Semester-I

Major I

Credit 04

1.1 Basic economics-I

Course Description

This course is designed to expose the students to the basic principles of how the economy works at the microeconomic level with some basic concepts like markets, and consumer choice. in macroeconomics. The emphasis will be on thinking like an economist and the course will illustrate how microeconomic concepts can be applied to analyze real-life situations. This course also discusses the preliminary macroeconomic concepts associated with the determination and measurement of aggregate macroeconomic variables like savings, investment, and GDP.

Course Outcomes (COs)

- To expose the students to the introductory micro and macro-economic concepts.
- To explain how to think like an economist and illustrate how microeconomic concepts can be applied to analyses of real-life situations.
- To introduce preliminary macroeconomic concepts associated with the determination and measurement of aggregate macroeconomic variables like savings, investment, and GDP.
- To examine the circular flow of income and expenditure in a 2, 3, and 4-sector economy.

Unit I: Exploring the Subject Matter of Economics, Markets and Welfare

The Ten Principles of Economics: How people make decisions; Working of the economy as a whole; Thinking Like an Economist: The Economist as Scientist – The scientific method: Observation, Theory and more observation; Role of Assumptions; Economic Models; Why economists disagree; Graphs in Economics; The Market Forces; Markets and Competition; The Demand and Supply curves – Market vs Individual curves, Shifts in Demand and Supply Curves; Market Equilibrium and changes therein; Price Elasticity of Demand – determinants and computation; Income and Cross Elasticity of Demand; The Price Elasticity of Supply – determinants and computation; Consumer and Producer Surplus.

LO: Upon completion of this module, students will get a basic idea about the basic underlying principles followed in economics and get a formative perspective to concepts of elasticity of demand and supply.

Unit II: Theory of Consumer Choice

The Budget Constraint; Preferences – representing preferences with indifference curves; Properties of Indifference Curves; Two extreme examples of indifference curves; Optimization – Equilibrium; Change in equilibrium due to changes in income, changes in price; Income and Substitution Effect; Derivation of Demand Curve; Three applications – Demand for Giffen goods, Wages and Labour Supply, Interest rate and Household saving.

LO: Upon completion of this module, the students can understand the problem of choice and decision-making by consumers and have a vivid understanding of optimization and equilibrium.

Unit III: Basic Concepts in Macroeconomics

Macro vs. Microeconomics; Limitations of Macroeconomics; Stock and Flow variables, Equilibrium and Disequilibrium, Partial, and General Equilibrium Statics – Comparative Statics and Dynamics; National Income Concepts – GDP, GNP, NDP, and NNP at market price, factor cost, real and nominal; Disposable Personal Income.

LO: Upon completion of this module, the students will be introduced to concepts of macroeconomic variables and the basic concept of National Income Accounting.

Unit IV: Measurement of Macroeconomic Variables

Output, Income and Expenditure Approaches; Difficulties of Estimating National Income; National Income Identities in a simple 2-sector economy and with government and foreign trade sectors; Circular Flows of Income in 2, 3 and 4-

sector economies; National Income and Economic Welfare; Green Accounting.

LO: Upon completion of this module, the students will be familiarized with the estimation of National Income and understand the circular flow of income and expenditures in a closed and open economy.

Textbook:

- ✓ *Gregory N Mankiw: Principles of Economics, 6th Edition, Cengage Learning India Private Limited, New Delhi*
- ✓ *Gregory N. Mankiw (2010): Macroeconomics, 7th edition, Cengage Learning India Private Limited, New Delhi*
- ✓ *Government of India (2012): National Accounts Statistics Sources and Methods, CSO, MOSPI*

Reference Book:

- ✓ *Karl E. Case and Ray C. Fair (2007): Principles of Economics, 8th Edition, Pearson Education Inc.*
- ✓ *Richard T. Froyen (2005): Macroeconomics, 2nd Edition, Pearson Education Asia, New Delhi.*

1.2 Indian Economy- I

Course Description

Using appropriate analytical frameworks, this course reviews major trends in economic indicators and policy debates in India in the post-independence period, with particular emphasis on paradigm shifts and turning points. Given the rapid changes taking place in India, the reading list should be updated annually.

Course Outcomes

1. To have an understanding of the evolution of the Indian economy from pre-colonial to modern times, and its current state as a developing economy.
2. To be able to explain the relationship between population growth, human development, and economic development in India.
3. To be able to assess the national income trends in India, including sectoral composition, regional disparities, and challenges like poverty, inequality, and unemployment.
4. To gain the ability to critically analyze the role of economic planning in India's development, including the evolution from Five-Year Plans to NITI Aayog.

Unit I: Basic Characteristics of Indian Economy as a Developing Economy

Indian Economy in the Pre-British Period; The Structure and Organization of Villages and Towns; Industries and Handicrafts in Pre-British India; Colonialism; Economic Consequences of British Rule; Decline of Handicrafts and Progressive Ruralization; The Land System and Commercialization of Agriculture; Industrial Transition; Colonial Exploitation and Impacts – Underdevelopment; Colonization and Modernization; State Policies and Economic Underdevelopment; The Current State of Indian Economy

LO: This module shall enable the students to gain an in-depth understanding of the pre-British Indian economy, including its structure, industries, colonial impacts, and modernization, and evaluate state policies and current economic conditions.

Unit II: Population and Human Development

Population Growth and Economic Development – size, growth and Future of Population; Causes of rapid Population Growth; Population and Economic Development; Population Policy; Demographic Issues– Sex and Age Composition of Population; Demographic Dividend; Urbanization and Migration; Human Resource Development – Indicators and importance of Human Resource Development; Education policy; Health and nutrition.

LO: Upon completion of this module, students will analyze the population trends and policies in India, understand their impact on economic development, and evaluate the importance of human development (education, health) for India's future.

Unit III: National Income in India: The Growth Story and Current Challenges

Trends in national and per capita income; Changes in sectoral composition of national income; Regional disparities in Growth and Income; Savings and Investment and Economic Growth – The Linkage; Poverty – Estimation and Trends, Poverty Alleviation Programs– MGNREGA, NRLM, SJSRY; Inequality – Measures and trends in India; Unemployment– Nature, Estimates, Trends, Causes and Employment Policy.

LO: Upon completion of this module, students will have an understanding of national income trends, sectoral contributions, regional inequalities, and challenges that India faces like poverty, inequality, and unemployment.

Unit IV: Economic Planning in India

Rationale, Features, Objectives, Strategies, Achievements and Assessment of Planning in India; Eleventh Five Year Plan– Objectives, Targets and Achievements; Twelfth Five Year Plan – Visionand Strategy;

From Planning to NITI– Transforming India's Development Agenda.

LO: Upon completion of this module, students will be able to appreciate the rationale and features of economic planning in India, its objectives and strategies, evaluate its achievements, and describe the transition to NITI Aayog.

Textbook:

- ✓ *Misra, S. K. and Puri V. K. Indian Economy — Its Development Experience. HimalayaPublishing House, Mumbai*

Reference Books:

- ✓ *Dutt R. and Sundharam K. P. M: Indian Economy. S. Chand & Company Ltd., New Delhi.*
- ✓ *Datt and Sundharam, Gaurav Datt and Ashwani Mahajan, S Chand: Indian Economy, Publications, 7th Revised Edition*
- ✓ *Indian Economy Since Independence, ed by Uma Kapila, Academic Foundation, Revised Nineteenth Edition 2008-09*
- ✓ *Government of India (Current Year): Economic Survey, Ministry of Finance, New Delhi Basu, K. (2008): Oxford Companion to Economics in India, Oxford University Press*

1.3 Mathematical Methods for Economics I

Course Description

This is the first of a compulsory two-course sequence. The objective of this sequence is to transmit the body of basic mathematics that enables the study of economic theory at the undergraduate level, specifically the courses on microeconomic theory, macroeconomic theory, statistics and econometrics set out in this syllabus. In this course, particular economic models are not the ends, but the means for illustrating the method of applying mathematical techniques to economic theory in general. The level of sophistication at which the material is to be taught is indicated by the contents of the prescribed textbook.

