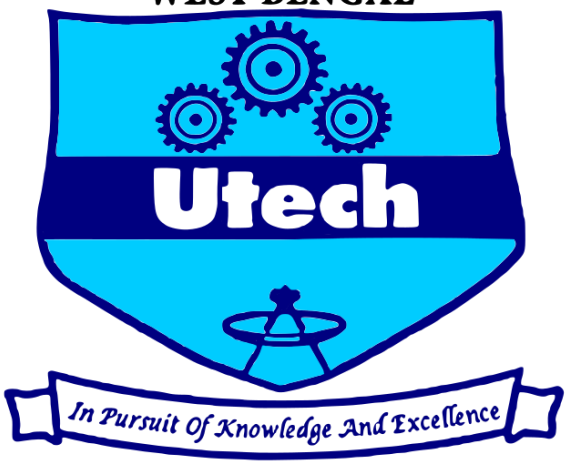
MASTER OF SCIENCE
IN
APPLIED ECONOMICS

(Applicable from the Academic Session 2023-24)

Draft Curriculum and Syllabus

MAULANA ABUL KALAM AZAD
UNIVERSITY OF TECHNOLOGY,
WEST BENGAL



Maulana Abul Kalam Azad University of Technology
West Bengal
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Haringhata-741249, Nadia, West Bengal, INDIA

BOS APPROVED DATED 25 MARCH 2023

SEMESTER WISE DETAILED SYLLABUS
M.Sc. in Applied Economics

SEMESTER 1

Sl No.	Course Code		Course Title	Course Type	Hours/Credit			
					L	T	P	C
1	MSCAE- 101	Theory	Microeconomics I	CC 1	4			4
2	MSCAE- 102	Theory	Macroeconomics I	CC 2	4			4
3	MSCAE- 103	Theory	Mathematical Methods I	CC 3	4			4
4	MSCAE- 104	Theory	Statistical Techniques	CC 4	4			4
5	MSCAE- 191	Practical	Statistical Analysis using Computer Software	CC 5			8	4
6	MSCAE- 181	Sessional	Computer Programming using Python	SEC 1			4	2
7	MSCAE- 105	Audit Course	History and Evolution of Economic Thought	VAC1	2			0
Total Credit								**22**

Course Title: Microeconomics I

Course Type: CC 1

Course Code: MSCAE-101

Course Outcome: At the end of the course, the learners will be able to

CO NO.	Course Outcomes	Bloom's Level
CO 1	Define the concepts and principles of microeconomic theory.	L1
CO 2	Explain the methods of interactions between demand and supply and also the characteristics of perfect and imperfect markets.	L2
CO 3	Apply microeconomic concepts to real-life situations.	L3

Course Details:

Module I: Consumer Behaviour, Demand Consumer preferences opportunity and Utility

Opportunity sets; optimum choices; indirect utility demand functions; income and substitution effects; Slutsky equation; normal versus inferior goods; types of demand functions; elasticity; welfare evaluation; consumer surplus; equivalent variation and compensating variation; revealed preference (weak and strong axioms); utility Functions and expected utility theorem; portfolio theory and risk.

Module II: Production and Cost

Types of production functions; marginal products; rate of technical substitution; technical progress; cost functions, average and marginal costs, short run versus long run costs; economies of scale and scope; profit maximization; cost minimization; derivation of input demand.

Module III: Competitive Markets

Assumptions of perfect market, competitive markets – demand and supply, demand and supply curves of individual firms, short-run versus long-run, competitive market equilibrium, tax incidence analysis, price-controls and shortages.

Module IV: Imperfect Competition

Market failure; imperfect markets, sources of monopoly power, monopoly market equilibrium, price discrimination – first, second and third degree; tax incidence; oligopoly, Cournot Model, Stackelberg model, Bertrand Model, Monopolistic Competition.

Suggested readings

1. Varian, H. R., *Microeconomic Analysis*, third edition, W.W. Norton and Co., 1992
2. Mas-Collel, Whinston and Green, *Micro-economic Theory*, OUP, 1995
3. Gravelle, H and R. Rees, *Microeconomics*, Pearson Education, 3rd Edition, 2004
4. Jehle, G. and J. Reny, *Advanced Microeconomic Theory*, Pearson Education, 2000.

MSCAE- 101

CO-PO Map	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	1	1	1	1	1		2
CO 2	3	1	1	1	1	1		2
CO 3	2	2	1	1	1	1		3
Correlation levels 1, 2 or 3 as defined below: 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)								

Course Title: Macroeconomics I

Course Type: CC 2

Course Code: MSCAE- 102

Course Outcome (CO): At the end of the course, the learners will be able to:

CO No.	Course Outcome	Bloom's Level
CO 1	Define the concepts and principles of macroeconomics.	L1
CO 2	Discuss real macroeconomic issues related to different schools of thought.	L2
CO 3	Evaluate various macroeconomic policies critically in terms of a coherent logical structure.	L5

Course details:

***Module I*:** Preliminaries

National Income Accounting; Keynesian Models; Keynes vs Classics.

Module II: Expectations and Macroeconomic Adjustments

Expectations formations, partial adjustment model, Lucas critique, Phillips curve, rules versus discretion, time consistency, inflation targeting, interest rate rules, effects of spending and taxes in models with flexible and sticky prices, perverse effects of fiscal expansion; Policy Irrelevance Results- Limitation of Rational Expectation Theory and the passage to Real Business Cycle.

Module III: Open Economy Macroeconomics

Foreign exchange market, Mundell-Fleming model, role of fiscal and monetary policies under alternative exchange rate regimes, purchasing power parity.

Module IV: Labour Market

Profit Maximization and Labour Demand; Utility and Labour Supply; Aggregate Supply with/without money illusion; Unemployment and Philips Curve.

Suggested readings

1. R.T. Froyen, *Macroeconomics*, Pearson Education Asia, 2nd edition, 2005.
2. Dornbusch, R., Fischer, S. and Startz, R., *Macroeconomics*, McGraw Hill Education, 2012.
3. Ghosh, C. and Ghosh, A., *Macroeconomics*, PHI Learning Private Limited, *2021*.
4. Caves, R. E., Frankel, J. A., & Jones, R. W., *World Trade and Payments*. London: Scott, Foresman, 2007, 10th Edition.
5. Romer, D., *Advanced Macroeconomics*, McGraw Hill, 2018.
6. Carlin, W., & Soskice, D. W., *Macroeconomics: Institutions, instability, and the financial system*. Oxford University Press, USA, 2015.
7. Blanchard, O., & Fischer, S., *Lectures on macroeconomics*. MIT press, 1989.
8. D'Souza, E. (2009). *Macroeconomics*. Pearson Education India.

MSCAE- 102

CO-PO Map	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	1	1	1	1	1		2
CO 2	3	2	2	1	1	1		3
CO 3	2	1	2	1	2	1		3
Correlation levels 1, 2 or 3 as defined below: 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)								

Course Title: Mathematical Methods I

Course Type: CC 3

Course Code: MSCAE- 103

Course Outcome (CO): At the end of the course, the learners will be able to:

CO NO.	Course Outcomes	Bloom's Level
CO 1	Discuss the mathematical foundations necessary for further study in the domain of economics.	L2
CO 2	Apply mathematical techniques to economic theory in general.	L3
CO 3	Interpret the mathematical results in the domain of economics.	L5

Course Details:

***Module I*:** Real Analysis

Sets and functions; The Real Numbers; Sets in R; Sequence – Real Sequence, Bounded sequence, Limit of a sequence, convergent sequence, Limit theorems, divergent sequence, some important limits, monotone sequence, subsequence, subsequential limit, characterization of a compact set, Cauchy Criteria; Series: Infinite series, series of positive terms, tests for convergence, conditionally convergent series. Limits and Continuity; Elements of point-set topology and real analysis.

