Name of the College
e. Month and year the project is presented

Contents

a. Certificate of the supervising teacher.
b. Certificate of the head of the department.
c. Declaration by the student.
d. Acknowledgement.
e. Table of Contents
f. List of Tables
g. List of Figures
h. Introductory Chapter
i. Analyses Chapters
j. Concluding Chapter
k. References
l. Appendix (if any)

Style of Presentation

1. Alignment: Justify
2. Font: Times New Roman
3. Font size:12
4. Line spacing:1.5
5. Reference – APA Style

Programme Outcomes:

The learners are expected to demonstrate the following:

- Critically evaluate and apply the theories and techniques of economics.
- Demonstrate the theoretical and conceptual aspects of economic theory along with econometric applications.
- Enhance their lifelong learning, employing a range of statistical and econometric skills to socially relevant economic issues and policies.
- Enhance their ability to evaluate, analyze and synthesize economic data with computer applications.
- Understand and appreciate the challenges of empirical modelling in Economics and Business.

SEMESTER 1

Course	**Name of the Course**	**Credit**	**Hours per week***
Core course 1	ECM1 C01 Mathematical Methods for Economic Analysis	5	7
Core course 2	ECM1 C02 Micro Economic Theory	5	7
Core course 3	ECM1 C03 Macroeconomic Theory	5	7
Core course 4	ECM1 C04 Basic Statistics and Sampling Theory	4	4
Audit	**Ability Enhancement Course**	4**	

SEMESTER 1
Core Corse 1
MA ECONOMETRICS (CBCSS)
ECM1 C01 Mathematical Methods for Economic Analysis I
(Credit 5)

Course Objective: To provide an understanding of basic mathematical concepts required in the learning of Econometrics theory and its application.

Expected outcome

At the end of the course students will able to;

(i) Gain necessary knowledge of basic mathematical concepts necessary for an understanding of Econometric theory.

(ii) Acquire necessary skills to apply mathematical methods to economic problems.

Total Hours:90
Lecture Hours:70
Seminar Hours:20

Module 1: Linear Algebra-Different types of functions and its graphs, Constant Linear, Quadratic, Cubic, Polynomial, Exponential and logarithmic functions. Applications of linear functions in Economics- Vectors and Matrices, determinants, solution of a system of equations - Inverse method and Crammer's rule- Rank of a matrix-characteristic equations and characteristic roots and vectors.

Module 2: Differential Calculus-Functions, limit of a function, continuity of a function, Derivative of a function - Rules of Differentiation, Higher order derivatives, differentiation of logarithmic functions, exponential functions and implicit functions- Application of Derivatives- Meaning of a Derivative- rate of change- slope of a curve- Marginal concepts related to demand, supply, cost, revenue and production functions. Maxima and minima- Economic applications.

Module 3:Functions of several variables- Functions of several variables - Partial differentiation- Optimisation of Multivariable functions- constrained optimization with Lagrangian multipliers-Consumers and producers equilibrium using constrained optimization Differentials- Total and partial -Total derivatives.

Rules of integration- Definite integral, area under a curve-estimation of producers and consumers surplus.

Module 4: Differential and Difference Equations-First order Differential equations - Definitions and concepts, general formula for Differential equations – Economic applications-Differential equations for limited and unlimited growth - First order Difference equations- Solution of first order difference equations - General formula for First order Linear Difference equations, applications - stability conditions, Cobb Web model.

Module 5: Financial Mathematics- Arithmetic and geometric sequence and series- Simple interest, compound interest and annual percentage rates- Depreciation- Net present value and internal rate of return- Annuities, debit repayments, sinking funds- The relationship between interest rates and the price of bonds.

References

1. Essential Mathematics for Economics and Business, Teresa Bradley and Paul Patton, Revised by Teresa Bradley, Wiley student Edition Chapter- 2 andChapter-4.
2. Introduction to Mathematical Economics Edward T. Dowling Third EditionChapter-8.
3. Taro Yamane: - An Introductory analysis, Harper &Row, Edition3.
4. Hoel PG: Introduction to Mathematical Statistics, John Wiley & Sons, Edition.
5. RGD Allen Mathematical Analysis for Economics.
6. Tulsian, P.C and Vishal Pandey: Quantitative Techniques, Pearson Education, New Delhi.
7. HoodaR.P. Statistics for Business and Economics, Macmillan, New Delhi.
8. Alpha C Chiang: Fundamental Methods of Mathematical Economics, 2nd Ed. Inter National Student Edition, McGrawhill.
9. Edward T Dowling: Introduction to Mathematical Economics, Third Edition, Schaum's Outlines, Tata Mc Grawhill Publishing Co. Ltd, New Delhi.
10. Sreenath Baruah: Basic Mathematics and its Applications in Economics, MacmillanIndia Ltd.

SEMESTER 1
Core Corse 2
MA ECONOMETRICS (CBCSS)
ECM1 C02 Micro Economic Theory
(Credit 5)

Course Objective: To provide knowledge about consumer behaviour, firms' profit optimizing behaviour, structures of markets and theories of pricing.

Expected outcome

At the end of the course students will able to;

i Gain necessary knowledge of micro economic theory
ii Learn about consumer behaviour and how choices are made.
iii Students will learn the theories of production, markets and distribution and how households and firms allocate scarce resources in maximising welfare and profits.
iv Acquire necessary skills to apply mathematical methods to economic problems.
v Use the fundamental techniques to think about a number of policy questions related to the operation of the real economy.

Total Hours:90
Lecture Hours:70
Seminar Hours:20

Module 1: Consumer Behaviour under Uncertainty and Risk - Theory of Consumer Behaviour: Utility Analysis: Cardinal Utility Theory and Ordinal Utility Theory- Indifference Curve Analysis, Consumer's Equilibrium. Price, Income and Substitution Effects-Types of Goods-Derivation of Individual Demand Curve and Market Demand Curve with the help of Indifference Curve-Slutsky equation-Types of demand functions-Elasticity, welfare evaluation-Equivalent variation and compensating variation- Revealed preference (weak and strong axioms)-Consumer Surplus

Recent developments in demand theory: Constant elasticity demand function- Distributed lag models of Demand-Nerlove, Houthakker and Taylor-Linear expenditure system-Characteristic approach to demand function.

Choice under uncertainty: Representing uncertainty by Probability distributions- St. Petersburg paradox-Neumann-Morgenstern utility index- Friedman Savage hypothesis-Markowitz hypothesis- Utility functions and attitudes towards risk- risk neutrality, risk aversion, risk preference, demand for risky assets- reducing risks- - The state preference approach to choice under uncertainty- Network externalities- Bandwagon effect, Snob effect and Veblen effect.

Module 2:Theory of Production and Costs-Short run and long run production function-returns to scale- elasticity of substitution- Homogeneous production function- Linear homogeneous production function- Fixed proportion production function- Cobb Douglas production function and CES production function- Technological progress and production function- Cost function- Cost minimising input choices- properties of cost functions-Economies of scope- The Learning curve

Module 3: Theory of Imperfect Markets-Market Structure- Monopoly-Monopolistic Competition-Oligopoly-Characteristics- Collusive versus non-collusive oligopoly- Non-collusive models-Cournot model- Bertrand model- Chamberlin's model-Kinked demand curve model of Sweezy- Stackelberg's model- Collusive models- Cartels and Price leadership

Module 4: Theory of Games and Asymmetric Information- Basic concepts-Cooperative versus non-cooperative game- Zero sum versus non- zero sum game- Prisoner's dilemma-Nash equilibrium- Prisoner's dilemma- Asymmetric information- Implications of asymmetric information- The lemons problem- Adverse selection- Moral hazard -Market signalling-Principal-agent problem- The efficiency wage theory.