Course Outcomes:

- To use mathematical techniques in analyzing economic problems
- To get a fair idea about the number system, set theory, and different types of functions.
- Evaluate and use the concept of derivative of functions involving single variables to link the total and marginal concepts in Economics.
- Understand major concepts of Linear Algebra

Unit I: Preliminaries and Functions of One Real Variable

Sets and set operations; Cartesian product; relations; functions and their properties; Number systems. Types of Functions: constant, polynomial, rational, exponential, logarithmic; Graphs and graphs offunctions; Limit and Continuity of functions; Limit theorems.

LO: This module will enable the students to know the theory of sets, ordered pairs, and Cartesian products; and learn the concepts of relation and function and limit and continuity of functions.

Unit II: Derivative of a Function

Rate of change and derivative; Derivative and slope of a curve; Continuity and differentiability of a function; Rules of differentiation for a function of one variable; Application- Relationship between total, average and marginal functions.

LO: This module will enable the students to know the concept of the derivative and the rules for derivatives; and about the economic applications of differentiation in establishing the relationship between total, marginal, and average functions in Economics.

Unit III: Functions of two or more Independent Variables

Partial differentiation techniques; Geometric interpretation of partial derivatives; Partial derivatives in Economics; Elasticity of a function – demand and cost elasticity, cross and partial elasticity.

LO: This module will enable the students to find out partial derivatives of multivariate functions; and calculate elasticities of multivariate functions.

Unit- IV: Matrices and Determinants

Matrices: concept, types, matrix algebra, transpose, inverse, rank; Determinants: concept, properties, solving problems using properties of determinants, solution to a system of equations - Crammer's rule and matrix inversion method.

LO: This module will enable the students to understand different types of matrices and determinants; and learn about the matrix operations and solve systems of linear equations using matrices.

Textbook:

- ✓ *C. Chiang and K. Wainwright (2005): Fundamental Methods of Mathematical Economics, McGraw Hill International Edition*

Reference Book:

- ✓ *K. Sydsaeter and P. J. Hammond (2002): Mathematics for Economic Analysis. Pearson Educational Asia*
- ✓ *Edward T Dowling (2004): Introduction to Mathematical economics, Tata McGeaw-Hill, Third Edition.*
- ✓ *Taro Yamane (1995): Mathematics foe Economists: An elementary survey. New Delhi Prentice Hall. Second Edition*

Major I **Credit 04**

1.4 Money and Banking

Course Description

This course exposes students to the theory and functioning of the monetary and financial sectors of the economy. It highlights the organization, structure and role of financial markets and institutions. It also discusses interest rates, monetary management and instruments of monetary control. Financial and banking sector reforms and monetary policy with special reference to India are also covered.

Course Outcomes:

- Understanding money and its types along with their functions and different measures of money supply.
- Understanding the basic concepts of banking, and its functions and to examine the banking scenario in India.
- To gain knowledge of the functions of central banks and monetary policies and how they have evolved.
- Get an understanding of the conceptual framework of the financial market and institutions of India.

Unit I: Money

Definition and functions of money; Types of money: legal tender money and bank money, near money; Value of money and index number; construction of index number; WPI, CPI, PPI, GDP deflator, Cost of living index. Demand for money- Classical and Keynesian approaches, Patinkin and the Real Balance Effect; Friedman's Quantity theory of money. Supply of Money- Measures of money supply: M_1, M_2, M_3 and M_4 ; High powered money and money multiplier.

LO: This module will enable students to understand various concepts of money and money substitutes, functions of money, and monetary aggregates.

Unit II: Commercial Banking

Meaning and types; Functions of commercial banks; the process of credit creation and its limitations; Balance sheet and portfolio management, Banking sector reforms in India; Lessons from Global Financial Crisis and Policy Response in India.

LO: This module will make the students aware of basics of commercial Banking and Finance.

Unit III: Central Banking

Functions of a central bank; Quantitative and qualitative methods of credit control; Central Bank's Supervision and prudential measures for financial stability; current monetary policy of India, liquidity adjustment facility (LAF) through Repo and reverse repo operation, MSF.

LO: Upon completion of this module, students will be able to appreciate the effects of the major policy tools and understand how central banks affect the financial system of the economy.

Unit IV: Financial Markets

Financial Market, Meaning, Types, Money market and Capital Market, Primary and Secondary Market, Stock Exchanges, SEBI; Role of Financial Markets for Economic Development. Financial Instruments: Government securities, derivatives, futures and options, bond, debentures.

LO: This module shall help students to understand the nature of financial instruments and their usage.

Textbook

- ✓ *Bhole, L. M. (2017): Financial institutions and Market, 6th Ed, Tata McGraw hill, New Delhi.*
- ✓ *Mishkin, F. S. & Eakins S. G (2017): Financial Market and Institutions, 8th Ed, PE, New Delhi.*

Reference Book

- ✓ *Suraj. B. Gupta (2010): Monetary Economics: Institution, Theory and Practice, S. Chand.*
- ✓ *Gorden & Natrajan (2023): Financial Market and institutions, 3rd Ed, Himalaya Publishing house*

Major II

Credit 04

2.1 Computational Methods in Economics

Course Description

This course introduces the students to understand uses of computers and their applications in economics. After completion of the course, students will develop professional competency in working with MS Office.

Course Outcomes:

- To understand the uses of computers and their applications in Economics.
- To develop professional competency in working with MS Office.
- To get hands-on use of Microsoft Office applications- Word, Excel, PowerPoint, and Access.
- To gain basic soft skills in handling data, creation, and formatting of Word documents, and making presentations.

Unit-I: Computer Fundamentals

The basic architecture of CPU and its functions – Input device and output device – Primary and secondary memory. Operating systems - concept and types, Windows- concepts and components; Basics of a computer network: LAN, WAN, and MAN; Introduction to internet and its applications; booting process, Machine language, and assembly language; Applications of computer in Economics, other fields.

LO: This module shall make the students understand the basics of computers – parts, memory, network, and internet.

Unit II: MS Word, PowerPoint, and Access Applications

MS Word: Word basics, creation of a document, use of tables, pictures, and charts; editing, formatting, and printing documents; MS PowerPoint: Features, Creation of Slides for presentation, Types of view, Slide master, Templates and Slide transition; MS-Access: Data Field, Record, Database file, Types of files, Types of records, Data type, Database evolution, Data transfer from Excel to Access

LO: Upon completion of this module, students shall be able to create text documents using MS Word, create interesting and appealing presentations using MS PowerPoint, and apply Database Management Software (DBMS) like MS Access to manage data of businesses and enterprises.

Unit III: Worksheet & MS Excel

Basics of worksheet –creating a worksheet, entering data into a worksheet, sorting data, autofill, saving & protecting a worksheet, Formatting of a worksheet. Previewing & Printing worksheet; Create an Excel chart; Drawing charts: Area, Bar, Column, Line, Pie, Scatter, etc. Move and Resize your chart; Charts Styles and Layouts; Chart Titles and Series Titles; Format chart Panel; Add labels to a Chart; Format chart segments; Format Axis titles; Format your Axis titles

LO: Upon completion of this module, students shall develop the ability to arrange data in spreadsheets using graphing tools, pivot tables, and formulas.