Module II: Linear Algebra and Programming

Introduction to Matrices and Vectors; Eigenvalues and Eigenvector, Rank of a matrix, The Diagonalization Of a Square Matrix, Quadratic Forms, Concave Programming and the Kuhn-Tucker conditions.

Module III: Classical Optimization

Unconstrained optimization, constrained optimization with equality constraints, Lagrangian method, Hessian and Jacobian matrices, Economic applications.

Suggested readings

1. Simon, C. and L. Blume, *Mathematics for Economists*, Norton, London, 1994
2. Ok, E.A., *Real Analysis with Economic Applications*, Princeton University Press, 2007
3. Hoy, M., Livernois, J., McKenna, C., Rees, R. and Stengos, T., *Mathematics for Economics*, MIT Press, 2011
4. Knut Sydsaeter and Peter J. Hammond, *Mathematics for Economic Analysis*, Pearson Education Asia, 1995
5. M.D. Intriligator, *Mathematical Optimization and Economic Theory*, Prentice-Hall, 1971
6. Dixit, A. K., *Optimization in Economic Theory*, Oxford University Press, 1990.
7. Gale, D., *The theory of linear economic models*. University of Chicago Press, 1989.
8. Mukherjee, A. and Guha, S., *Mathematical Methods & Economic Theory*, Oxford University Press. 2010.

MSCAE- 103

CO-PO Map	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	1	3	2	1	1	2		1
CO 2	1	3	2	1	1	2		1
CO 3	1	3	2	1	1	2		1
Correlation levels 1, 2 or 3 as defined below: 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)								

Course Title: Statistical Techniques

Course Type: CC 4

Course Code: MSCAE- 104

Course Outcome (CO): At the end of the course, the learners will be able to:

CO No.	Course Outcome	Bloom's Level
CO 1	Discuss the statistical techniques necessary in the domain of economics.	L2
CO 2	Apply statistical techniques to various kinds of data.	L3
CO 3	Interpret the statistical results.	L5

Course details:

***Module I*:** Probability

Concept of probability, conditional probability and Bayes' theorem; Random variables –discrete and continuous; Density and distribution functions, joint, marginal and conditional distribution, moment generating function, law of large numbers and Central Limit theorem; Probability Distributions- discrete versus continuous distribution, joint, marginal and conditional distribution, characteristic function and moment generating function, functions of random variables.

***Module II*:** Sampling Methods and Sampling distributions

Simple random sampling, stratified random sampling; probability and non-probability sampling, statistic and sample moments; Sampling distributions: Student's-t, Chi-square and F-distribution; Determinants of sample size, law of large numbers and Central Limit theorem.

***Module III*:** Estimation

Point estimation of population mean for large sample and small sample, estimation of population proportion and population variance, Maximum likelihood and method of moment estimation, properties of good estimators: unbiasedness, consistency, efficiency, sufficiency, Interval estimation.

***Module IV*:** Hypothesis Testing

Statistical hypothesis, simple versus composite hypothesis, critical region, types and size of error – type-I and type-II error, power of a test, p-value, Hypothesis test about: a population mean, population proportions, difference between two population means, difference between two proportions, a population variance, the ratio of two population variances, Tests of goodness of fit, the analysis of contingency tables (Chi-square test for testing independence of two-classification criteria), test for correlation, Rao-Blackwell Theorem, Cramer-Rao Identity, ANOVA.

Suggested readings

1. Hogg, R. and A. Craig, J., *Introduction to Mathematical Statistics*, McGraw-Hill, 1965.
2. Goon, A. M, Gupta, M. K, and Dasgupta, B. *Fundamentals of Statistics* (Volume One, Volume two), The World Press Private Ltd
3. William G. Cochran, *Sampling Techniques*, John Wiley, 2007
4. Miller, I. and M. Miller, *Mathematical Statistics*, sixth edition, Prentice Hall International, 1999.
5. Mood, A. M., R. A. Graybill and R.C. Boes, *Introduction to the Theory of Statistics*, McGraw-Hill, 1974.

MSCAE- 104

CO-PO Map	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	1	3	3	1	1	2		2
CO 2	1	3	3	1	1	2		2
CO 3	1	3	3	1	1	2		2
Correlation levels 1, 2 or 3 as defined below: 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)								

Course Title: Statistical Analysis using Computer Software

Course Type: CC 5

Course Code: MSCAE-191

Course Outcome (CO): At the end of the course, the learners will be able to:

CO No.	Course Outcome	Bloom's Level
CO 1	Understand data management techniques.	L2
CO 2	Apply statistical techniques to various kinds of data using computer software.	L3
CO 3	Explain the statistical results intuitively.	L6

Course details:

Module I: Data management

Introduction to computer software for data management;Missing data, Variable generation and Recoding; Exploratory data analysis; Cleaning and merging data.

Module II: Descriptive Analysis

Descriptive statistical analysis using computer software and interpretation of results.

Module III: Estimation and Hypothesis Testing

Parameter estimation and testing of hypotheses using data in computer software.

(The computer software used for this course will be decided by the course instructor)

Suggested readings

Note: The necessary study materials will be provided by the course instructor.

MSCAE- 191

CO-PO Map	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	1	3	3	1	1	2		2
CO 2	1	3	3	1	1	2		2
CO 3	1	3	3	1	1	2		2

Correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Course Title: Computer Programming using Python

Course Type: SEC 1

Course Code: MSCAE- 181

Course Outcome (CO): At the end of the course, the students will be able to:

CO No.	Course Outcome	Bloom's Level
CO 1	Understand the principles of Python and acquire skills in programming in python.	L2
CO 2	Apply the python programming features in practical applications.	L3
CO 3	Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.	L5

Course Details:

***Module I*:** Basic concepts

Fundamentals of Python Getting Started: Running Code in the Interactive Shell, Input, Processing and Output, Editing, Saving and Running a Script, Working with Python Variables, Expressions, and Statements: Values and Data Types, Variables, Keywords, String Literals, Escape Sequences, Operators and Operands, Expressions and Statements, Interactive mode and Script mode, Order of Operations, and Comments.

***Module II*:** String Handling and Control Structures

Basic String Operations -- String Functions, - String Formatting Operator -- Structuring with indentation in Python -- Built-in String Methods, Boolean Expressions - Selection Control - If Statement- Indentation in Python- Multi-Way Selection – If-Elif statements-- Iterative Control- For loop- While Statement- Infinite loops— Break and Continue Statements--Definite vs Indefinite Loops- Boolean Flags and Indefinite Loops.

***Module III*:** Knowing Library of Python

Numpy: Introduction to numpy - Creating arrays - Indexing Arrays - Array Transposition - Universal Array Function - Array Processing - Array Input and Output--- Pandas: What are pandas - Where it is used - Series in pandas - Index objects - Reindex - Drop Entry - Selecting Entries - Data Alignment - Rank and Sort - Summary Statics - Index Hierarchy--Matplotlib: Introduction to Matplotlib - Data Visualization - Python for Data Visualization

***Module IV*:** Economics with Python

Data collection, statistical analysis, economic research, web scraping and visualization.