Module 5: Theory of Distribution-Euler's theorem-Adding up problem-Clark-Wicksteed-Walras Product exhaustion theorem-General equilibrium of exchange- General equilibrium of production- Efficiency of competitive markets- Existence, uniqueness and stability of general equilibrium-Welfare economics- Criteria of social welfare-Pareto optimality-Kaldor-Hicks compensation criterion- Scitovsky criterion- Theory of second best- Arrow's impossibility theorem

References

1. Walter Nicholson and Christopher Snyder (2017): Microeconomic Theory- Basic Concepts and Extensions, 12th edition, Cengage Learning India Private Limited.
2. Andrew Schotter (2009): Microeconomics: A Modern Approach- 1st edition, South Western Cengage Learning.
3. Michael E Wetzstein(2013): Microeconomic Theory- Concepts and Connections, 2nd edition, Routledge.
4. Robert S Pindyck and Daniel L Rubinfeld (2017): Microeconomics- 8th edition, Pearson.
5. Thomas J Nechyba (2010): Microeconomics: An Intuitive Approach with Calculus- 1st edition, South Western Cengage Learning.
6. Andreu Mas-Colell, Michael D Whinston and Jerry R Greene (1995): Microeconomic Theory- 1st edition, Oxford University Press.
7. Geoffrey A Jehle (2010): Advanced Microeconomic Theory- 3rd edition, Prentice Hall
8. Hall R Varian (2014): Intermediate Microeconomics- A Modern Approach, WW Norton and Co.
9. Jeffrey M Perloff (2019): Microeconomics -7th edition, Pearson
10. Hugh Gravelle and Ray Rees (2007): Microeconomics- 3rd edition, Pearson Education
11. Edgar K Browning and Mark Zupan (2011): Microeconomics: Theory and Applications- 3rd edition.
12. Dominick Salvatore (2009): Microeconomics – 5th edition, Oxford University Press.
13. A Koutsoyiannis (1979): Modern Microeconomics- 2nd edition, Macmillan.
14. Robert YAwh(1976): Microeconomics: Theory and Applications- John Wiley & Sons
15. Watson and Getz (2004): Price Theory and its Uses- 5th edition, AITBS Publishers and Distributors.
16. James H Henderson and Richard E Quandt (1980): Microeconomic Theory: A Mathematical Approach- 8th edition, McGraw-Hill
17. G S Madalla and Ellen Miller (1989): Microeconomics: Theory and Applications- 1st Edition, Tata McGraw-Hill.

SEMESTER 1
Core Corse 3
MA ECONOMETRICS (CBCSS)
ECM1 C03 Macroeconomic Theory
(Credit 5)

Course Objective: To introduce the macroeconomic concepts like consumption and investment and to give an idea about the inter relationship among these macro-economic variables.

Expected outcome

At the end of the course students will able to;

i. Gain necessary knowledge of macroeconomic theory and concepts of consumption, employment, investment and their impact on the real economy.
iii Understand the various challenges faced by the economies of the world and build capacities to frame policies suited to solve these challenges.
iiii Acquire necessary skills to apply various macroeconomic theories in the policy making arena.

Total Hours:90
Lecture Hours:70
Seminar Hours:20

Module 1: Aggregate demand: Consumption Function: Keynes' psychological law- Absolute income hypothesis- Kuznet's consumption puzzle - Relative income hypothesis - Fisher's inter-temporal choice model – Permanent income hypothesis- Life cycle hypothesis- Investment Function - MEC and MEI approaches -user cost and Neo-classical theory of investment- Tobin's q-ratio- Accelerator theory of investment (simple and flexible acceleration models).

Demand for Money- Classical approach to demand for money- Quantity theory approaches, Fisher's equation, Cambridge quantity theory, Keynes's liquidity preference approach - Post-Keynesian approaches to demand for money : Friedman's restatement of Quantity theory of money, Approaches of Baumol and Tobin.

Supply of Money - Measures of money supply (RBI definition) - The H theory of money supply- Money multiplier process-Behavioural and endogenous money supply models- Fisher effect.

Module 2: Theories of inflation and unemployment: Keynesian and monetarist approach to inflation- Structuralist theory of inflation- Inflation unemployment trade off-Phillips Curve- Short run and long run Phillips curve -The natural rate of unemployment hypothesis- Modified Phillips curve- Adaptive expectation hypothesis- Augmented Phillips curve- NAIRU- Okun's Law-The new microeconomics of the labour market and search theory- Rational expectations.

Module 3: **Theories Business cycles**- Business cycles- Monetary theory of Hawtrey- Over investment theory of Hayek- Innovation theory of Schumpeter-Models of Samuelson, Hicks and Kaldor-Keynesian theory of business cycle-The real business cycle theory- Political business cycle theory

Module 4: Neo-classical and Keynesian Synthesis: The IS-LM model-equilibrium in goods and money market - ISLM model with government sector; Relative effectiveness of monetary and fiscal policies; Extension of IS-LM models with labour market and flexible prices. The three-sector macro model with Keynesian and Neoclassical versions.

Module 5: Macroeconomic policy: Macroeconomic policies- Objectives of macroeconomic policies- Targetvariable and instrument variable-Monetary policy-Instruments- The issue of central bank autonomy-Rules versus discretion- The Taylor rule-Time inconsistency of policy- Fiscal policy- Instruments- Policy lags - Inside and outside lags- Fiscal policy and

budget deficit- Crowding out effect and government budget- The Ricardian Equivalance- Income policy- Stabilization policy.

References:

1. Gregory Mankiw (2008): Macroeconomics- Worth Publishers NY, 6thed.
2. Richard T Froyen (2005): Macroeconomics: Theories and Policies- Pearson (LPE), Seventhed.
3. RosalindLevacicandAlexanderRebman(1982):Macroeconomics:AnIntroductionto Keynesian-Neoclassical Controversies- 2nd ed. Macmillan.
4. Eric Pentacost: Macroeconomics-An Open Economy Approach-Macmillan.
5. Rudiger Dornbusch, Stanley Fisher and Richard Startz (2004): Macroeconomics- Tata McGraw Hill, 9thed.
6. Errol D'Souza (2008): Macroeconomics- Pearson Education.
7. P.N Junankar (1972): Investment: Theories and Evidence-Macmillan.
8. Fred R Glahe (1985): Macroeconomics: Theory and Policy- Harcourt Publishers, New Delhi.
9. Veneries and Sebold (1977): Macroeconomics: Models and Policies- John Wiley &Sons.
10. Gurley J and Shaw E S (1960): Money in a Theory of Finance- Washington: Brookings Institution.
11. Samuelson and Nordhaus (1998): Macroeconomics- 16th ed. Irwin McGrawHill.
12. Robert J Gordon: Macroeconomics- Eastern Economy Edition.
13. Edward Shapiro: Macroeconomics- Galgotia Publications, New Delhi.
14. Mervyn K.Lewis and Paul D Mizen (2000): Monetary Economics- Oxford University Press.
15. Jagdish Handa (2000): Monetary Economics-Routledge.