Unit IV: MS-Excel Basic Function

Basic calculations: Sum, Sqrt, Max, Min, Count, Averages, Rank; Conditional and logical functions: IF, AND, OR; Estimation of correlation and regression; Hypothesis testing: t-test, F-test and Z-test Excel Pivot Tables; The LOOKUP Function; The VLOOKUP Function in Excel; Hyperlinks in Excel

AEC Paper I

English: Business Communication

Credits: 4

S. No	Modules	Outcomes
1.	**English Language and Communication: Introduction**	• Communication, its Importance and Factors • Types of Communication • Verbal and Non-verbal Communication • Styles of Communication
2	**English Language and Communication: Listening and Speaking**	• Types of Listening • Speaking to communicate effectively • Style of speaking in Various Situations • English Pronunciation
3	**English Language and Communication: Reading and Writing**	• Reading methods and techniques. • Reading texts to Understand meaning • Writing Process • Writing short and Long texts
4	**English Language and Communication: Grammar and Vocabulary**	• Grammar • Sentence structure • Functions of Language

Reference Book: A Course book for ENGLISH COMMUNICATION (Publisher: Orient BlackSwan)

LO: This module shall enable the learner to analyze data using MS Excel functions.

Textbooks:

- ✓ *New Perspectives Microsoft Office Excel 2016, Comprehensive Enhanced Edition, by Parsons, et al, Nelson Publisher.*
- ✓ *Sinha, P. K. (2004): Computer Fundamentals, 6th Ed, BPB Publications, New Delhi.*

Reference Book

- ✓ *Raja Raman.V. (2014): Fundamentals of Computers, 6th Ed, PHI, New Delhi.*
- ✓ *Kerns R. L.(1992): Essentials of Microsoft Windows, Word and Excel, PHI.*
- ✓ *Alexis Leon & Mathews Leon: Introduction to Computers with Ms-Office, TMH.*

VAC Paper I

Environmental Studies & Disaster Management

(Credit-3)

Unit 1: Multidisciplinary nature of environmental studies (8 Period)

Definition, scope and importance

Need for public awareness

Environmental Pollution

Definition

- Cause, effects and control measures of:-

a) Air pollution

b) Water pollution

c) Soil pollution

d) Marine pollution

e) Noise pollution

f) Radiation pollution

Unit 2: Natural Resources: (8 Period)

Renewable and non-renewable resources:

Natural resources and associated problems.

a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.

c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, waterlogging, salinity, case studies.

e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Case studies.

Biodiversity:- Introduction-Definition; Biogeographically classification of India

India as a mega diversity nation. Hot sports of biodiversity, Threats to biodiversity. Endangered and endemic species of India. Conservation of biodiversity. In Situ and Ex-so conservation of biodiversity

Unit-3: Disaster Management (8 Period)

1. Disaster Management: Types of disasters (natural and Man-made) and their causes and effect)

2. Vulnerability Assessment and Risk analysis: Vulnerability to various disasters (Flood, Cyclone, Earthquake, Heat waves, Desertification and Lighting)

3. Institutional Framework: Institutional arrangements for disaster management (National Disaster Management Authority (NDMA), State Disaster Management Authority (SDMA), Disaster Management Act, 2005, District Disaster Management Authority (DDMA), National Disaster Response Force(NDRF) and Odisha Disaster Rapid Action Force(ODRAF)

4. Preparedness measures: Disaster Management cycle, Early Warning System, Pre Disaster and Post-Disaster Preparedness, strengthening of SDMA and DDMA, Community Preparedness for flood cyclone, heat waves, fire safety, lightening and snake biting. Stake holders participation, Corporate Social Responsibility (CSR)

5. Survival Skills: Survival skills adopted during and after disaster (Flood, Fire, Earthquake, Cyclone and Lightening), Disaster Management Act-2005, Compensation and Insurance

Unit 4: Social Issues and the Environment (6 Period)

A. a) Environmental Ethics: Issues and possible solutions.

b) Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies

c) Environment Protection Act

d) Air (Preservation Control of Pollution) Act

e) Water (Preservation Control of Pollution) Act

f) Wildlife Protection Act

g) Forest Conservation Act

h) Solid waste management Cause, effect and Control Measure of Urban and Industrial waste (Role of each individual in conservation of Natural resources and prevention of pollution)

B. Human Population and the Environment

Population Ecology: Individuals, species, population, community

Human population growth, population control method

Urbanisation and its effect on society

Unit 5: Field work (15 Periods of 30 hrs)

- Visit to an area to document environmental assets: river/forest/flora/fauna, etc.
- Visit to a local polluted site- Urban/Rural/Industrial/Agricultural
- Study of common plants, insects, birds and basic principles of identification.
- Study of simple ecosystems-pond, river, Delhi Ridge , etc.

Semester-II

Major I

Credit 04

1.5 Basic Economics II

Course Description

This course is designed to expose the students to the basic principles of how the economy works at the microeconomic level with some basic concepts like production, firms and input markets. This course also aims to introduce the students to the basic macroeconomic concepts of money, inflation, and the theories of determination of income and employment in the aggregate economy.

Course Outcomes

- ✓ *To have a clear idea about the principles that govern the economy's running at the micro and macro levels.*
- ✓ *To understand about the working of the input market.*
- ✓ *To gain clarity about dynamic concepts of Inflation, Employment, money, and income.*
- ✓ *To understand of the theories of determination of income and employment in the aggregate economy.*

Unit I: The Firm and Market Structures

Cost concepts; Production and Costs; The various measures of cost – Fixed and Variable cost, Average and Marginal cost; Cost curves and their shapes; Costs in the short run and the long run; Economies and diseconomies of scale. Firms in Competitive Markets – What is a competitive market; Profit maximization and the competitive firm's supply curve; The marginal cost curve and the firm's supply decision; Firm's short-run decision to shut down; Firm's long-run decision to exit or enter a market; The supply curve in a competitive market – short run and long run

LO: Upon completion of this module, the students will have a clear understanding of the traditional theory of cost and different cost concepts, and be able to distinguish between short-run and long-run costs, and relate them to a firm's decision-making under competitive markets.

Unit II: The Input Markets

The Demand for Labour – The production function and the marginal product of labour; Value of the marginal product of labour and demand for labour; Shifts in labour demand curve; The supply of labour – the trade-off between work and leisure; Shifts in the labour supply curve; Equilibrium in the Labour Market; Other factors of production: Land and Capital; Linkages among factors of production

LO: Upon completion of this module, the students will get an insight into the analysis of demand and supply of inputs and the linkages among the factors of production.

Unit III: Money and Changes in its Value

Evolution and Functions of Money, Quantity Theory of Money – Cash Transactions, Cash Balances and Keynesian Approaches, Value of Money and Index Number of Prices

Inflation – Meaning, Causes, and Anti-Inflationary Measures; Classical, Keynesian, Monetarist and Modern Theories of Inflation, Inflationary Gap, Deflation- Meaning, Causes, and Anti- Deflationary Measurers, Depression and Stagflation; Inflation vs. Deflation

LO: Upon completion of this module, the students shall understand the evolution of money and the classical theories of money supply and be able to explain the causes of inflation and deflation in an economy and the impact and solution thereto.

Unit IV: Determination of National Income

The Classical Approach - Say's Law, Theory of Determination of Income and Employment with and without saving and Investment; Basics of Aggregate Demand and Aggregate Supply and Consumption- Saving – Investment Functions, The Keynesian Approach – Basics of Aggregate Demand and Aggregate Supply and Consumption, Saving, Investment Functions; The Principle of Effective Demand; Income Determination in a Simple 2-Sector Model; Changes in Aggregate Demand and Income- The Simple Investment Multiplier

LO: Upon completion of this module, the students shall get to know the classical and Keynesian theories of income and employment determination.