***Suggested Readings*:**

1. M. Lutz, *Learning Python Powerful Object Oriented Programming*, O'reilly Media 2018, 5th Edition.
2. T. A. Budd, *Exploring Python*, Tata MCGraw Hill Education Private Limited 2011, 1st Edition.
3. A. Downey, J. Elkner, C. Meyers, *How to think like a computer scientist: learning with Python*, 2012.
4. S. Taneja & N. kumar, *Python Programming a Modular approach – A Modular approach with Graphics, Database, Mobile and Web applications*, Pearson, 2017.
5. C. Satyanarayana M. Radhika Mani, B. N. Jagadesh, *Python programming*, Universities Press 2018.
6. K. A. Lambert, *The Fundamentals of Python: First Programs*, 2011, Cengage Learning, ISBN: 978- 1111822705

MSCAE- 181

CO-PO Map	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1		3	3			1	2	
CO 2		3	3			1	2	
CO 3		3	3			1	2	

Correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Course Title: History and Evolution of Economic Thought

Course Type: VAC 1

Course Code: MSCAE- 105

Course Outcome (CO): At the end of the course, the students will be able to:

CO No.	Course Outcome	Bloom's Level
CO 1	Develop a conceptual understanding of the world economy.	L2
CO 2	Understand the different schools of economic thought.	L2
CO 3	Compare and Contrast Economic ideas across the world.	L5

Course details:

Module I: Episodes in World Economy

Contours of World Development; Episodes of Global Recession; Economic Miracles in the World.

Module II: Schools of Economic Thought

Pre-Classical History- Mercantilism, Physiocrats, Cantillon, Quesnay and Tableau Economy Laissez-Faire; Adam Smith; Utilitarianism; David Ricardo; Marginalist School; Marxian Critique; Schumpeter; Contemporary Economic Ideas.

Module III: Development of Macroeconomics

Keynesianism, post-Keynesiam; Kalecki; Sraffa's Production of Commodities by means of commodities; Theories of Imperialism; Rise of Heterodox School.

Suggested Readings

1. Maddison, A., *The world economy*. OECD publishing, 2006.
2. Screpanti E and Zamagni, S, *An Outline of the History of Economic Thought*, OUP , 2005.
3. Robbins, L. L., Medema, S. G., & Samuels, W. J., *A history of economic thought: the LSE lectures*. Oxford University Press, 2001.
4. Schumpeter, *History of Economic Analysis*, Harvard University Press, 1954.

5. Medema, S. G., & Samuels, W. J., *The History of Economic Thought: A Reader*, Routledge, 2003.

MSCAE- 105

CO-PO Map	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	1	1	1	1	1		3
CO 2	3	1	1	1	1	1		3
CO 3	3	1	1	1	1	1		3

Correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

SEMESTER 2

Sl No.	Course Code		Course Title	Course Type	Hours/Credit			
					L	T	P	C
1	MSCAE- 201	Theory	Microeconomics II	CC 6	4			4
2	MSCAE- 202	Theory	Macroeconomics II	CC 7	4			4
3	MSCAE- 203	Theory	Mathematical Methods II	CC 8	4			4
4	MSCAE- 204	Theory	Econometrics	CC 9	4			4
5	MSCAE- 291	Practical	Computer-aided Econometric Applications	CC 10			8	4
6	MSCAE- 281	Sessional	Machine Learning and Data Science Fundamentals	SEC 2			4	2
7	MSCAE- 205	Audit Course	English Communication Skills	VAC 2	2			0
Total Credit					**22**			

Course Title: Microeconomics II

Course Type: CC 6

Course Code: MSCAE- 201

Course Outcome: At the end of the course, the learners will be able to

CO NO.	Course Outcomes	Bloom's Level
CO 1	Define the advanced concepts and principles of microeconomic theory.	L1
CO 2	Explain the role of General Equilibrium and Welfare Economics.	L2
CO 3	Apply microeconomic concepts to real-life situations.	L3

Course details:

Module 1: General equilibrium analysis

Pure exchange economy; General versus partial equilibrium; Walrasian and Edgeworthian foundations of perfect competition; Existence, uniqueness and stability of the equilibrium; Concepts of core and equilibria; Externalities and Market Failure.

Module II: Welfare Economics

Arrow-Debreu economy; Welfare theorems; Existence of Walrasian equilibrium, fixed-point theorem, core and core convergence, general equilibrium with time and uncertainty; Jensen's Inequality; social welfare function, transfer efficiency; Kaldor-Hicks-Samuelson criterion; Rawl's theory of social justice.

Module III: Economics of Asymmetric Information

Choice under uncertainty; Moral hazard problem; Adverse selection; Principal-agent problem; Theory of lemon; Implications of asymmetric information; Market signalling; Hidden information modelling; Efficiency wage model; Information and insurance.

Suggested readings

1. Mas-Colell, A., M. Whinston and J. Green, *Microeconomic Theory*, Oxford University Press, 1995
2. Jehle, G. and J. Reny, *Advanced Microeconomic Theory*, Pearson Education, 2000
3. Gravelle, H. and R. Rees, *Microeconomics*, Pearson Education, 3rd Edition, 2004
4. Tirole, J., *The Theory of Industrial Organization*, The MIT Press, 1988

MSCAE- 201

CO-PO Map	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	1	1	1	1	1		2
CO 2	3	1	1	1	1	1		2
CO 3	3	1	1	1	1	1		3

Correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Course Title: Macroeconomics II

Course Type: CC 7

Course Code: MSCAE- 202

Course Outcome: At the end of the course, the learners will be able to

CO No.	Course Outcome	Bloom's Level
CO 1	Define the advanced concepts and principles of macroeconomics.	L1
CO 2	Discuss real macroeconomic issues related to different schools of thought.	L2
CO 3	Evaluate various macroeconomic policies critically in terms of a coherent logical structure.	L5

Course details

Module I: Growth Theory

Economic growth and economic development; Harrod-Domar model; Solow model, technological progress, growth accounting and total factor productivity; Foundation of neoclassical growth; The Ramsey Cass-Koopmans model; Growth with overlapping generations; Applications of neoclassical growth model; Endogenous Growth Theory- Basics of endogenous growth, the AK-Model, human capital and economic growth, product variety and innovation, learning by doing, role of R&D and economic growth.

Module II: Real Business Cycle

Overlapping Generation Model and the Ricardian Equivalence, Exposition of Real Business cycle in an Overlapping Generation Model- Integration Between Trend and Cycle- Intertemporal Labor-Leisure Substitution and its Critique.

Module III: New Keynesian Macroeconomics

Menu cost, Aggregate demand externality and Non-neutrality of money; Wage price staggering; Efficiency wage theory; Technological complementarities, coordination failure and recession.

Suggested Readings

1. Barro, R., & Sala-i-Martin, X., *Economic growth,* second edition, 2004.
2. Aghion, P., & Howitt, P. W., *The economics of growth*. MIT press, 2008.

3. Romer, D., *Advanced Macroeconomics*, McGraw Hill, 2018.
4. Carlin, W., & Soskice, D. W., *Macroeconomics: Institutions, instability, and the financial system*. Oxford University Press, USA, 2015.
5. Blanchard, O., & Fischer, S., *Lectures on macroeconomics*. MIT press, 1989.