SEMESTER 1
Core Corse 4

MA ECONOMETRICS (CBCSS)
ECM1 C04 Basic Statistics and Sampling Theory
(Credit 4)

Total Hours:90
Lecture Hours:70
Seminar Hours:20

Course Objective: To provide an understanding of basic statistical concepts required to learn Econometric theory.

Expected outcome

At the end of the course students will able to

i Collect data from a population or sample scientifically and to classify it properly.
ii Present the data in different tabular and graphical forms
iii Compute different measures of central values, partition values and dispersion.
iv Apply the concepts of Correlation and Regression in the context of economic data analysis.
v Distinguish between different methods of sampling and to apply these methods in proper situations

Module 1: ***Collection and Presentation of Data*****:** Data – Collection of Data – Population and Sample- Census and Sampling- levels of measurement (nominal, ordinal, interval and ratio), Sampling frame – sampling errors- Tools of Data Collection – Questionnaires - Classification of data - Preparation of tables- Frequency distribution – frequency polygons- Frequency curves- Ogives – Histogram- box plots- stem & leaf plots- Pie charts – bar charts.

Module 2: ***Measures of Central Values and Dispersion*****:** Arithmetic mean, median, mode, geometric mean, harmonic mean – Partition values – Quartiles- Deciles- Percentiles- Measures of dispersion – range, mean deviation, standard deviation – Measures of shape – moments, skewness and kurtosis.

Module 3: ***Correlation and Regression****:* Scatter Plot, Simple correlation, Karl pearsons coefficient- Spearman's rank correlation- Simple regression, two regression lines, regression coefficients. Fitting of regression line -least square method

Module 4: ***Sampling theory*** – Probability and non-probability sampling, Sampling methods– Simple random sampling, sampling with and without replacement, Stratified sampling – Estimation of mean, variance and proportion. Systematic sampling –linear – circular – Cluster sampling – Multi-stage and Multi-phase sampling (concepts only)

References

1. Taro Yamane, Statistics: An Introductory Analysis, Harper & Row, Edition 3, 1973
2. Business Statistics for Contemporary Decision Making, 6th edition, John Wiley and Sons Inc., 2010.

2. Hoel PG: Introduction to Mathematical Statistics, John Wiley & Sons, Edition 4, 1971

3. YP Agarwal: Statistical Methods: Concepts, Application and Computation, Sterling Publishers 1986

4. Sidney Siegal, N. John Castellan: Non parametric Statistics for Behaviour Sciences, Edition 2, 1988, Mc Graw-Hill

5. Tulsian, P.C and Vishal Pandey: Quantitative Techniques, Pearson Education, New Delhi

6. S.P. Gupta: Statistical Methods, Sulthan Chand and Sons, New Delhi.

7. Hooda R.P: Statistics for Business and Economics, Mac Million, New Delhi

8. Alpha C Chiang: Fundamental Methods of Mathematical Economics, 2nd Ed. -Inter National Student Edition, Mc Grawhill

9. Edward T Dowling: Introduction to Mathematical Economics, Third Edition, Shaum's Outlines, Tata Mc Grawhill Publishing Co. Ltd, New Delhi.

10. Sreenath Baruah: Basic Mathematics and its applications in Economics, Macmillan India Ltd.

SEMESTER II

Course	Name of the Course	Credit	Hours per week*
Core course 5	ECM2 C05 Econometric Theory I	5	7
Core course 6	ECM2 C06 Indian Economy: Problems and Policies	5	7
Core course 7	ECM2 C07 Financial Markets	5	7
Core course 8	ECM2 C08 Probability and Probability Distributions	5	4
Audit	Professional competency course	4*	

SEMESTER 2
Core Corse 5
MA ECONOMETRICS (CBCSS)
ECM2 C05 Econometric Theory I
Credit 5

Course Objective: To provide an understanding of basic Econometric theory.

Expected outcome

At the end of the course students will able to;

(i) Gain necessary knowledge of various regression models and their assumptions.
(ii) Learn the various diagnostic tests that ensure the robustness of the econometric models.

Total Hours:90
Lecture Hours:70
Seminar Hours:20

Module 1: Simple Linear Regression Model: Nature and scope of Econometrics-Economic theory and mathematical economics- Methodology of econometrics-Uses of econometrics-The concept of PRF -Significance of stochastic error term-The SRF-Problem of estimation-Method of ordinary least squares- Assumptions underlying the method of least squares-Properties of estimators- Gauss Markov theorem-Coefficient of determination, r^2 -Normality assumption-Hypothesis testing- t and F tests-P value- Practical versus statistical significance-Prediction-Method of maximum likelihood-Maximum likelihood estimation of two variables model.

Module 2: Multiple Regression Analysis: The three-variable model-OLS estimation of partial regression coefficients-Multiple coefficient of determination R^2 and adjusted R^2-Hypothesis testing-Testing the overall significance of the regression model-F test-Testing the equality of two regression coefficients-Restricted least squares-Chow test-General k variable regression model- Matrix approach to estimation and derivation of the properties of OLS estimators.

Module 3:Assumptions of the Classical Model: Multicollinearity-Nature, consequences, detection and remedial measures-Autocorrelation- Nature, consequences, detection, and remedial measures- Heteroskedasticity-Nature, consequences, detection and remedial measures.

Module4: Extensions of Two Variables and Dummy Variable Regression Model: Regression through the origin-Functional forms of regression models, log-log, log-lin, lin-log and reciprocal models- Dummy variable-ANOVA models-ANCOVA models-Dummy variable trap-Dummy variables and seasonal analysis-Structural analysis-Piecewise linear regression.

Module 5: Model Specification and Diagnostic Testing: Types of specification errors-Detection and consequences-RESET-Errors of measurement- Consequences, remedies

References

1.Damodar N Gujarati and Dawn C Porter (2009): Basic Econometrics, Fifth Edition, McGraw Hill International Edition.

2.Damodar N Gujarati (2011): Econometrics by Example, First Edition, Palgrave, MacMillan.

3.James H Stock and Mark W Watson (2017): Introduction to Econometrics, Third Edition, Pearson, Addison Wesley.

4.Carter Hill, William Griffiths and Guay Lim (2011): Principles of Econometrics, 4th Edition, John Wiley & Sons.

5.Jeffrey M Wooldridge (2018): Introductory Econometrics: A Modern Approach, 7th Edition, Thomson South Western.

6.Robert S Pyndick and Daniel L Rubinfeld (1998): Econometric Models and Economic Forecasts, Fourth Edition, McGraw Hill International Edition.

7.Kerry Patterson (2000): An introduction to Applied Econometrics: A Time Series Approach, First Edition, Palgrave.

8.Walter Enders (2010): Applied Econometric Time Series, Third Edition, Wiley India Edition.

9.Richard Harris and Robert Sollis (2006): Applied Time Series Modeling and Forecasting, First Edition, Wiley Student Edition.