Textbook:

- ✓ *Gregory N Mankiw: Principles of Economics, 6th Edition, Cengage Learning India Private Limited, New Delhi*
- ✓ *Gregory N. Mankiw (2010): Macroeconomics, 7th edition, Cengage Learning India Private Limited, New Delhi*
- ✓ *Government of India (2012): National Accounts Statistics Sources and Methods, CSO, MOSPI*

Reference Book:

- ✓ *Karl E. Case and Ray C. Fair (2007): Principles of Economics, 8th Edition, Pearson Education Inc.*
- ✓ *Richard T. Froyen (2005): Macroeconomics, 2nd Edition, Pearson Education Asia, New Delhi.*

Major I

Credit 04

1.6 Indian Economy II

Course Description

This course examines sector-specific policies and their impact in shaping trends in key economic indicators in India. It highlights major policy debates and evaluates the Indian empirical evidence. Given the rapid changes taking place in the country, the reading list should be updated annually.

Course Outcomes

- To analyze the current state of Indian agriculture, including production trends, factors influencing production, and policy initiatives like land reforms and the green revolution.
- To evaluate the development of Indian industries, including historical industrial policies, challenges faced by small-scale industries, and the role of labor.
- To assess the contribution of the tertiary sector to the Indian economy, and understand the concept of Human Resource Development (HRD) and its role in India's development.
- To explain India's foreign trade scenario, including trade composition, export promotion strategies, and the role of foreign capital.
- To analyze the environmental policies implemented in India and the global response to climate change, considering India's specific situation.

Unit I: Agricultural Development in India

Indian Agriculture: nature, importance, trends in agricultural production and productivity, factors determining production, land reforms, new agricultural strategies and green revolution, rural credit; Agricultural marketing and warehousing.

LO: Students will be able to analyze the structure, challenges, and advancements in Indian agriculture, including policies, credit, and marketing.

Unit II: Industrial Development in India

Trends in industrial output and productivity; Industrial Policies of 1948, 1956, 1977, and 1991; Industrial Licensing Policies – MRTP Act, FERA, and FEMA; Growth and problems of SSIs, Industrial sickness; Industrial finance; Industrial labor.

LO: Students will know about industrial output and productivity trends, industrial policies, the impact of licensing policies, small-scale industries' growth, industrial finance, and labor issues in India.

Unit III: Tertiary Sector, HRD, and the External Sector

Tertiary Sector: growth and contribution of the service sector to GDP of India, share of services in employment; Human development – concept, evolution, measurement; HRD: indication, importance, education in India, Indian educational policy; Health and Nutrition. Foreign Trade: role, composition, and direction of India's foreign trade, trends of export and import in India, export promotion versus import substitution; Balance of Payments of India; India's Trade Policies; Foreign Capital – FDI, Aid and MNCs.

LO: Students will have an understanding of the growth of India's service sector, human development strategies (education & health), and international trade dynamics (exports, imports, foreign investment)

Unit IV: Indian Economy and Environment

Environmental Policies in India: The Environment (Protection) Act 1986, The Environment (Protection) Rules 1986, The National Forest Policy 1988, Policy statement for Abatement of

Pollution 1992, National Conservation Strategy and Policy Statement on Environment and Development

1992, The National Environment Appellate Authority Act 1997, National Environmental Policy 2006; Global deal with Climate Change: Introduction, Intergovernmental Panel for Climate Change (IPCC), Impact of Climate Change on India, Global Response on Climate Change, Possible Role of India.

LO: Students will be able to analyze key environmental policies in India, the global deal on climate change, IPCC's role, climate change impacts, and global responses to India's role.

Textbook:

- ✓ *Mishra, S. K. and Puri V. K. Indian Economy — Its Development Experience. HimalayaPublishing House, Mumbai*

Reference Books:

- ✓ *Dutt R. and Sundharam K. P. M.: Indian Economy. S. Chand & Company Ltd., New Delhi.*
- ✓ *Datt and Sundharam, Gaurav Datt and Ashwani Mahajann: Indian Economy, S Chand Publications, 7th Revised Edition*
- ✓ *Indian Economy Since Independence, ed by Uma Kapila, Academic Foundation, RevisedNineteenth Edition 2008-09*
- ✓ *Government of India (Current Year): Economic Survey, Ministry of Finance, New Delhi*

1.7 Statistical Methods for Economics

Course Description:

This is a course on statistical methods for economics. It begins with some basic concepts and terminology that are fundamental to statistical analysis and inference. It is followed by a study and measure of the relationship between variables, which are the core of economic analysis. This is followed by a basic discussion on index numbers and time series. The paper finally develops the notion of probability, followed by probability distributions of discrete and continuous random variables, and introduces the most frequently used theoretical distribution, the Normal distribution.

Course Outcomes:

- To summarize data effectively using measures of central tendency, dispersion, and graphical techniques.
- To analyze relationships between variables through correlation and regression analysis.
- To understand and interpret time series data by identifying trends and seasonality.
- To apply probability theory and sampling techniques to solve statistical problems and assess data validity.

Unit I: Data Collection and Measures of Central Tendency and Dispersion

Basic concepts: population and sample, parameter and statistics; Data Collection: primary and secondary data, methods of collection of primary data; Presentation of Data: frequency distribution; cumulative frequency; graphic and diagrammatic representation of data; Measures of Central Tendency: mean, median, mode, geometric mean, harmonic mean, their relative merits and demerits; Measures of Dispersion: absolute and relative - range, mean deviation, standard deviation, coefficient of variation, quartile deviation, their merits, and demerits; Measures of skewness and kurtosis.

LO: At the end of this module, students will be able to distinguish between population and sample, collect and organize data, and calculate measures of central tendency and dispersion to understand a data set's characteristics.

Unit II: Correlation and Regression Analysis

Correlation: scatter diagram, sample correlation coefficient - Karl Pearson's correlation coefficient and its properties, probable error of correlation coefficient, Spearman's rank correlation coefficient. Two variable linear regression analysis - estimation of regression lines (Least square method) and regression coefficients - their interpretation and properties, standard error of estimate.

LO: This module shall help students master the techniques to measure the strength and direction of relationships between variables (correlation) and use linear regression analysis to model and predict those relationships.

Unit III: Time Series and Index Number

Time Series: definition and components, measurement of the trend- freehand method, methods of semi-average, moving average and method of least squares (equations of first and second degree only), measurement of the seasonal component; Index Numbers: Concept, price relative, quantity relative and value relative; Laspeyer's and Fisher's index, family budget method, problems in construction and limitations of index numbers, test for ideal index number.

LO: Upon completion of this module, students will be able to analyze time series data for trends and seasonality, and construct and interpret index numbers to measure price and quantity changes.

Unit IV: Probability Theory and Sampling

Probability: Basic concepts, addition, and multiplication rules, conditional probability; Meaning of Sampling, Types of Sampling: Probability Sampling versus Non-Probability Sampling; Simple Random Sampling and its selection, Systematic Sampling, Multi-stage Sampling, Quota Sampling; Error: Sampling and Non-sampling.

LO: Upon completion of this module, students will be able to calculate probabilities, understand different sampling methods (probability vs. non-probability), and identify potential errors associated with sampling.