MSCAE- 202

CO-PO Map	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	1	1	1	1	1		2
CO 2	3	2	2	1	1	1		3
CO 3	3	2	2	1	1	1		3
Correlation levels 1, 2 or 3 as defined below: 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)								

Course Title: Mathematical Methods II

Course Type: CC 8

Course Code: MSCAE- 203

Course Outcome (CO): At the end of the course, the learners will be able to

CO NO.	Course Outcomes	Bloom's Level
CO 1	Discuss the mathematical foundations necessary for further study in the domain of economics.	L2
CO 2	Apply mathematical techniques to economic theory in general.	L3
CO 3	Interpret the mathematical results in the domain of economics.	L5

Course details:

Module I: Dynamics

Definite and indefinite integrals, applications – measuring consumer and producer surplus, continuous interest – discount calculations; difference and differential equations, phase diagrams, Cobweb model, multiplier accelerator, Harrod-Domar and Solow model.

Module II: Linear and Non-linear Optimization

Duality theory, constrained optimization with inequality and non-negativity constraints, Kuhn- Tucker formulation; linear programming – formulation, primal and dual, solutions using graphical and Simplex methods; Economic applications.

Module III: Dynamic Optimization

Calculus of variation, Optimal control theory; Economic Applications.

Suggested readings

1. Chiang, A. C., *Fundamental Methods of Mathematical Economics*, McGraw-Hill, 1984
2. Hoy, M., Livernois, J., McKenna, C., Rees, R. and Stengos, T. *Mathematics for Economics*, MIT Press, 2011
3. Knut Sydsaeter and Peter J. Hammond, *Mathematics for Economic Analysis*, Pearson Education Asia, 1995
4. M.D. Intriligator, *Mathematical Optimization and Economic Theory*, Prentice-Hall, 1971
5. A. C. Chiang. *Elements of Dynamic Optimization*, McGraw Hill, 1992.
6. Dorfman, R., Samuelson, P. A., & Solow, R. M., *Linear programming and economic analysis*. Courier Corporation, 1987.

MSCAE- 203

CO-PO Map	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	1	3	2	1	1	2		2
CO 2	1	3	2	1	1	2		2
CO 3	1	3	3	1	1	2		2

Correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Course Title: Econometrics

Course Type: CC 9

Course Code: MSCAE- 204

Course Outcome (CO): At the end of the course, the learners will be able to:

CO NO.	Course Outcomes	Bloom's Level
CO 1	Discuss the various econometric methods.	L2
CO 2	Apply econometric methods to various kinds of data.	L3
CO 3	Interpret the data and the econometric results logically.	L5

Course details:

Module I: Classical Linear Regression Model

Two-variable and K-variable CLRM – Assumptions, Estimation (using OLS & ML Method); Properties of Estimators; ANOVA in CLRM; Inference Analysis, Prediction, Applications.

Module II: Dummy Variables

Regression on a dummy (qualitative) variables with two categories, with more than two categories intercept shifters, dummy variable trap, the interaction of two categorical variables, the interaction of categorical and continuous (quantitative) variables- slope shifters, piecewise linear regression model, Chow test for cross-section data and for time-series data (test structural stability of regression models)

Module III: Linear Models and Non-Linear Estimation

Method of maximum likelihood and its properties (including consistency), trinity of classical tests (Wald test, Lagrange multiplier, likelihood ratio), Consequences, detection and remedial measures of multicollinearity, heteroskedasticity (WLS, MLE), and autocorrelation (GLS), Specification error (omitted variable, inclusion of irrelevant variables, measurement error in dependent and independent variables), method of moments (IV method)

Module IV: Simultaneous Equation System

Problem of Identification: Structural Form and Reduced Form, Observational Equivalence, Rank and Order Condition. Method of Estimation – ILS, 2SLS, 3SLS and Instrumental variable method Test for exogeneity.

Module V: An introduction to time series Data

Structure of time series- AR, ARMA, MA, ARIMA, identification of series-Box-Jenkins approach; Introduction to stationary processes; autocovariance functions; autocorrelation and partial autocorrelation; Concept of Stationarity and Unit root test; Cointegration and Error Correction; Test for Causality.

Suggested Readings:

1. Jack Johnston and John Dinardo, *Econometric Methods*, McGraw Hill Higher Education; 4th edition.
2. D. N. Gujarati and D.C.Porter, *Essentials of Econometrics*, 13 McGraw Hill, 4th edition, InternationalEdition, 2009.
3. Maddala, G. S. and Lahiri, K., *Introduction to Econometrics*, Wiley, 2012.
4. Greene, W. H., *Econometric Analysis*, Pearson, 2018.

MSCAE- 204

CO-PO Map	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	1	3	3	2	1	2		2
CO 2	1	3	3	2	1	2		2
CO 3	1	3	3	2	1	2		2

Correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Course Title: Computer-aided Econometric Applications

Course Type: CC 10

Course Code: MSCAE- 291

Course Outcome (CO): At the end of the course, the learners will be able to:

CO NO.	Course Outcomes	Bloom's Level
CO 1	Estimate econometric models using computer software.	L2
CO 2	Apply statistical and econometric techniques to various kinds of data using computer software.	L3
CO 3	Analyse the results of statistical and econometric applications.	L5

Course details:

Module I: Bivariate and Multivariate regression and its interpretation.

Module II: Hypothesis testing.

Module III: Model evaluation.

Module IV: Test for Heteroscedasticity, Autocorrelation, and Multicollinearity.

Module V: Regression diagnostic.

(The computer software used for this course will be decided by the course instructor)

Suggested Readings

Note: The required study materials will be suggested by the course instructor.

MSCAE- 291

CO-PO Map	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	1	3	3	2	1	2		2
CO 2	1	3	3	2	1	2		2
CO 3	1	3	3	2	1	2		2
Correlation levels 1, 2 or 3 as defined below: 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)								

Course Title: Machine Learning and Data Science Fundamentals

Course Type: SEC 2

Course Code: MSCAE- 281

Course Outcome (CO): At the end of the course, the learners will be able to:

CO NO.	Course Outcomes	Bloom's Level
CO 1	Understand the statistical concepts of machine learning.	L2
CO 2	Use elementary techniques of machine learning.	L3
CO 3	Apply machine learning techniques in real world data.	L5

Course Details:

Module I: Statistics for Machine Learning-I

Simple Linear Regression, Multiple Linear Regression, Logistic Regression, Model Accuracy, Confusion Matrix – Precision and Recall, Sensitivity and Specificity, AUC, ROC, F1 Score.

Module II: Statistics for Machine Learning-II

Resampling Methods – Cross-validation and Bootstrap, Concept of Bias - Variance and Model Complexity, Linear Discriminant Analysis, Principal Component Analysis, Shrinkage Methods – Ridge, LASSO & Net Elastic.

Module III: Machine Learning Basics

Concept of Supervised Learning and Unsupervised Learning, GLM Regression, K-Means, KNN, Decision Tree, Random Forest, Naïve Bayes; Introduction to Neural Networks, Introduction to Deep Learning, Introduction to Natural Language Processing, Introduction to Network Analysis.

Suggested Readings:

1. Gareth James, Daniela Witten, Trevor Hastie and Robert Tibshirani; *An Introduction to Statistical Learning*, Springer.
2. Trevor Hastie, Robert Tibshirani and Jerome Friedman; *The Elements of Statistical Learning*, Springer.
3. Peter Bruce and Andrew Bruce; *Practical Statistics for Data Scientists*, O'Reilly.
4. Joel Grus, *Data Science from Scratch*; O'Reilly.