10.DimitriosAsteriou and Robert Hall (2015): Applied Econometrics, 3rd Edition, Oxford University Press.

11.Jack Johnston and John Dinardo (1998): Econometrics Methods, Fourth Edition, The McGraw Hill Companies.

12.William H Greene (2018): Econometric Analysis, 8th Edition, Pearson Education.

13.Christopher Dougherty (2007): Introduction to Econometrics, Third Edition, Oxford University Press.

14.Chris Brooks (2012): Introductory Econometrics for Finance, 3rd Edition, Cambridge.

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SEMESTER 2
Core Corse 6
MA ECONOMETRICS (CBCSS)
ECM2 C06 Indian Economy: Problems and Policies
Credit 5

Course Objective: To provide and understanding of the Indian Economy and develop ideas of the basic characteristics of Indian economy, its potential on natural resources.

Expected outcome
At the end of the course students will able to;

i Learn the strategy of economic development undertaken by India and grasp the importance of planning undertaken by the government of India.
ii. Understand the features of economic reforms, its successes and failures.
iii. Gain an insight into the Kerala model of economic development.
iv. Understand the various challenges faced by the economies of the world and build capacities to frame policies suited to solve these challenges.

Total Hours:90
Lecture Hours:70
Seminar Hours:20

Module 1: Growth, Structural Changes and Challenges of the Indian Economy: Economic growth in India- CSO and national income related aggregates- Contribution of different sectors to GVA, GDP and Employment- Trends in savings and investment since reforms- Migration, diaspora and remittance - Regional disparity in growth and development- Analysis of poverty, unemployment and inequality in India

Module 2: Review of Economic Development: Assessment of Indian agriculture sector and recent initiatives by the government for its growth-Inter regional dimensions of industrial growth in India- Make in India initiative- Service sector: growth rate, share in exports and imports, software exports- Infrastructure at cross roads -Prices: Headline inflation-Inflation based on WPI and CPI combined, food inflation, core inflation- Monetary management in India prior to1990 and position after 1990s-New initiatives of the government towards black money-Inclusive policies of the government-A global deal on climate change: possible role for India.

Module 3: Economic Planning in India: Planning and economic development-Objectives of planning-Techniques of planning- Achievements of planning- Bottom up and Step down approaches in planning- Evaluation of Five Year Plans-NITI Aayog and its Vision Documents- Welfare programmes announced in the last two Union Budgets.

Module 4: Economic Reforms Since 1991: Background of economic reforms- Washington Consensus- Industrial policy reforms- Trade policy reforms- Fiscal policy reforms- Financial sector reforms- Foreign investment policy reforms- Second generation economic reforms-An appraisal of India's economic reforms- Post reform Infrastructure Investment Models-PPP-Cooperative federalism with special reference to GST.

Module 5: Kerala Economy: Economic liberalization and economic growth in Kerala-Kerala model of development- Agricultural Performance-Industrial backwardness- Health and education - Migration of casual workers to Kerala- Decentralization-Achievements of

decentralization-Poverty and unemployment in Kerala - State finances of Kerala- Causes of acute fiscal crisis of Kerala.

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SEMESTER 2
Core Course 7
MA ECONOMETRICS (CBCSS)
ECM2 C07 Financial Markets
Credit 5

Course Objective: To provide and understanding of the functioning of the various organs of the financial sector and learn how the financial markets impact the economy.

Expected outcome
At the end of the course students will able to;
i Understand the components of the financial system.
ii Distinguish between the money and capital markets
iii Understand how the global financial system works.
iv Learn about the various instruments existing in the financial market

Total Hours:90
Lecture Hours:70
Seminar Hours:20

Module 1:Financial Markets: Functions of financial markets-Types of financial markets-Participants in financial markets- Role of financial intermediaries-Financial innovation-Financial inclusion and inclusive growth.

Module 2: Money Market: Functions of money market-Instruments of the money market-Call money-Bill of exchange- Commercial bills-Treasury bills- Commercial paper-Interbank market-Federal funds- Negotiable certificate of deposits- Banker's acceptance-Repurchase agreements-Money market mutual funds- Features of a developed money market-Structure of Indian money market- Money market reforms in India since 1991.

Module 3: Capital Market: Functions of capital market-Primary market-Instruments of the primary market- Secondary market-Functions- Instruments of the secondary market-Demutualisation of stock exchanges- Trading mechanism of the stock exchanges- Liquidity products (margin trading, short sales, securities lending and borrowing)-Foreign institutional investment-Participatory notes (P- notes)-Insider trading-Investor protection- Credit rating-Capital market institutions- Depositories-Discount and Finance House of India-Stock Holding Corporation of India- Securities Trading Corporation of India-SEBI-Functions and powers- Capital market reforms in India since 1991.

Module 4: Derivatives Market: Types of derivatives-Participants in the derivative markets-Uses of derivatives- Options- Types of options-Uses of options-Platforms for options trade-Trading mechanics-Option premium-Profits and losses with options-Stock options and stock index options in India- Futures- Types of futures (stock index futures-foreign currency futures-interest rate futures- commodity futures)-Uses of futures-Market mechanics-Market participants- The clearing process- Stock futures and stock index futures in India-Difference between options and futures-Swaps-Interest rate swaps-Foreign currency swaps.

Module 5:Global Financial Markets Instruments- American Depository Receipts (ADR)-Global Depository Receipts (GDR)- Foreign Currency Convertible Bonds (FCCB)-External commercial borrowings-International bonds-Eurobonds-Euronotes-Euro commercial papers-Eurodollars-Eurocurrency market- Reasons for the growth-Features-Effects of the eurocurrency market.

References

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SEMESTER 2
Core Course 8
MA ECONOMETRICS (CBCSS)
ECM2 C08 Probability and Probability Distributions
Credit 5

Total Hours:90
Lecture Hours:70
Seminar Hours:20

Expected outcome

At the end of the course students are expected to

i Apply the concept of probability in different situations to solve economic problems.
ii Understand the concept of random variables and to explain probability functions and its properties.
iii Explain the properties of standard probability distributions.
iv Explain the context of sampling distributions and its applications.

Module 1: ***Probability*** – Random experiment- Sample Space – Event –Mathematical definition - Axiomatic probability – Addition and multiplication theorem – Conditional probability- Independence- Baye's theorem.

Module 2: ***Random Variables***- Random Variables- Discrete and continuous- Probability distribution function - Cumulative distribution functions – joint probability function – mathematical expectation – properties- moment generating function and characteristic function.

Module 3: ***Special probability distributions*** — Discrete distributions - Bernoulli, Binomial, Uniform, Poisson, Geometric. Continuous distributions – Uniform, Exponential, Normal, Gamma, Pareto- Log-normal – (Properties and applications).

Module 4: ***Sampling Distributions*** — Sampling distributions – Standard error – Distributions of sample mean, Sample variance – chi square Student's t, and F distributions (Properties, applications and inter relationships).

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2. Business Statistics for Contemporary Decision Making, 6th edition, John Wiley and Sons Inc., 2010.