Basic Readings and Textbooks:

- ✓ *S. C. Gupta (2017): Fundamentals of Statistics, Himalaya Publishing House, Delhi*

Reference Book:

- ✓ *Murray R. Speigel (2017): Theory & Problems of Statistics, Schaum's publishing Series.*
- ✓ *A L Nagar & R K Das (1983): Basic Statistics. Oxford University Press.*

Major I

Credit 04

1.8 Public Economics

Course description:

Public economics is the study of government policy from the points of view of economic efficiency and equity. The paper deals with the nature of government intervention and its implications for allocation, distribution and stabilization. Inherently, this study involves a formal analysis of government taxation and expenditures. The subject encompasses a host of topics including public goods, market failures and externalities.

Course Outcomes:

- The course will familiarize the students with the relevance, responsibilities, and sources of receipts of the government.
- Students will be able to understand the rationale behind the public provision of specific goods and services and what can be left to market for provision.
- Students will be able to understand the normative ideas behind public expenditure, taxation, and public debt as well as the budget of government and its impact on the economy.
- Students will be able to understand the methods of fiscal management by the government in India.

Unit I: Introduction to Public Finance and Public Budgets

The concept of Pareto Optimality. Pareto improvement and potential Pareto improvement. Public good verses private good; Free riding and public Good provision. Maximum Social advantage. Market failure and role of government; Public Budget: kinds of budget, economic and functional classification of the budget; Balanced and unbalanced budget; Balanced budget multiplier; Budget as an instrument of economic policy

LO: This module will give an idea of the goods to be provided by the government and market and the challenges faced by the government to provide public goods; and will also teach about different types of budgets and their implications for the economy.

Unit II: Public Expenditure

Meaning, classification, principles, cannons and effects, causes of growth of public expenditure, Wagner's law of increasing state activities, Peacock-Wiseman hypotheses. Pareto Optimality Criterion, social Allocation

LO: This module will educate on the principles behind public expenditure and the causes behind the rise in the public expenditure.

Unit III: Public Revenue

Sources of Public Revenue; Taxation - meaning, cannons and classification of taxes, impact and incidence of taxes, division of tax burden, the benefit and ability to pay approaches, taxable capacity, effects of taxation, characteristics of a good tax system, major trends in tax revenue of central and state governments in India, Introduction of GST in India. Issues and Challenges relating to GST.

LO: This module will educate on the sources of receipts for the government, theoretical ideas behind taxation, and implementation of GST in India.

Unit IV: Public Debt

Sources, effects, debt burden – Classical/ Ricardian views, Keynesian and post-Keynesian views; shifting - intergenerational equity, methods of debt redemption, debt management, tax verses debt.

LO: This module will give a fair idea of different aspects of the implications of public debt on the economy

Textbooks:

- ✓ J. Hindriks and G. Myles (2006): *Intermediate Public Economics*, MIT Press.

Reference Book:

- ✓ *R. A. Musgrave and P. B. Musgave (1989): Public Finance in Theory and Practices. McGraw Hill*
- ✓ *Bhatia H L (2018): Public Finance. Vikas Publishing House.*

Major II

Credit 04

2.2 Introductory Econometrics

Course Description:

This course provides a comprehensive introduction to basic econometric concepts and techniques. It covers statistical concepts of hypothesis testing, estimation and diagnostic testing of simple and multiple regression models. The course also covers the consequences of and tests for misspecification of regression models.

Course Outcomes:

- To have a comprehensive introduction to basic econometric concepts and techniques.
- To gain an understanding of the statistical concepts of hypothesis testing, estimation, and diagnostic testing of simple and multiple regression models.
- To gain knowledge about the consequences, tests, and remedies of violation of Least Square assumptions.

Unit I: Introduction

Definition, Nature and scope of econometrics; Theoretical Probability Distributions: Binomial, Poisson and Normal distributions: their properties. Theory of Estimation: Estimation of parameters; properties of estimators – small sample and asymptotic properties; point and interval estimation.

LO: This module will enable the students to know about some common discrete and continuous theoretical probability distributions; and to know about estimators, point and interval, and the desirable properties of point estimators.

Unit II: Hypothesis Testing

Testing of hypotheses: defining statistical hypotheses; Simple and composite hypotheses; Null and alternative hypothesis; Type I and Type II errors, Critical region; Neyman-Pearson lemma; Power of a test; Test statistics: z, chi square, t and F.

LO: This module will enable the student to gain knowledge about statistical hypotheses and the procedure of testing of hypothesis; and have an understanding of type I and type II errors in the procedure of hypothesis testing.

Unit III: Linear Regression Analysis

Two variable linear regression model – Assumptions; Least square estimates, Variance and co- variance between Least square estimates; BLUE properties; Standard errors of estimates; Co- efficient of determination; Inference in a two variable linear regression model; ANOVA; Forecasting. Introduction to multiple regression models.

LO: This module will enable the students to understand the concept and usefulness of regression analysis and differentiate between Linear and non–linear relations; understand the difference between simple & multiple linear regression models and their estimation as well as inference drawn therefrom.

Unit IV: Violation of Classical Assumptions

Heteroscedasticity, Multicollinearity and Auto-correlation: Meaning, consequences, tests and remedies.

LO: This module will enable the student to understand the consequences, tests, and remedies of violation of Least Square assumptions.

Textbook:

- ✓ *Gujarati, D & Sangeetha (2007); —Basic Econometrics*l, *McGraw Hill Book Co.*

Reference Book:

- ✓ *Wooldrige, J. M. (2022): Introductory Econometrics: A modern Approach, 7th Ed, Cengage Publication*

AEC Paper II

English: Word and Presentation skill

Credits: 4

S. No	Modules	Outcomes
1.	**Basic Communication**	• Explain: o Structures in present and present continuous tense o Structures in past & past continuous tense o Structure in present perfect & present perfect continuous tense o Structures in future tense o Modals: helping verbs o Prepositions o Idioms • Practice speech on a given topic. • Practice Extempore speech
2	**Communication**	• Describe communication. • Describe the Process of communication. • Discuss the Importance of communication • Explain various Types of communication. • Demonstrate Useful Phrases for Everyday Use • Explain the technique of Asking Questions
3	**Hotel English**	• Describe the Essential qualities of a good speaker. • Discuss Speech improvement- pronunciation. • Explain the importance of Stress in speech. • Describe Intonation and modulation. • Describe Common phonetics- difficulties

VAC Paper I

Good Citizenship

Credits:3

Objectives/Learning Goals of the Course

- Development of good human being and a responsible citizen
- Developing a sense of right and wrong leading to ethically correct behavior.
- Inculcating a positive attitude and a healthy work culture.

Learning Objectives:

- Understanding Basic Values of Indian Constitution.
- Understand how to be a patriot.
- Develop professionalism and understand the ethics relating to various professions.

1. **Indian Constitution (1 Credit= 15 hours)**

   Salient Values of Preamble: Sovereign, Socialist, Secular, Democratic, Republic, Justice, Liberty, Equality and Fraternity

2. **Patriotism (1 Credit= 15 hours)**

   Patriotic Value and ingredients of nation building, Concept of Good Citizenship, Emotional connection with the country, Duties of citizens and Qualities of good citizens

3. **Work Ethics (1 Credit= 15 hours)**

   Punctuality, Cleanliness, Law abidingness, Rational Thinking and Scientific Temper

Semester-III

Major I

Credit 04

1.9 Microeconomics I

Course Description

The course is designed to provide sound training in microeconomic theory to formally analyze the behavior of individual agents. Since students are already familiar with the quantitative techniques in the previous semesters, mathematical tools are used to facilitate understanding of the basic concepts; this course looks at the behavior of the consumer and the producer and also covers the behavior of a competitive firm.

Course Outcomes:

- To develop an understanding of preferences and consumer choice and formally analyze the behavior of individual agents
- To be able to use mathematical tools to facilitate understanding of the basic concepts of Economics.
- To understand the behavior of the consumer and the producer.
- To understand the behavior of a competitive firm.