MSCAE- 281

CO-PO Map	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1		3	3	1	1	2		2
CO 2		3	3	1	1	2		2
CO 3		3	3	1	1	2		2

Correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Course Title: English Communication Skills

Course Type: VAC 2

Course Code: MSCAE- 205

Course Outcome (CO): At the end of the course, the learners will be able to:

CO NO.	Course Outcomes	Bloom's Level
CO 1	List facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating the main ideas given in written texts	L1
CO 2	Demonstrate the basic concepts of the usage of English grammar & vocabulary in communication.	L3
CO 3	Apply acquired linguistic knowledge in producing various types of written texts.	L5
CO 4	Develop and demonstrate speaking skills for group discussions.	L6

Course details:

***Module I*: Grammar**

Sentence Structure, Voice, Narration

***Module II*: Writing Skills**

Report Writing (Structure, Types of report), Article/ Blog writing

***Module III*: Business Correspondence**

Formal letter, Job Application, CV/ Resume, Email

***Module IV*: Reading Comprehension (Seen & unseen)**

Selected pieces from literature (1 Prose & 1 Poetry), Skill of answering questions by understanding a given text

***Module V*: Communication Skills**

Video & Audio Conferencing, Group Discussion, non-verbal skills, etc.

***Module VI*: Speaking Skills**

Mock Interview sessions, Group Discussion Practice, Extempore, Debate etc.

Suggested Readings

1. *Business Communication*, by Urmila Rai & S. M. Rai. Himalaya Pub.

2. *Communication Skill for Effective Management* by Dr. Anjali Ghanekar. Everest Pub. House.

3. *Developing Communication Skill* by Krishna Mohan, Meera Banerji. McMillan.

MSCAE- 205

CO-PO Map	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1							3	
CO 2							3	
CO 3							3	
CO 4							3	

Correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

SEMESTER 3
(Specialization: Financial Economics)

Sl No.	Course Code		Course Title	Course Type	Hours/Credit			
					L	T	P	C
1	MSCAE- 301	Theory	International Economics	CC 11	4			4
2	MSCAE- 302	Theory	Game Theory	CC 12	4			4
3	MSCAE- 303	Theory	Advanced Econometrics	DSE 1	4			4
4	MSCAE- 304	Theory	Money, Financial Market and Institutions	DSE 2	4			4
5	MSCAE- 305	Theory	Financial Economics	DSE 3	4			4
6	MSCAE- 381	Sessional	Project I	SEC 3	4			4
7	MSCAE- 306	Audit Course	Research Methodology	VAC 3	2			0
Total Credit				**24**				

Course Title: International Economics

Course Type: CC 11

Course Code: MSCAE- 301

Course Outcome: At the end of the course, the learners will be able to

CO NO.	Course Outcomes	Bloom's Level
CO 1	Define the concepts and theories of International Trade.	L1
CO 2	Explain the implications of trade policies.	L2
CO 3	Apply the theoretical concepts to the contemporary issues of International Trade.	L3

Course Details:

***Module I*:** Introduction

Important issues in international trade; History and present state of world trade flows; History of the development of trade theory

Module II: International Trade Theory

Ricardo and Comparative Advantage; The Specific Factors Model; Hecksher-Ohlin model of trade.

Module III: Trade and Imperfect Competition

Monopolistic Competition- Intra-industry Trade; Horizontal Product Differentiation; Vertical Product Differentiation; Differentiated Producers goods; IIT in identical products; Oligopolistic competition and Strategic Trade Theory; The Game Theoretic Structure of Strategic Trade Policy; Profit-shifting Export Subsidy in a Third Market Model; Strategic Trade Policy in a Reciprocal Market Model; Technology and Trade.

Module IV: The Theory and Practice of Commercial Policy

Mechanism for trade protection; Protection and the National Welfare; The Political Economy of Protection; Trade Policy and Imperfect Competition; Preferential Arrangements and Regional Issues in Trade Policy.

Module V: World Trade Organization, Preferential Trading Arrangements, Custom Unions and Economic Integration

Free trade agreements, customs unions; Trade creation vs trade diversion; Trade policy in developing countries: import substitutions, export promotion; International negotiations: GATT, WTO, Doha round.

Suggested Readings:

1. R. Caves, R. Jones and J. Frenkel, *World Trade and Payments: An Introduction*, 10th edition.
2. Dornbusch, R., *Open Economy Macroeconomics*, Norton, 1980.
3. Salvatore, D., *International economics*. John Wiley & Sons, 2019.
4. Feenstra, R. C., & Taylor, A. M., *International trade*. Macmillan, 2008.

MSCAE- 301

CO-PO Map	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	1	2	1	1	1		2
CO 2	3	1	2	1	1	1		2
CO 3	3	1	2	1	1	1		3

Correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Course Title: Game Theory

Course Type: CC 12

Course Code: MSCAE- 302

Course Outcome: At the end of the course, the learners will be able to

CO NO.	Course Outcomes	Bloom's Level
CO 1	Define the concepts and principles of Game Theory.	L1
CO 2	Explain the interaction among economic agents and the role of information.	L2
CO 3	Apply the theoretical concepts in explaining real-world problems.	L3

Course Details:

Module I: Games under Complete Information

Static Games: Concept of a game – normal form representation – Prisoners' Dilemma - iterated elimination of dominated strategies – Nash equilibrium.
Dynamic Games: sub games – backwards induction – subgame perfect Nash equilibrium – Entry Deterrence Game. Repeated Games – Infinitely repeated games- folk theorem.

Module II: Games under incomplete information

Static games: Bayesian Nash Equilibrium – Applications
Applications of Dynamic games: Perfect Bayesian Equilibrium – Signaling games - Applications

Module III: Cooperative Game

Introduction to Cooperative games; Cooperative vs Non-Cooperative Game; Shapley value and Core; Applications.

Module IV: Mechanism Design

Basic Mechanism Design Problem; Mechanism Design and Implementation.

Suggested Readings

1. Gibbons, R., *Game Theory for Applied Economists*, Pearson Higher Education & Professional Group, 2010
2. Mas-Collel, Whinston and Green, *Micro-economic Theory*, OUP, 1995
3. Osborne and Rubinstein, *A Course in Game Theory*, MIT Press, 1994.
4. Fudenberg and Tirole, *Game Theory* , 1991.
5. Felix. Too-Gonzalez Munoz-Garcia (Daniel.), *Strategy and Game Theory: Practice Exercises with Answers*. Springer, 2018.

MSCAE- 302

CO-PO Map	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	1		2	1	1		1
CO 2	3	1		2	1	1		2
CO 3	3	1		2	1	1		3

Correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Course Title: Advanced Econometrics

Course Type: DSE 1

Course Code: MSCAE- 303

Course Outcome: At the end of the course, the learners will be able to

CO NO.	Course Outcomes	Bloom's Level
CO 1	Define the advanced concepts and theories of econometrics.	L1
CO 2	Understand the variety of cross-section, time series and panel data models.	L2
CO 3	Apply the theoretical concepts in real-world data.	L3

Course Details:

***Module I*:** Multivariate Time Series

Motivation for multivariate model, Autoregressive Distributive Lag Models, Simultaneity and motivation for Vector autoregressive (VAR) models, Testing for order of VAR models, Block significance and tests for causality including Granger causality, Forecasting.

Module II: Non-Stationary Time-series processes

Deterministic and stochastic trends, Integrated process and random walk, random walk with drift, Unit root and tests for unit root- Dickey-Fuller and Augmented Dickey-Fuller tests, Phillips-Perron Test and KPSS test, Unit Roots and Structural Breaks, Unit roots in regression residuals and spurious regression, Cointegration and its testing using Engel-Granger method, Lead-lag and Long Run relationships, Characteristic Root, Rank and Cointegration, Testing for and estimating cointegrating systems using the Johansen method based on VARs, Vector Error Correction Models.