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3. YP Agarwal: Statistical Methods: Concepts, Application and Computation, Sterling Publishers 1986

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SEMESTER III

Course	Name of the Course	Credit	Hours per week*
Core course 9	ECM3 C09 Econometric Theory II	5	7
Core course 10	ECM3 C10 International Finance	5	7
Core course 11	ECM3 C11 Statistical Inference	5	4
Elective 1	ECM3 E01	4	7

SEMESTER 3
Core Course 9
MA ECONOMETRICS (CBCSS)
ECM3 C09 Econometric Theory II
Credit 5

Course Objective: To learn how to empirically analyse different types of economic data using econometric techniques and to make scientific conclusions on the analysis.

Expected outcome
At the end of the course students will able to;
i Study different forms data analysis employing advanced econometric methods.
ii Learn the application of qualitative, panel and dynamic regression models.
iii Learn to run simultaneous equation models.

Total Hours:90
Lecture Hours:70
Seminar Hours:20

Module 1: Qualitative Response Regression Models: The linear probability model (LPM)-The logit model- The probit model- The tobit model.

Module 2: Panel Data Regression Models: What is panel data? Pooled OLS Regression or Constant Coefficient Model-The Fixed effect LSDV model-The Fixed Effect within Group(WG) Estimator- The Random Effects Model- Properties of various estimators

Module 3:Dynamic Econometric Models and Panel Data Regression Models: Autoregressive and distributed-lag models-Role of lag in economics-The Koyck approach-The adaptive expectations model- Stock adjustment model-Estimation of autoregressive models- The method of instrumental variable (IV)- Durbin h test- Almon approach to distributed lag models-Panel Data Regression Models-Fixed effects regression model-The random effects model.

Module 4: Simultaneous Equation Methods: Simultaneous equation bias-The identification problem-Rules of identification- Rank and order condition- Simultaneous equation methods-Limited information versus full information methods-Recursive models and ordinary least squares-The method of indirect least squares (ILS)-The method of two stage least squares (2SLS)-Instrumental variable estimation- Properties of various estimators.

References

1. Damodar N Gujarati and Dawn C Porter (2009): Basic Econometrics, Fifth Edition, McGraw Hill International Edition.

2. Damodar N Gujarati (2011): Econometrics by Example, First Edition, Palgrave, MacMillan.

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SEMESTER 3

Core Course 10

MA ECONOMETRICS (CBCSS)

ECM3 C10 International Finance

Credit 5

Course Objective: To acquire basic knowledge of the economic relationship between countries and understand the way the international monetary system works.

Expected outcome

At the end of the course students will able to;

i Study the concepts of balance of payments (BOP) and how the equilibrium in the BOP is achieved.

ii To learn how currency exchange rates are fixed in the foreign exchange market.

iii Understand the functioning of the international monetary system.

Total Hours:90
Lecture Hours:70
Seminar Hours:20

Module 1: Balance of payments: Balance of payments- Components- Equilibrium and disequilibrium in BOP- Methods of correcting BOP deficit-Adjustment Mechanisms-Automatic, price and income adjustments- Elasticity approach- Marshall-Lerner condition-Absorption Approach-Monetary approach- J curve effect- Currency convertibility- Current and capital account convertibility-The Indian experience-FEMA.

Module 2: Exchange rate: Exchange rate -Nominal, Real, Effective, NEER, REER-Exchange rate systems- Relative merits and demerits of fixed and flexible exchange rates-Hybrid exchange rates- Purchasing power parity theory-Monetary approach- Asset market (portfolio balance) model- Exchange rate overshooting - Exchange rate in India- Indian Rupee and its fluctuations in international currency market.

Module 3: Foreign exchange market Foreign exchange market-Functions-Participants-Stability of foreign exchange markets-Spot and forward market- Currency futures and options- Swap market- Foreign exchange risk- Hedging- Speculation- Stabilizing and de-stabilizing- Currency arbitrage- Internal and external balance- Policy adjustments-Expenditure changing and expenditure switching policies-Assignment problem- Swan diagram- Mundell-Fleming model.

Module 4: International capital flows: Portfolio investment and direct investments-Motives for capital flows- Effects of international capital flows- Multinational corporations-Advantages and disadvantages of MNCs- Foreign investment in India since 1991.

Module 5: International monetary system: International monetary system-The gold standard and its breakdown-Bretton Woods system and its breakdown- Present international monetary system- European monetary union-Euro- Optimum currency areas- Currency boards- Dollarization- Brexit.

References

1. Dominick Salvatore: International Economics- John Wiley andSons.
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5. Thomas A. Pugel: International Economics-TMH.
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SEMESTER 3

Core Course 11

MA ECONOMETRICS (CBCSS)

ECM3 C11 Statistical Inference

Credit 5

Course Objective:

To help the students acquire skills in statistical estimation of parameters and their significance.

Expected outcome

At the end of the course students are expected to

(i) Demonstrate the ability to estimate population parameters with different methods

(ii) To conduct testing of statistical hypothesis in various situations.

Total Hours:90
Lecture Hours:70
Seminar Hours: 20

Module 1: ***Theory of Estimation*** **:** – Estimations of population parameters – point and interval estimation – Properties of good estimators – Point estimators of mean and proportion- Confidence interval for Mean and Proportion and variance – Methods of estimation – Methods of least squares, Method of maximum likelihood and its properties**.**

Module 2: ***Testing of Hypotheses*****:** Research and Statistical hypothesis **-** Simple and composite – Null hypothesis –Alternate Hypothesis- Types of errors in testing of hypothesis – Type 1 and Type 2 errors–Level of significance- Power of test – Testing procedure – Critical region – One tailed and two tailed tests –Critical values –Steps in hypothesis testing.

Module 3: ***Parametric and Non- Parametric Tests*** **:** Parametric and Non -parametric tests– Large sample tests – Z-test for single population mean –Comparing two population means– Comparing proportions– –Small sample tests–t-test for single population mean, independent t-test and paired t-test– correlation tests– Chi Square test – goodness of fit–test for independence of attributes– association test– Non parametric tests- sign test, Wilcoxon – Mann Whitney U Test, Signed rank test, Kruskal Wallis test, Wald – Wolfowitz test.

Module 4: ***Analysis of Variance:*** Analysis of Variance – Meaning, assumptions – One – way classification and Two-way classifications, simple applications.

References

1. Taro Yamane, Statistics: An Introductory Analysis, Harper & Row, Edition 3, 1973
2. Business Statistics for Contemporary Decision Making, 6th edition, John Wiley and Sons Inc., 2010.

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SEMESTER 3

Elective Course 1

MA ECONOMETRICS (CBCSS)

ECM3 E01 Analysis of Economic data Using Computer Software

Credit 4

Course Objective:

The course attempts to familiarise the students with the application of econometrics, particularly through statistical and econometric software packages.

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Expected outcome

At the end of the course students are expected to;

(i) Demonstrate the ability to analyse economic data

(ii) Have working knowledge various econometric software and coding.