Unit I: Consumer Theory I

Preferences and Utility, Axioms of Rational Choice, Utility, Trades and Substitutions, Indifference curves; Mathematics of Indifference curves, Utility functions for specific preferences, the many good cases; Utility Maximization and choice: the 2-good case (graphical analysis), the n-good case, Indirect utility function, the Lump sum principle, Expenditure minimization, properties of the expenditure function.

LO: This module will enable the students to understand the basic concepts in consumer behavior like utility, choice, optimization, and Indifference curves using mathematical tools; and differentiate between direct and indirect utility, and explain expenditure function and its properties.

Unit II: Consumer Theory II

The Income and Substitution Effects: Demand function, changes in income, changes in goods price- Direct and Indirect Approaches (Slutsky), the Individual's Demand Curve, Compensated (Hicksian) demand curves and functions, demand elasticity, Consumer Surplus, Demand relationships among goods, the 2-good case, substitutes and complements, Net (Hicksian) substitutes, and Complements, Substitutability with many goods.

LO: This module will enable the students to analyze the effects of changes in income and prices on demand; differentiate between Ordinary and compensated demand; explain the concepts of price and income elasticities, and substitutability between goods; and understand the concept of Consumer Surplus

Unit III: Production Theory and Costs

Production Functions: Marginal productivity, Production with One Variable Input (labour) and with Two-Variable Inputs, Isoquant Maps and the Rate of Technical Substitution, Returns to Scale, Elasticity of Substitution, Some Simple Production Functions: Linear, Fixed Proportions; Technical Progress. Definition of Cost and its properties, Cost minimizing input choices (Optimization principles, Expansion Path), Cost Functions and Shift in Cost Curves, Long-Run versus Short-Run Cost Curves.

LO: This module will enable the students to understand concepts like production function in the short run and the long run, isoquants, and substitution between inputs; and explain concepts of cost, and optimization in the short run and long run

Unit IV: Profit Maximization

The Nature and Behaviour of Firms, Marginal Revenue – Relationship between Average and marginal revenue, Short-Run Supply by a Price-Taking Firm, Profit Functions and its Properties, Profit maximization – General conditions, Input demands

LO: This module will enable the students to understand the behavior of the competitive firm and concepts like average and marginal revenue; and learn the conditions for profit maximization, properties of profit function

Textbook:

- ✓ *C. Snyder and W. Nicholson (2012): Microeconomic Theory: Basic Principles and Extensions, 11th Edition, Cengage Learning, Delhi, India*

Reference Books:

- ✓ *H. R. Varian (2010): Intermediate Microeconomics: A Modern Approach, 8th Edition,W.W. Norton and Company/Affiliated East-West Press (India). The workbook by Varian and Bergstrom may be used for problems*

Major I

Credit 04

1.10 Macroeconomics- I

Course Description

This course introduces the students to formal modelling of a macro-economy in terms of analytical tools. It discusses various alternative theories of output and employment determination in a closed economy in the short run as well as long run, and the role of policies in this context.

Course Outcomes:

- To understand the basics of consumption function and its relation with income, and factors influencing consumption function.
- To get a knowledge about various types of investment spending and evaluate the impact of investment through multiplier and accelerator in economies.
- Discuss the various approaches to demand and supply of money.
- Analyse and interpret the IS-LM model as a step toward understanding economic fluctuations.

Unit I: Consumption

Consumption – Income Relationship, Propensities to Consume and the Fundamental Psychological Law of Consumption; Implications of Keynesian Consumption Function; Factors Influencing Consumption Function; Measures to Raise Consumption Function; Absolute, Relative, Permanent, and Life-cycle hypothesis

LO: This module shall enable the students to find out how consumption is affected by income and other factors.

Unit II: Investment

Autonomous and Induced Investment, Residential and Inventory Investment, Determinants of Business Fixed Investment, Decision to Invest and MEC, Accelerator and MEI, Theories of Investment: The Accelerator and Tobin's theory

LO: Students will gain an understanding of different forms of investment spending and theories of investment

Unit III: Demand for and Supply of Money

Demand for Money – Classical, Neoclassical, and Keynesian Approaches, The Keynesian Liquidity Trap and its Implications, Supply of Money – Classical and Keynesian Approaches, The Theory of Money Supply Determination and Money Multiplier, Measures of Moncy Supply in India, RBI approach to money supply, Determination and Money multiplier. High-powered money and money multiplier

LO: Students will be able to understand the workings of money in an economy.

Unit IV: Aggregate Demand and Aggregate Supply

Derivation of Aggregate Demand and Aggregate Supply Curves in the IS-LM Framework; Nature and Shape of IS and LM curves; Interaction of IS and LM curves and Determination of Employment, Output, Prices and Investment; Changes in IS and LM curves and their Implications for Equilibrium

LO: This module shall help to gain knowledge about the way the goods market and money market serve as a basis for the determination of employment, output, price, and investment.

Text Readings:

- ✓ *N. Gregory Mankiw (2010): Macroeconomics, 7th edition, Cengage Learning India Private Limited, New Delhi.*
- ✓ *Richard T. Froyen (2005): Macroeconomics, 2nd Edition, Pearson Education Asia, New Delhi.*

Reference Book:

- ✓ *Snowdon, B. and Vane H. R. (2005). Modern macroeconomics –its Origins, Development and Current State. Edward Elgar Publishing Limited, Cheltenham, UK.*
- ✓ *Ahuja H. L. (2019). Macroeconomics- Theory and Policy. 20th Edition, S Chand publication.*
- ✓ *Dwivedi, D. N. (2018): Macroeconomics -Theory and Policy. 5th Edition, Tata McGraw Hill.*

Major I

Credit 04

1.11Mathematical Methods for Economics II

Course Description:

This course is the second part of a compulsory two-course sequence. This part is to be taught in Semester II following the first part in Semester I. The objective of this sequence is to transmit the body of basic mathematics that enables the study of economic theory at the undergraduate level, specifically the courses on microeconomic theory, macroeconomic theory, statistics and econometrics set out in this Syllabus. In this course, particular economic models are not the ends, but the means for illustrating the method of applying mathematical techniques to economic theory in general. The level of sophistication at which the material is to be taught is indicated by the contents of the prescribed textbook.

Course Outcomes:

- To use mathematical techniques to analyze economic problems.
- To have an understanding of the input-output models.
- To be able to use second and higher-order derivatives and integration to analyze the nature of functions.
- To develop the ability to optimise objective functions subject to satisfaction of constraints.

Unit I: Linear models:

Input-Output Model: Basic concepts and structure of Leontief's open and static Input-Output model; Solution for equilibrium output in a three-industry model; The closed model.

LO: This module will enable the students to get an idea of the static input-output model in its closed and open versions, which are of great practical importance in Economics.

Unit II: Second and Higher Order Derivatives and Integration:

Technique of higher order differentiation; Interpretation of second derivative; Second order derivative and curvature of a function; Concavity and convexity of functions; Points of inflection, Derivative of Implicit Function; Higher Order Partial Derivative. Indefinite Integrals; Rules of Integration; Techniques of Integration: Substitution Rule, Integration by parts, and Partial Fractions; Definite Integral – Area Interpretation.

LO: This module will enable the students to know the concept of higher-order derivatives and integration, definite and indefinite; and the applications of higher-order derivatives and integration in Economics.

Unit III: Single and Multivariable Optimization:

Optimum values and extreme values; Relative maximum and minimum; Necessary versus sufficient conditions – First and Second derivative tests (using Hessian Determinants); Economic applications thereof, First and second order condition for extrema of multivariable functions; Convex functions and convex sets.