Module III: Modeling volatility

Volatility-Meaning and measurement; Univariate volatility models - ARCH, GARCH, EGARCH, TARCH, and GARCH in Mean; Multivariate volatility models.

Module IV: Advanced Cross-Sectional Econometrics

Limited Dependent Variable Models; Censoring, Truncation & Selection Bias; Multinomial Response Models – Ordered and Sequential response Models; Endogeneity Problem.

Module V: Panel Data Models

Introduction to panel data, Balanced and Unbalanced Panel, pooled repeated cross-section model, within and between estimators, one-way fixed effects model, fixed effects model using least squares dummy variable approach, first difference estimator, random effects model, time fixed effects, Tests of hypothesis for pooled or fixed effects model, pooled and or random effects models (Breusch-Pagan Lagrange Multiplier Test) and fixed or random effects (Hausman test), Introduction to dynamic Panel data models.

Suggested Readings

1. C. Chatfield, *The Analysis of Time Series – An Introduction*, CRC 1999.
2. G.E.P. Box, G.M. Jenkins &G.C.Reinsel, *Time Series Analysis – Forecasting & Control*, Wiley, 5th edition, 2015.
3. P.J. Brockwell & R.A. Davis, *Introduction to Time Series Analysis and Forecasting*,

Wiley, 2nd edition, 2002.
4. Ruey S. Tsay, *Analysis of Financial Time Series*, Wiley India (P) ltd, 2010.
5. Baltagi, B. H., *Econometric analysis of panel data* (Vol. 4). Chichester: Wiley, 2008.
6. Wooldridge, J. M., *Econometric Analysis of Cross-Section and Panel Data*, The MIT Press.

MSCAE- 303

CO-PO Map	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	1	3	3	2	2	2		2
CO 2	1	3	3	2	2	2		3
CO 3	1	3	3	2	2	2		3

Correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Course Title: Money, Financial Market and Institutions
Course Type: DSE 2

Course Code: MSCAE- 304

CO NO.	Course Outcomes	Bloom's Level
CO 1	Define the concepts, principles and theories of financial markets.	L1
CO 2	Explain the working of financial institutions.	L2
CO 3	Apply the theoretical concepts in the contemporary issues of financial markets	L3

Course Details:

Module I: Banking System

Historical development of Banking System; Balance sheet and portfolio management; Multiple Deposit Creation; Determinants of the Money Supply; Indian banking system- Changing role and structure- banking sector reforms; Central Banking and Monetary Policy; Shadow banking alternative in the technological era; Case studies.

Module II: Introduction to Financial Markets

Pole and purpose of financial markets; Capital markets, consumption and investments with and without capital markets, market places and transaction costs and the breakdown of separation; Fisher separation theorem; the agency problem; maximization of shareholder's wealth, capital budgeting techniques.

Module III: Financial Markets, characteristics and operations

Stock market – types of shares, primary and secondary market; Market indexes, GDR and ADR, Stock Market and Macroeconomic Variables, Stock Market and issues of Foreign Capital Inflows;
Bond Market - Present Value, Price and Yield, Yield-To-Maturity, Yield-To Call, Current Yield, Holding Period Return; Risks in Bonds, G-secs Market and Corporate Bond Market in India;
Money market - Call Money Market, Treasury Bill Market, Commercial Bill Market, Certificate of Deposit, Commercial Paper, Money Market Mutual Fund(MMMF), Repo and Reverse Repo;
The Euro markets: Eurocurrency markets, Eurobonds, Note issuance facilities, Euro notes, Euro commercial papers, Asia currency markets
Blockchain technology and evolution of cryptocurrency
Case Studies.

Suggested Readings

1. Mishkin, F. S. (2012). *The Economics of Money, Banking and Financial Markets* (The Pearson Series in Economics).
2. F. J. Fabozzi, F. Modigliani, F. J. Jones, M. G. Ferri, *Foundations of Financial Markets and Institutions*, Pearson Education, 3rd edition, 2009.
3. M. R. Baye and D. W. Jansen, *Money, Banking and Financial Markets*, AITBS, 1996.
4. Rakesh Mohan, *Growth with Financial Stability- Central Banking in an Emerging Market*, Oxford University Press, 2011.
5. Madura, J., *Financial Markets and Institutions*, Cengage Learning, 11th Edition.

6. Shah, A., Thomas, S. and Gorham M., *India's Financial Markets: An Insider's Guide to How the Markets Works*, Elsevier.

MSCAE- 304

CO-PO Map	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	1	2	2	1	3	1		2
CO 2	1	2	2	1	3	1		2
CO 3	1	2	2	1	3	1		3
Correlation levels 1, 2 or 3 as defined below: 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)								

Course Title: Financial Economics

Course Type: DSE 3

Course Code: MSCAE- 305

CO NO.	Course Outcomes	Bloom's Level
CO 1	Define the concepts and theories of financial economics.	L1
CO 2	Understand the theoretical ideas related to Asset Pricing, Portfolio theory, Capital structure etc.	L2
CO 3	Apply the theoretical concepts to the contemporary issues of financial markets.	L3

Course Details:

Module I: Introduction to Asset Pricing

Capital asset pricing model; empirical methods to test models of asset pricing; Factor models and cross-section of stock returns; arbitrage pricing theory and models.

Module II: Mean-Variance Portfolio Theory

Measuring portfolio return and risks, effect of diversification, minimum variance portfolio, perfectly correlated assets, minimum variance opportunity set, static portfolio choice; mean-variance frontier of risky and risk-free asset.

Module III: Efficient Market Hypothesis

Defining capital market efficiency; relationship between the value of information and efficient capital markets, rational expectations and market efficiency, market efficiency with costly information, efficient capital market theory and empirical models

Module IV: Theories of Capital Structure

capital structure and the pie theory, Maximizing firm value versus maximizing stockholders' interest, Financial Leverage and Firm Value – Modigliani and Miller Propositions.

Module V: Project and Case Studies

Suggested Readings

1. Copeland, T. E. and J. F. Weston, *Financial Theory and Corporate Policy*, Addison Wesley, 1992
2. Elton, E.J and M.J. Gruber, *Modern Portfolio Theory & Investment Analysis*, (fourth edition) John Wiley & Sons, 1991.
3. Houthakker, H.S. and P.J. Williamson, *Economics of Financial Markets*, Oxford University Press, 1996.
4. Luenberger, D. G., *Investment science*. OUP Catalogue, 1997.