Total Hours:90
Lecture Hours:70
Seminar Hours: 20

Module 1: What is Data Science? Big Data and Data Science – Datafication - Current landscape of perspectives - Skill sets needed; Matrices - Matrices to represent relations between data, and necessary linear algebraic operations on matrices -Approximately representing matrices by decompositions (SVD and PCA)

Module 2: Data pre-processing: Data cleaning - data integration - Data Reduction Data Transformation and Data Discretization.-Exploratory Data Analysis (EDA) - Basic tools (plots, graphs and summary statistics) of EDA, Philosophy of EDA - The Data Science Process- **Data processing using Microsoft Excel**: Fundamentals of spreadsheets – Fill handles – Absolute positioning – Cell operations – Data sorting and filter – Specific functions – Frequencies – Charts and chart Options – Mathematical Functions – Transformations – matrices – Solving linear equations using spreadsheet – statistical functions – measures of central tendencies and dispersions – data analysis –regression – forecasting – chi-square test.

Module 3: Basics of Coding in Python: Downloading Python-Using Comments in Python - Executing Commands in Python - Importing Packages in Python- Getting Data into Python - Saving Output in Python - Accessing Records and Variables in Python - Setting Up Graphics in Python

Module 4: Basic coding in R*:* Downloading R and RStudio -Basics of Coding in R - Using Comments in R - Executing Commands in R - Importing Packages in R - Getting Data into R- Saving Output in R - Accessing Records and Variables in R

Module 5: Exploratory data analysis

Constructing Bar graphs, contingency tables, histogram using Python and R

References

1. Cathy O'Neil and Rachel Schutt, “Doing Data Science, Straight Talk from The Frontline”, O'Reilly, 2014.
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11. P.K.Viswanathan: Business Statistics: An Applied Orientation, Pearson.
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SEMESTER 3

Elective Course 2

MA ECONOMETRICS (CBCSS)

ECM3 E02 Banking : Theory and Practice

Credit 4

Course Objective: To provide and understanding of the functioning of the various banking institutions in India and abroad.

Expected outcome

At the end of the course students will able to;

i. Understand the various types of banking institutions.
ii. Know the various innovations in the banking industry.
iii. Learn the reforms in the Indian banking system.
iv. Understand the manner in which the global banking system works.

Total Hours:90
Lecture Hours:70
Seminar Hours: 20

Module 1: Structure and functions of central banks-Federal Reserve System-Bank of England- European Central Bank-Reserve Bank of India- Monetary policy- Objectives and instruments- Liquidity management- Autonomy of the RBI-Monetary sector reforms in India since 1991- Recent monetary and credit policy of RBI-Impact of RBI's monetary policy on economic growth and inflation.

Module 2: Commercial Banks and Specialised Financial Institutions

Structure of commercial banks-Public sector banks-Private sector banks-New generation banks-Foreign banks-Functions of commercial banks-Commercial banks and credit creation-Branch expansion programme and policy-Deposit mobilization and sectoral allocation of bank credits- Priority sector lending- Social banking-Lead bank scheme- Land development banks- Regional rural banks-Development financial institutions (IFCI, IDBI, IIBI, SIDBI) - Specialized financial institutions (EXIM Bank-National Housing Bank-NABARD-MUDRA bank, DFI)-Specialized investment institutions (Pension funds-Hedge funds-Mutual funds-UTI)- Non Banking Financial Companies-Investment banks-Merchant banks.

Module 3: Innovations in Banking Transactions

Mail transfer-Telegraphic transfer-MICR clearing-Automated clearing system-Electronic funds transfer-NEFT-RTGS-IMPS-Digital payment system-E-banking-Virtual payments systems-Internet banking- Mobile banking-Home banking-Tele-banking-Core banking.

Module 4: Banking Sector Reforms in India

Banking sector reforms since 1991- Context, need and objectives-Implementations of the Narsimham Committee recommendations- Issues in banking sector reforms-Priority sector lending-Asset classification-Non-performing assets-Deposit Insurance-Capital adequacy norms-Regulation of the banking sector-Board for Financial Supervision-Credit Information Bureau of India Limited (CIBIL)-Banking Ombudsman-SARFAESI Act.

Module 5: International Banking

International banking-Reasons for the growth of international banking-Offshore banking-Multinational banking-Bank for International Settlements (BIS)-World Bank-Asian Development Bank-New Development Bank (BRICS bank).

References

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2. Bhole and Mahakud: Financial Institutions and Markets , McGraw Hill
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9. N.S. Kher: Non-Perfoming Advances in Banks, Skylark, New Delhi.
10. Hansen and Kathuria (ed.) A Financial Sector for the 21st Century OUP.
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15. Report of the Committee (Narsimham) on the Financial System Nov., 1991.
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SEMESTER 3

Elective Course 3

MA ECONOMETRICS (CBCSS)

ECM3 E03 Research Methodology

Credit 4

Course Objective: The course attempts to provide the students with an understanding of scientific methods in research and apply these methods to research in various domains of Economics.

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Expected outcome

At the end of the course students are expected to;

(i) Formulate and analyse research problems in Economics
(ii) Demonstrate the ability to collect and analyse various types of economic data
(iii) Write research proposals and reports

Total Hours:90
Lecture Hours:70
Seminar Hours: 20

Module 1: Introduction: Meaning of research- The relation between theory and research- Types of research- Scientific and social research- Pure and applied research- Special features of social research- Different approaches in social research.

Module 2: Formulation of a Research Problem:

Formulation of research problems- Meaning-Identification and selection of research problems Generation of hypothesis-Process of hypothesis generation-null and alternative hypothesis-Characteristics of a good hypothesis-Research design – Meaning- Objectives- Characteristics of a research design- Types of research design – Descriptive, diagnostic, exploratory, experimental- Deductive and inductive method- Static and dynamic method- Historical and dialectical method- Case study method-Interdisciplinary research-Research design process

Module 3: Research Proposal: Purpose of a research proposal-Types of research proposals-Development of research proposals—Formatting- contents-Requirements of the sponsoring agent-Evaluation of a research proposal

Module 4: Report Writing -Objective of report writing- Steps in Research Report – Introduction-Literature Review-Methodology-Results/findings-Discussion-Conclusion-Referencing/Bibliography- Appendices- Styles in research writing- APA style-Chicago style-MLA style- Harvard style-Columbia style-

Module 4: Ethics in research- Research environment –Negligence – Plagiarism-Management of data- Ethics of manipulation of data – Authorships - Conflict of interest - Distribution of scientific feats, Intellectual property and copyright - Justification of financial investment and its outcome - Sharing and ownership of data -Response to violations of ethical standards.

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SEMESTER 3

Elective Course 4

MA ECONOMETRICS (CBCSS)

ECM3 E04 Environmental Economics

Credit 4

Course Objective: To comprehend various environmental issues and to develop an understanding of the economics of environment in the theoretical as well as practical context.

.