LO: This module will enable the student to learn the concept of optimization of single and multi-variable functions.

Unit IV: Optimization with Equality Constraints:

Effects of a constraint; Finding stationary value – Lagrange-Multiplier method (Two variable singleconstraint case only): First and second order condition; The Bordered Hessian determinant.

LO: This module will enable the student to understand the meaning and definition of constraint optimization, and the use of the Lagrange multiplier method and the Bordered Hessian determinant to optimize an objective function with respect to a constraint.

Text Reading:

- ✓ *A. C. Chiang and K. Wainwright (2005): Fundamental Methods of Mathematical Economics, McGraw Hill International Edition.*

Reference Book:

- ✓ *K. Sydsaeter and P. J. Hammond (2002): Mathematics for Economic Analysis. PearsonEducational Asia*
- ✓ *Edward T Dowling (2004): Introduction to Mathematical economics, Tata McGeaw-Hill, Third Edition.*
- ✓ *Taro Yamane (1995): Mathematics foe Economists: An elementary survey. New Delhi Prentice Hall. Second Edition.*

Major I

Credit 04

1.12 Development Economics I

Course Description:

This is the first part of a two-part course on economic development. The course begins with a discussion of alternative conceptions of development and their justification. It then proceeds to aggregate models of growth and cross-national comparisons of the growth experience that can help evaluate these models. The axiomatic basis for inequality measurement is used to develop measures of inequality and connections between growth and inequality are explored. The course ends by linking political institutions to growth and inequality by discussing the role of the state in economic development and the informational and incentive problems that affect state governance.

Course Outcomes:

- The course will enhance the understanding of concepts of development and the need for it.
- It helps students learn about aggregate models of growth.
- It examines the axiomatic basis for inequality measurement and explores the connections between growth and inequality.
- It familiarizes the students with the socio-economic and political institutions while showing their contribution to economic development.

Unit I: Study of Economic Development

Conceptions of Development economic growth and economic development; Alternative measures of development, documenting the international variations in these measures, comparing development trajectories across nations and within them measures of economic development – national and per capita income, basic needs approach, capabilities approach, three core values of development, PQLI, HDI, HPI, MDPI, GDI; Happiness Index

LO: Upon completion of this module, students learn the alternative concepts associated with the development and the changes in the measurement of development over time.

Unit II: Theories of Economic Growth and Development

Classical theory, Marxian theory; Schumpeterian theory; Rostow's stages of economic growth; Harrod-Domar model, Solow model and convergence with population growth and technical progress.

LO: Upon completion of this module, students gain an elaborate knowledge about the growth theories put forth by different Schools of Economics.

Unit III: Poverty, Inequality, Agriculture, Industry and Development:

Measuring poverty: Head Count Ratio, Poverty Gap Ratio, Squared Poverty Ratio, FGT Ratio; Measuring Inequality – Lorenz curve and Kuznets' inverted U hypothesis; Growth, poverty and inequality; Policy options – some basic considerations

Agriculture, Industry and Economic Development: Interdependence between agriculture and industries – A model of complementarities between agriculture and industry; terms of trade between agriculture and industry; functioning of markets in agrarian societies; interlinked agrarian markets

LO: This module shall help the leraners to understand different measures of poverty and inequality in an economy and gain an insight into the role of agriculture and industry in economic development and the dynamic complementarity between the two sectors.

Unit IV: Institutions and Economic Development:

Role of institutions in economic development; Characteristics of good institutions and quality of institutions; The pre-requisites of a sound institutional structure; Different measures of institutions – aggregate governance index, property rights and risk of expropriation; The role of democracy in economic development; Role of markets and market failure; Institutional and cultural requirements for operation of effective private markets; Market facilitating conditions; Limitations of markets in LDCs; Corruption and economic development – tackling the problem of corruption

LO: Upon completion of this module, students get to know the importance and role of institutions in the process of economic development.

Textbook:

- ✓ *Todaro, Michael P and Stephen C Smith (2006): Economic Development, 8th Edition, Pearson*

Reference Books:

- ✓ *Debraj Ray (2009): Development Economics, Oxford University Press.*
- ✓ *Thirlwall, A P (2011): Economics of Development, 9th Edition, Palgrave Macmillan*

Major II

Credit 04

2.3 Fundamentals of Data Analytics

Course Description:

This course provided an introduction to the principles, techniques and application of Data Analytics. It familiarises a student with the process of data collection, organization, analysis and interpretation so as to generate meaningful insights.

Course Outcomes:

- Understand the fundamental concept and foundation of Data analytics in Economics
- Identify the significance of data analytics in various spheres of study.
- Preprocess data from various sources using appropriate techniques for analysis and interpretation of data sets including accessing the confidence level.
- Demonstrate about data privacy, visualization tools and limitation of data analytics in real world situation.

Unit I:

Foundations of Data Analytics: Data, information, knowledge - types of data: structured, unstructured, time-series, cross-section, panel. Types of data analytics: descriptive, diagnostic, predictive, prescriptive.

Unit II:

Data analysis process: problem definition, data collection, data cleaning, data analysis, modelling, interpretation, reporting . Role of data analytics in economics, business and policy making. Analytics vs Statistics vs ML

Unit III:

Analytics Methods for Economics: Statistical inference basics: sampling distributions, confidence intervals, hypothesis testing - t, z, f chi-square and Regression analysis, interpretation for policy

Unit IV:

Time series analytics: trend, seasonality, smoothing, ARIMA basics, Data visualization & dashboards. Index numbers and growth rate, CAGR (compound annual growth rate). Data visualisation ethics: data privacy, bias, reproducibility, communicating results to technical and non-technical audience.

Suggested Readings

Textbooks

- ✓ Kumar, U. D. (2017). Business Analytics: The Science of Data-Driven Decision Making Wiley India
- ✓ Gupta, S. P. (2022). Statistics for Economics. Sultan Chand & Sons.

References

- ✓ C.R. Kothari – Research Methodology: Methods and Techniques
- ✓ Maheshwari, A. (2017). Data Analytics: The Science of Data Analytics Made Accessible. McGraw Hill Education (India).
- ✓ Wheelan, C. (2021). Naked Statistics: Stripping the Dread from the Data (Updated Edition). W. W. Norton & Company.
- ✓ Hyndman, R. J., & Athanasopoulos, G. (2021). Forecasting: Principles and Practice (3rd ed.). OTexts

Major II

Credit 04

2.4 Excel Application in Data Analytics

Course Description

Microsoft excel course is a versatile tool for data analytics. It facilitates students in developing practical's skills with data sets using formulas, functions, and data validation techniques. Excel is extensively used for data analysis in economics, social sciences, research and helps in developing advanced analytics tools and techniques.