MSCAE- 305

CO-PO Map	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	2	2	2	1	3	1		2
CO 2	2	2	2	1	3	1		2
CO 3	2	2	2	1	3	1		3

Correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Course Title: Project I

Course Type: SEC 3

Course Code: MSCAE- 381

Course Outcome: At the end of the course, the learners will be able to

CO No.	Course Outcome	Bloom's Level
CO 1	Apply theoretical concepts in analysing a research problem.	L3
CO 2	Analyze any problem using appropriate scientific tools.	L4
CO 3	Evaluate any real-life scenario using scientific principles.	L5
CO 4	Develop the ability to work with his or her peers, building teamwork and group skills.	L6

Course Details:

*Students are required to prepare a **research project** with the guidance of their supervisor and submit a report, along with a **presentation**. A student will choose the topic for their project and the supervisors will approve it. The preparation of the project is divided into two semesters; in Semester 3, the course title is Project I, and in Semester 4, the course title is Project II. At the end of the semester, the students must present a progress report on the project.*

MSCAE- 381

CO-PO Map	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	1	2	3	3	1	2		2
CO 2	1	3	3	3	1	2		3
CO 3	1	3	3	3	1	2		3
CO 4	1	1	1	1	1	2	3	1

Correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Course Title: Research Methodology

Course Type: VAC 3

Course Code: MSCAE- 306

Course Outcome: At the end of the course, the learners will be able to

CO No.	Course Outcome	Bloom's Level
CO 1	Understand the foundation related to Research Methodology and its various approaches.	L2
CO 2	Provide logical reasoning in the formulation of the research problem, and the problems involved in the systematic explanation of the phenomenon.	L3
CO 3	Evaluate any real life scenario using scientific principles.	L5
CO 4	Develop Research Design with quantitative techniques for economic data analysis.	L6

Course Details:

***Module I*:** Foundations of Research

Meaning, Objectives, Motivation, Utility; Concept of theory, empiricism, deductive and inductive theory; Characteristics of scientific method; Characteristics of scientific method; Problem Identification & Formulation; Research Design; Experimental Design; Qualitative and Quantitative Research.

Module II: Critical thinking

Systematic process of critical thinking; Characteristics of critical thinkers.

***Module III*:** Measurement

Concept of measurement; Levels of measurement

***Module IV*:** Sampling

Concepts of Statistical Population, Sample, Sampling Frame, Sampling Error, Sample Size, Non Response. Characteristics of a good sample. Probability Sample – Simple Random Sample, Systematic Sample, Stratified Random Sample & Multi-stage sampling. Determining size of the sample – Practical considerations in sampling and sample size.

***Module V*:** Data Analysis

Data Preparation – Univariate analysis (frequency tables, bar charts, pie charts, percentages), Bivariate analysis – Cross tabulations and Chi-square test including testing hypothesis of association; Interpretation of Data.

***Module VI*:** Research Paper Writing

Principles of writing a research paper; The steps of the research writing process.

***Module VII*:** Research Tools

Tools used for reference management, citation, paper writing, diagrammatic representation etc.

Suggested Readings

1. Kothari, C. R., *Research methodology: Methods and techniques*. New Age International, 2004.
2. Facione, P., *Critical thinking: What it is and why it counts*. Millbrae, CA: Insight Assessment, California Academic Press, 2007.
3. James D. Lester, James D. Lester Jr., *The Principles of Writing Research Papers*. Penguin Academics, 2010.

MSCAE- 306

CO-PO Map	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	1	1	2	3	1	2	1	1
CO 2	1	1	1	3	1	2	1	2
CO 3	1	3	3	3	1	2	1	3
CO 4	1	3	3	3	1	2	1	3

Correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

SEMESTER 4

(Specialization: Financial Economics)

Sl No.	Course Code		Course Title	Course Type	Hours/Credit			
					L	T	P	C
1	MSCAE- 401	Theory	Development Economics	CC 13	4			4
2	MSCAE- 402	Theory	Public Economics	CC 14	4			4
3	MSCAE- 491	Practical	Computer- aided Advanced Econometrics	DSE 4			8	4
4	MSCAE- 403	Theory	International Finance	DSE 5	4			4
5	MSCAE- 404	Theory	Financial Derivatives and Corporate Finance	DSE 6	4			4
6	MSCAE- 481	Sessional	Project II	SEC 4	4			4
Total Credit					**24**			

Course Title: Development Economics

Course Type: CC 13

Course Code: MSCAE- 401

Course Outcome: At the end of the course, the learners will be able to

CO NO.	Course Outcomes	Bloom's Level
CO 1	Define the concepts, principles and theories of Development Economics.	L1
CO 2	Explain the implications of development, growth, poverty and inequality.	L2
CO 3	Apply the theoretical concepts in the contemporary issues of development economics.	L3

Course Details:

Module I: Overview of Economic Development

Concepts, approaches and dimensions of development and their indicators; measurement issues; income growth as development, factors influencing growth - human capital and

demographic characteristics, structure and openness of the economy, path dependence-expectations- complementarities, political institutions and governance; distribution of income – economic inequality, its measurement and interrelationship income growth, poverty measures and underdevelopment.

Module II: Development Discourse

Theories of Economic Growth; Balanced versus unbalanced growth, Harrod-Domar model, Solow model, technical progress, growth convergence; new growth theories – human capital and growth, total factor productivity; comparative analysis; role of resources, technology and institutions.

Module III: Human Resources and Labour Markets

Impact of nutrition, health, education, population growth on human capital; segmented labour markets, migration, unemployment (Harris-Todaro model, labour turnover model, efficiency wage hypothesis) suboptimal employment, disguised unemployment, informal labour markets.

Module IV: Institutions and Political Economy

Institutions and its allocation of property rights for decision-making across different governance modes and their implications for economic efficiency & equity,Social welfare institutions and economic development, Economic consequences of different forms of government and electoral rules, empirical strategies of comparative political economy; role of state in provision of public goods; political economy aspects of property rights; corruption and its impacts economic development and potential strategies to tackle corruption.

Suggested Readings

1. Ray, D., *Development Economics*, Princeton University Press, 1998
2. Basu, K., *Analytical Development Economics*, MIT Press, 2003
3. Bardhan, P. and C. Udry, *Development Microeconomics*, Oxford University Press, 1999
4. Hayami, Y. and Y. Godo, *Development Economics: From Poverty to Wealth of Nations*, Oxford University Press, 2005.

MSCAE- 401

CO-PO Map	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	1	1	1	1	1		2
CO 2	3	1	2	1	1	1		2
CO 3	3	2	2	1	1	1		3

Correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Course Title: Public Economics

Course Type: CC 14

Course Code: MSCAE- 402

Course Outcome: At the end of the course, the learners will be able to

CO NO.	Course Outcomes	Bloom's Level
CO 1	Define the concepts and theories of Public Economics.	L1
CO 2	Understand the concepts of public good, taxation and government budget.	L2
CO 3	Evaluate contemporary government policies across the world.	L5

Course Details:

Module I: Theory of Public Good and Public Choice

Public goods and externalities, merit goods, Samuelson theory, free rider problem, Lindahl solution, Coasian theory, theory of clubs, median voter theorem, theory of rent-seeking.

Module II: Taxation

Direct and indirect taxes, efficiency and equity, deadweight loss; taxation and monopoly; measurement of income and expenditure; Tax Incidence in Partial and General Equilibrium Framework; Tax Design- Theory of Optimum Commodity and Income Taxation, Value Added Tax, Political Economy of Taxation; Laffer curve analysis; Taxation in a Federal system; Taxation and labour supply, taxation and savings, risk-taking and wealth.

Module III: Public Choice

The reasons for public choice: allocative efficiency , redistribution; Preference revelation, aggregation of preference - Arrow's Impossibility Theorem; aggregation of information; Public choice in democracy; Party Competition; The role of bureaucracy.

Module IV: Public Finance

Financing of public expenditure: debt versus tax financing, impact of public expenditure on the level and composition of output; fiscal federalism: central and sub-national expenditures; Impact of government expenditure on output and employment; designing optimal government expenditure policy: issues of size and composition, designing subsidy policy: health and education expenditure policy; Indian Public Finance.