Expected outcome

At the end of the course students will able to;

i. Develop an understanding of the various analytical tools to comprehend environmental issues

ii. Know the various aspects of sustainable development

Total Hours:90
Lecture Hours:70
Seminar Hours: 20

Module 1: Introduction: Economics of environment – Meaning- Nature- Scope- Significance -Environment as an economic and a social good – Exhaustive and renewable common property resources -Economic development and environment –trade-off – Environmental Kuznets curve and limits to growth -Sustainable development

Module 2: Environmental Challenges:

Environment and agricultural development – Technological change –Use of water, fertilizers, pesticides – Groundwater and forest–Depletion of environment and industrial development – Pollution- Urbanization- Global environmental issues – Depletion of ozone layer, Greenhouse effect, Global warming, Climate change, Loss of bio-diversity

Module 3: Environmental Regulation – Theories and Analytical Tools: The economic theory of efficient pollution control – marginal abatement cost (MAC) and marginal environmental damage (MED)-Externalities and market failures – Coase theorem- Environmental regulation – Command and control regulation versus market based instruments – Emission taxes and charges, Environmental taxes and subsidies – Resolutions through direct negotiations – Emissions trading – Environmental value assessment – Environmental value – Revealed preference method – Stated preference method – Cost-benefit analysis

Module 4: Climate Change, Environmental Agreements and Policies:

Climate Change – Greenhouse gases – Accumulation of emissions and process of global warming, Kyoto Protocol – Emission reduction targets – Kyoto mechanisms, Limitations of Kyoto Protocol – Carbon Credits Paris Agreement – Aims – Nationally determined contributions – Effects on global temperature – Mechanisms and criticism – India's environmental policy – Environment protection laws – National Green Tribunal

References

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SEMESTER IV

Course	Name of the Course	Credit	Hours per week*
Core course 12	ECM4 C12 Time Series Econometrics	3	7
Core course 13	ECM4 C13 Linear programming and its Applications in Economics	3	4
Elective 2		4	7
Elective 3		4	6

SEMESTER 4

Core Course 12

MA ECONOMETRICS (CBCSS)

ECM4 C12 Time Series Econometrics

Credit 3

Course Objective:

The course attempts to familiarise the students with Econometric methods of analysing time series data.

.

Expected outcome

At the end of the course students are expected to;

(i) Understand the methods of anlaysing time series data.

(ii) Demonstrate the ability to distinguish between stochasitic process and stationary process and the skills to test the presence of unit roots in data employing various econometric techniques.

(iii) Have working knowledge forecasting methods.

(iv) Have skills to perform diagnostic tests related to time series models.

Total Hours:90
Lecture Hours:70
Seminar Hours: 20

Module 1: Classical time series analysis – utility of time series analysis – components of time series data – measurement of trend, seasonality and cycles – moving averages and smoothing techniques to time series analysis - classical time Series decomposition models – additive and multiplicative models – forecasting using smoothing techniques and time series decomposition methods – applications in finance .

Module 2: Tools of modern time series analysis – **s**tochastic and stationary process – tests of stationary – trend vs difference stationery process – Dickey-Fuller and augmented Dickey-Fuller tests – spurious regression and co-integration of time series – Engle-Granger test – CRDW test – error correction mechanism.

Module 3: Univariate time series analysis and forecasting – linear time series analysis – autocorrelation function and partial auto-correlation function – auto-regressive (AR) models, moving average (MA) models, Box-Jenkins (BJ) ARMA and ARIMA models – identification – estimation and forecasting with ARIMA models – economic applications.

Module 4: Multivariate time series analysis and forecasting – vector autoregressive (VAR) models – advantages and problems – estimation and forecasting with VAR – impulse response function – Johansen Co-integration test on VAR – Granger causality test – applications in finance.

Module 5: Modeling volatility and auto-correlation in time series – **m**otivation and test for non-linearity – historical and implied volatility – auto-regressive conditional hetroscdasticity (ARCH) model – generalised ARCH model – applications in finance.

References

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SEMESTER 4

Core Course 13

MA ECONOMETRICS (CBCSS) SEMESTER 4

ECM4 C13 Linear programming and its Applications in Economics

Credit 3

Course Objective:

The course attempts to familiarise the students with the application of linear programming models to economic problems.

Expected outcome

At the end of the course students are expected;

i To solve problems in constrained optimization situations

ii Apply the concepts and theory of LPP in various contexts like transportation problems, assignment problems etc.

Total Hours:90
Lecture Hours:70
Seminar Hours:20

Module 1: Some basic algebraic concepts. Definition of a vector space, subspaces, linear dependence and independence, basis and dimensions, direct sum and complement of subspaces, quotient space, inner product and orthogonality. Convex sets and hyperplanes.

Module 2: Algebra of linear programming problems. Introduction to linear programming problem (LPP), graphical solution, feasible, basic feasible and optimal basic feasible solution to an LPP, analytical results in general LPP, theoretical development of simplex method. Initial basic feasible solution, artificial variables, big – M method, two phase simplex method, unbounded solution, LPP with unrestricted variables, degeneracy and cycling, revised simplex method.

Module 3: Duality theory and its applications. Dual of an LPP, duality theorems complementary slackness theorem, economic interpretation of duality, dual simplex method. Sensitivity analysis and parametric programming, integer programming, Gomery's cutting plane algorithm and branch and bound techniques.

Module 4: Transportation problem and game theory. Transportation problem, different methods of finding initial basic feasible solution, transportation algorithm, unbalanced transportation problem, assignment problem, travelling salesman problem. Game theory, pure and mixed strategies. Conversion of two person's zero-sum game to a Linear programming problem. Fundamental theorem of game. Solution to game through algebraic, graphical and Linear programming method.

References

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SEMESTER 4

Elective Course 5

MA ECONOMETRICS (CBCSS)

ECM4 E05 Mathematical Economics

Credit 4

Course Objective:

To provide the knowledge of mathematical background of basic economic theories and to understand the quantitative component of microeconomics.

Expected outcome

At the end of the course students are expected to;

(i) Understand mathematical expositions of the theories of consumer behaviour, production function and markets.

(ii) Grasp the technique of input-output analysis and decision theory as applied to economic problems.

Total Hours:90
Lecture Hours:70
Seminar Hours:20

Module 1: Theory of Consumer Demand: Utility maximization- derivation of demand functions – Elasticity- measurement –Slutsky equation -Direct and cross effects - Homogeneous and homothetic utility functions - Indirect utility function - Roy's identity - Linear expenditure systems -Constant elasticity models.

Module 2: Theory of Production: Production Function – Producers equilibrium – derivation of input demand functions - Cobb- Douglas production function - CES production function -VES production function- Translog production. Cost function: Derivation of cost as a function of output-Duality - Shepherd's lemma- derivation of supply function- generalized Leontief cost function - Technological progress and production function.

Module 3: **Theory of Markets:** Mathematical treatment of market equilibrium- Single goal firm and multiple goal firms- Mathematical treatment of equilibrium under different market situations.

Module 4: Input-Output Analysis: -Open and closed, static and dynamic Leontief system - Technological viability -Hawkins-Simon’s conditions for viability-

Module 5: Decision Theory: Decision theory framework-Payoff tables-Regret tables-Decision under uncertainty- uncertainty and risk-Methods of incorporating risk-Value of perfect information-Decision tree and its uses-Theory of Games: Two person zero-sum game - Pure and mixed strategy - Saddle point theorem.

References

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SEMESTER 4

Elective Course 6

MA ECONOMETRICS (CBCSS)

ECM4 E06 Behavioural Economics

Credit 4

Course Objective:

To equip the students with basic knowledge in the domain of Behavioural Economics

Expected outcome

At the end of the course students are expected to;

(i) Understand fundamental concepts of cognitive behaviour

(ii) Have an understanding of how people think and how altering the decision-making context can make an impact on their choices.