Suggested Readings

1. R.A. Musgrave and P.B. Musgrave, *Public Finance in Theory & Practice*, McGraw Hill Publications, 5th edition, 1989.
2. J. E. Stiglitz. *Economics of Public Sector*, W. W Norton and Company, 3rd Edition, 2000.
3. A Ghosh and C. Ghosh, *Public Finance*, Prentice Hall India Learning Private Limited; 2nd Revised edition, 2014.
4. Bhatia, H. L., *Public finance*. Vikas Publishing House, 2018.

MSCAE- 402

CO-PO Map	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	1	1	1	1	1		2
CO 2	3	1	1	1	1	1		2
CO 3	3	2	2	2	1	1		3

Correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Course Title: Computer- aided Advanced Econometrics

Course Type: DSE 4

Course Code: MSCAE- 491

Course Outcome: At the end of the course, the students will be able to:

CO NO.	Course Outcomes	Bloom's Level
CO 1	Estimate advanced econometric models using computer software.	L2
CO 2	Apply statistical and econometric techniques to various kinds of data using computer software.	L3
CO 3	Analyse the results of statistical and econometric applications.	L5

Course Details:

Module I: Applications of Simultaneous Equation System

Estimation of Simultaneous Equations

Module II: Applications of Time Series Econometrics

Identification of AR, MA process, ACF, PACF, Unit root test, Cointegration, ECM, Granger Causality; Univariate volatility models - ARCH, GARCH, EGARCH, TARCH, and GARCH in Mean; Multivariate volatility models.

Module III: Applications of Cross-Section Data

Limited Dependent Variable Models; Censoring, Truncation & Selection Bias; Multinomial Response Models – Ordered and Sequential response Models; Endogeneity Problem.

Module IV: Applications of Panel Data Models

Estimation of Fixed effects model, LSDV estimation, Random effects model; Hypothesis testing.

(The computer software used for this course will be decided by the course instructor)

Suggested Readings

Note: The required study materials will be suggested by the course instructor.

MSCAE- 491

CO-PO Map	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	1	3	3	2	2	2		2
CO 2	1	3	3	2	2	2		2
CO 3	1	3	3	2	2	2		2

Correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

***Course Title*: International Finance**
***Course Type*: DSE 5**

***Course Code*: MSCAE- 403**

CO NO.	Course Outcomes	Bloom's Level
CO 1	Define the concepts and theories of International Finance.	L1
CO 2	Understand the working of International financial flows.	L2
CO 3	Apply the theoretical concepts to the contemporary issues of the International financial market.	L3

Course Details:

Module I: Institutional Structure of International Finance

History of exchange rate regimes (Classical gold-standard system, Bretton woods, Post Bretton woods era) Different Exchange Rate Regimes, Monetary unions, Role and Functions of International Monetary Fund; Case studies of Global Financial Institutions.

Module II: The Balance of Payments and Foreign Exchange Market

Balance of payment accounts Foreign exchange market, Demand & supply of foreign exchange, Effects of exchange rate changes on domestic prices and terms of trade, Marshall-Lerner condition, J-curve effect.

Module III: Theories of Exchange Rates

Parity conditions-Purchasing power parity and interest rate parity, The monetary theory of exchange rates, Sticky price models- theories of overshooting, Portfolio-balance approach to exchange rates, and Currency substitution.

Module IV: International capital flows and financial crises

Financial crises, varieties, definitions. Models of currency and financial crisis; case studies on financial crisis and the role of institutions.

Module V: Spot market

Organization of the interbank spot market, direct, indirect and cross rates, Bid-ask spread, and triangular arbitrage.

Suggested Readings

1. Krugman, Paul R., Maurice Obstfeld and Marc J. Melitz, *International Economics*: *Theory & Policy*, 9th edition, Addison-Wesley, 2012.
2. Copeland, Laurence S., *Exchange Rates and International Finance*, 4th edition Pearson Education Limited, 2005.
3. Levi, M. D., *International Finance*, Routledge.
4. Gandolfo, G., & Federici, D. (2001). *International finance and open-economy macroeconomics*. New York: Springer, 2001.

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CO-PO Map	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	2	2	2	1	3	1		2
CO 2	2	2	2	1	3	1		2
CO 3	2	2	2	1	3	1		3

Correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

***Course Title*: Financial Derivatives and Corporate Finance**
***Course Type*: DSE 6**

***Course Code*: MSCAE- 404**

CO NO.	Course Outcomes	Bloom's Level
CO 1	Define the concepts and theories of Corporate Finance and Derivative market.	L1
CO 2	Understand the concepts related to financial accounting, risk and capital budgeting decisions of the firm.	L2
CO 3	Apply the theoretical concepts to real-world case studies.	L3

Course Details:

Module I: Corporate Financial Reporting and Accounting

Overview of financial statement analysis, Structure of Financial Statements: Balance Sheet, Income Statement, Statement of Cash Flow, Financial Ratios and Financial Statement Analysis; Book-Keeping & its importance; Accounting Principles; Bank Reconciliation Statement.

Module II: Financial Risk

Major Financial Risk; Interest Rate Risk; Foreign Exchange Risk; Credit Risk; Commodity Risk; Operational Risk; Measuring Risk; Financial Risk Management.

Module III: Introduction to Derivatives

Derivative markets and trading; Types of Derivatives; Arbitrage, Speculation and Hedging; Forward and future contracts; Options; Swaps; Real options; Derivative Pricing- Pricing futures, bounds and option payoffs, the put-call parity, Valuing options - Binomial model and Black-Scholes Model, Volatility estimation and implied volatility, Greek letters and hedging.

Module IV: Capital Budgeting Decision of firms

Introduction to risk, return and opportunity cost of capital: measuring portfolio risk, diversification and risk, limits to diversification, Capital Asset Pricing Model.

Module V: Special Topics

Value at risk; Exotic options; Acquisitions and takeovers; Indian capital market and financial sector reforms

Suggested Readings

1. Hull, J. Options, *Futures and other Derivatives*, tenth edition, Prentice Hall.
2. Brealey, R. and S. Myers, *Principles of Corporate Finance*, eighth edition, New York, McGraw Hill.
3. Houthakker, H.S. and P.J. Williamson, *Economics of Financial Markets*, Oxford University Press, 1996.
4. Tirole, J., *The theory of corporate finance*. Princeton university press, 2010.

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CO-PO Map	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	1	2	2	1	3	1		2
CO 2	1	2	2	1	3	1		2
CO 3	1	2	2	1	3	1		3

Correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Course Title: Project II

Course Type: SEC 4

Course Code: MSCAE- 481

Course Outcome: At the end of the course, the learners will be able to

CO No.	Course Outcome	Bloom's Level
CO 1	Apply theoretical concepts in analysing a research problem.	L3
CO 2	Analyze any problem using appropriate scientific tools.	L4
CO 3	Evaluate any real life scenario using scientific principles.	L5
CO 4	Develop the ability to work with his or her peers, building teamwork and group skills.	L6

Course Details:

*Students are required to prepare a **research project** with the guidance of their supervisor and submit a report, along with a **presentation**. A student will choose the topic for their project, and the supervisors will approve it. The preparation of the project is divided into two semesters; in Semester 3, the course title is Project I, and in Semester 4, the course title is Project II. At the end of the semester, the students must present a progress report on the project.*

MSCAE- 481

CO-PO Map	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	1	2	3	3	1	2		2
CO 2	1	3	3	3	1	2		3
CO 3	1	3	3	3	1	2		3
CO 4	1	1	1	1	1	2	3	1

Correlation levels 1, 2 or 3 as defined below:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)