Total Hours:90
Lecture Hours:70
Seminar Hours:20

Module 1: Introduction: What is behavioural economics? - History and evolution- relation with other disciplines- objectives, and scope- themes and methodology of behavioural economics (theory, evidence, consilience) – application

Module 2: Foundation: Values, preferences and choice- believes- heuristic and biases- state dependent preferences (such as habit formation and addiction)- mis-prediction and projection bias-anticipation and information avoidance-decision making under risk and uncertainty- prospect theory- the role of reference- dependent preference in both risky (loss aversion) and risk free (endowment) choices-mental accounting- applications

Module 3: Intertemporal choice: The discounted utility model (origin, features, methodology, anomalies with discounted utility models)- alternative inter temporal choice models (time preferences, time inconsistent preferences- hyperbolic discounting- modifying the instantaneous functions)- applications

Module 4: Strategic interaction: Behavioural game theory (nature, equilibrium, mixed strategies, bargaining, iterated games, signalling, learning)- application Modelling of social preferences –nature and factors affecting social preferences- distributional social preferences based on altruism, inequality aversion models- reciprocity models, evidence and policy implications

Module 5: Nudges and happiness: Nudges, Policy, and Happiness- the application

References

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4. Philosophical problems of behavioural economics by Steffan Heidel, Routlege, 1996
5. Varieties of modern economic rationality – from Adam Smith to Contemporary Behavioural and evolutionary economists by Michael S Zoubulakis, Routledge, 1997
6. Behavioural foundations of economics by J.L. Buxter, McMillan Press,
7. Choice, Behavioural economics and addiction, edited by Ruby E Vachinich and Nick Heather, Pergamon Elsevier, 2003,
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SEMESTER 4

Elective Course 7

MA ECONOMETRICS (CBCSS)

ECM4 E07 Growth and Development

Credit 4

Course Objective: To provide an understanding of the various theories of economic development and growth and an understanding of the financing of economic development.

.

Expected outcome

At the end of the course students will able to;

i. Develop an understanding of the various theories of growth and development

ii. Know the various aspects of financing development

Total Hours:90

Lecture Hours:70

Seminar Hours: 20

Module 1: Concepts and Measurements of Economic Growth and Development: Concepts of growth and development-Indicators of Economic Development: National Income, Per capita Income, PQLI, Human Development Index, Gender Development Index, Human Poverty Index and Deprivation Index. Measures of Inequality: Kuznets Inverted U hypothesis, Lorenz Curve and Gini-coefficient, Atkinson, Theil, Palma ratio.

Module 2: **Theories of Economic Growth:** Harrod-Domar Growth Model- Contributions of Kaldor-Mirrlees and Joan Robbinson, Hirofumi Uzawa model, Solow's Growth Model and the Convergence Hypothesis, Endogenous Growth Theory and the role of Human Capital; Indian Plan Models of Mahalanobis and Wage-goods model.

Module 3: Partial Theories of Economic Growth and Development: Basic Features of Underdeveloped Countries, Population Growth and the Theory of Low- Level Equilibrium Trap, Critical Minimum Effort Thesis, Theory of Big-Push; Balanced Versus Unbalanced Growth Theories- Concepts of linkages.

Module 4: Stage Theories: Marxian Stage theory, Rostow's Stage Theory. Theory of Growth and Structural Change. Concept of Dualism: Technological, Social, Geographical and Financial. Myrdal and Circular Causation, Backwash and Spread Effect. Institutions and Economic Growth.

Module 5: Financing Economic Development: Domestic Resource Mobilisation: Prior-Savings Approach, The Keynesian and Quantity Theory Approaches to the Financing of Economic Development. Foreign Resource: Dual Gap Analysis.

References

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18.

SEMESTER 4

Elective Course 8

MA ECONOMETRICS (CBCSS)

ECM4 E08 Industrial Economics

Credit 4

Course Objective:

To make the students aware of the importance of industrial sector in economic development and to help them understand the dynamics of the changes in the industrial sector in India as well as around the world.

Expected outcome

At the end of the course students are expected to;

(i) Have the ability to develop, demonstrate and examine various topics under Industrial Economics.

(ii) Evaluate and examine subject areas in economics bringing out the relation to industry and industrial development.

Total Hours:90
Lecture Hours:70
Seminar Hours:20

Module 1: Introduction: Industrial Economics – Emergence, meaning and definition Scope– and importance of Industrial Economics –Classification of Industries –New empirical industrial organization approach

Module 2: Theories of Industrial Location: General determinants of industrial location – Theories of industrial location –Alfred Weber's theory of industrial location –Sergeant Florence's theory of industrial location –Policy of industrial location in India –Need for balanced regional development

Module 3: Industrial Productivity and Growth: Industrial Productivity - Norms and measurement– Factors affecting productivity and measures to improve productivity –Public enterprises- Efficiency, productivity and performance – Case for and against in India –Skill development and industrial productivity– Industrial growth in India: Cause for concern– Challenges to private sector –Policy measures to enhance industrial growth

Module 4: Industrial Policies in India: Industrial Policy in India (1948, 1956) – Progress since 1991–Developments in Industrial Policy – Special Economic Zones, 'Make in India'– 'Start up India" – Atma Nirbhar Bharath–Public Private Partnership –Changing role and performance of the public and the private sector in India – Developments in policy for MSMEs since 1991 –Development in FDI Policy – Emergence of Indian multinational Companies–Globalization of labour markets and the impact on emerging economies

References

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SEMESTER 4

Elective Course 5

MA ECONOMETRICS (CBCSS)

ECM4 E09 Public Finance: Theory and Policy

Credit 4

Course Objective:

To make the students aware of the importance of government in the organisation of economic activity and to help them understand the dynamics of managing public finances.

Expected outcome

At the end of the course students are expected to;

(i) Have the ability to develop, demonstrate and examine various topics in the domain of public finance

(ii) Ability to apply the theory in the policy making in government.

Total Hours: 90
Lecture Hours:70
Seminar Hours:20

Module 1: The Case for Public Sector: The role of government in the national economy– Concepts of club goods, public goods- Tiebout hypothesis, merit goods, externalities, Pigovian tax.

Module 2: Public Revenue and Policy: Theory of tax- Partial and general equilibrium analysis- Shifting and incidence of tax- Theory of optimal taxation- Distributional considerations in public finance- Fiscal and monetary policies -Comparative analysis- Balanced budget multiplier- Zero based budgeting.

Module 3: Public Expenditure and Debt: Pure theory of public expenditure-Pricing of public utilities-Public choice theory-The Median Voter theorem- Concept of subsidy-Macroeconomic impacts of deficits- Debt burden and inter-generational equity- Sustainability of public debt and Domar stability condition.

Module 4: Fiscal Federalism: Theory of fiscal federalism- Theory of inter-governmental transfers- fiscal decentralisation- Problems of centre-state financial relations in India-Vertical and horizontal imbalance in inter-governmental transfers in India.

Module 5: Indian Public Finance: Sources of revenue in the union, states and local bodies in India-Trends in public expenditure and public debt in India- VAT and GST in federal set-up- The FRBM Act- Federalism and issues of Centrally Sponsored Schemes- Finance Commissions and the changing Centre- State relations during the reform period-Analysis of the latest union budget.

References

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