Course Outcomes

- It introduces students to Microsoft excel as a tool for Data Management and analysis
- It develops the ability to organise preprocess data using excel: its functions and features
- Equip and enable students to create data visualization, dashboard for decision making
- Promotes critical thinking and problem-solving skills through hands on exercise and case studies

Unit 1: Introduction to MS Excel and Data Entry

Overview of Spreadsheet Applications, Features of Microsoft Excel, Excel Interface and Navigation, Workbook, Worksheet, Rows, Columns, and Cells, Creating, Saving, and Opening Files, Entering and Editing Data, Cell Formatting, Number Formats for Economic Data, Tables and Borders, Conditional Formatting

Unit 2: Charts and Graphical Representation and Managing Economic Data

Line Charts, Bar Charts, Pie Charts, Combo Charts, Sparklines and Dashboards, Sorting and Filtering, Data Validation, Removing Duplicates, Importing CSV and External Data, Organizing Economic Datasets, Creating PivotTables, Pivot Charts

Unit 3: Descriptive Statistics and Formulas in Excel

Mean, Median, and Mode, Variance and Standard Deviation, Correlation Analysis, Frequency Distribution, Histograms, Arithmetic Operations, Cell References (Relative and Absolute), SUM, AVERAGE, COUNT, MIN, MAX, IF and Logical Functions, Percentage Calculations

Unit 4: Economic and Financial Calculations

Growth Rate Analysis, Inflation Rate Calculation, Compound Growth, Index Numbers, Trend Analysis, Trend Lines, Moving Averages, Forecast Sheet, Scenario Analysis, Introduction to Regression Analysis, Interpreting Regression Output, Formatting Reports, Exporting and Printing Reports

Practical Work

1. Calculate GDP growth rates
2. Compute inflation percentages
3. Analyze household consumption expenditure
4. Prepare a GDP dataset, Format inflation and unemployment tables, Import and clean economic data
5. Create inflation trend charts
6. Analyze wage distribution
7. Compare regional unemployment data
8. Regional GDP analysis using PivotTables
9. Forecast inflation trends
10. Analyze relationship between income and consumption

Key Formulae

- Growth Rate = ((Current Value - Previous Value) / Previous Value) × 100

- $FV = PV(1 + r)^n$
- Variance: $s^2 = \Sigma(x_i - \bar{x})^2 / (n - 1)$
- Linear Regression: $y = a + bx$

Suggested Practical Project

- Inflation Analysis of India
- GDP Growth Comparison
- Unemployment Trend Analysis
- Trade and Export Dashboard
- Household Consumption Survey Analysis

Suggested References

✓ *Excel Data Analysis for Dummies by Stephen McDaniel*
✓ *Microsoft Excel Training: https://support.microsoft.com/excel*
✓ *World Bank Data Portal: https://data.worldbank.org*

Semester-IV

Major 1

Credit 04

1.13 Microeconomics II

Course Description

This course is a sequel to Microeconomics I. The emphasis will be on giving conceptual clarity to the student coupled with the use of mathematical tools and reasoning. It covers the Market, general equilibrium and welfare, imperfect markets, and topics under information economics.

Course Outcomes:

- To understand short-run and long-run supply decisions of a competitive firm & industry equilibrium
- To have a basic understanding of concepts of Pareto efficiency in consumption & production; general equilibrium, and welfare theorems
- To develop an understanding of imperfect markets such as Oligopoly
- To understand basic concepts of game theory.

Unit I: Firm Supply and Equilibrium

Supply decision of a competitive firm and Exceptions; Inverse Supply Function; Profits and Producer's Surplus; Long Run Supply Curve of a Firm; Long Run Average Costs; Short Run and Long Run Industry Supply; Industry Equilibrium in Short and Long Run; Meaning of Zero Profits; Economic Rent

LO: Upon completion of this module, students will understand the short-run and long-run supply decisions of a competitive firm and the concept of industry equilibrium; and gain an idea about long-run average costs, zero profit, and economic rent

Unit II: General Equilibrium, Efficiency and Welfare

The Edgeworth Box; Trade; Pareto Efficient Allocations; Existence, Stability and Uniqueness of equilibrium; Walras Law; The Welfare Theorems and their implications; The Firm; Production and the Welfare Theorems; Production possibilities, comparative advantage and Pareto efficiency

LO: This module shall help to understand concepts like Pareto efficiency, and general equilibrium in consumption and learn welfare theorems, comparative advantage, production possibilities, and general equilibrium in production

Unit III: Market Imperfections: Monopoly and Monopolistic Competition

Barriers to Entry, Profit Maximization and Output Choice, Monopoly and resource Allocation, Price Discrimination, Degrees of Price Discrimination, Regulation of Monopoly, Dynamic Views of Monopoly. Monopolistic competition – product differentiation, Selling costs and excess capacity

LO: This module shall aid in understanding the nature of monopoly markets and the role of barriers to entry and explain price discrimination; and to explain features of monopolistic competition and the question of economic inefficiency in equilibrium

Unit IV: Oligopoly and Game Theory

Non-collusive oligopoly models: Cournot, Bertrand, Stackelberg, Sweezy, Chamberlin, Collusive oligopoly models: Cartels, Price leadership. The Payoff Matrix of a Game; Nash Equilibrium, Pure and Mixed Strategies, The Prisoner's Dilemma, Repeated Games, Tit-for tat strategy, Enforcing a cartel, Sequential Games, A Game of entry deterrence

LO: Upon completion of this module, students will be able to understand and explain the features of oligopoly and learn different models thereof; and the meaning and use of game theory in oligopoly; understand concepts like Nash equilibrium and different types of games, especially Prisoner's dilemma.

Textbook:

- ✓ *H. R. Varian (2010): Intermediate Microeconomics: A Modern Approach, 8th Edition, W.W. Norton and Company/Affiliated East-West Press (India). The workbook by Varian and Bergstrom may be used for problems.*
- ✓ *Koutsoyiannis, A (1979): Modern Microeconomics, 2nd Ed, ELBS/Macmillan*

Reference Book:

- ✓ *C. Snyder and W. Nicholson (2012): Microeconomic Theory: Basic Principles and Extensions, 11th Edition, Cengage Learning, Delhi, India.*
- ✓ *Robert S. Pindyck and Daniel Rubinfeld: Microeconomics, 8th Edition, Pearson*
- ✓ *H. L. Ahuja (2018): Advanced Economic Theory. Twenty-First Edition, Sultan Chand Publication*

Major I

Credit 04

1.14 Macroeconomics II

Course Description

This paper deals with growth models and the classical school of thought, and its evolution into Keynesian economics. The students are introduced to long-run dynamics in growth and technical progress. This paper also familiarizes about the open economy and its dynamics.

Course Outcomes:

- To emphasize on conceptual understanding and some applications of important growth models.
- To enable critical appreciation of the classical school of thought and the evolution of Keynesian economics.
- To understand the theoretical underpinnings of economic policy in open economies, such as monetary and fiscal policy, the basic Mundell-Fleming model, and nominal and real exchange rate determination.
- To understand the trade-off between Unemployment and Inflation; get a critical understanding of Long-run and Short-run Phillips Curve, unemployment, and Expectations.

Unit I: Economic growth model:

Accumulation of capital in the basic Solow model; supply and demand for goods, growth in the capital stock and the steady state, Golden rule level of capital, comparing steady states, transition to the golden rule steady state with too much and too little capital, population growth technological progress – Solow version

LO: The module shall enable the students to get conceptual clarity and strengthen theoretical foundations of the Solow growth model

Unit II: Classical and Keynesian Macroeconomic thought

Classical macroeconomics, Employment and output determination: Say's law; the quantity theory of money, Keynes General theory: Keynes main propositions, Analysis of the labour market, Keynes critique of Says law and Quantity Theory of Money, the orthodox Keynesian school, underemployment equilibrium in the Keynesian model.

LO: This module shall help students in developing a clear, comprehensive understanding of how and in what ways the Classical and Keynesian schools of economic thought differ from each other.

Unit III: Open Economy and Macroeconomic policies

Balance of payments –concepts, meaning of equilibrium and disequilibrium in Balance of payments measures to correct disequilibrium. Determination of foreign exchange rate- the balance of payments theory, fixed versus flexible exchange rate; the short run open economy model: The basic Mundell-Fleming model: Macroeconomic policies – Fiscal policy - Crowding-out and Crowding-in; Monetary policy and instruments, the Transmission Mechanism, Effectiveness of macroeconomic policies in the open and closed economies.

LO: This module will enable students to get clarity on macroeconomic theories and models in the context of open economies, the interdependent nature of key macroeconomic variables,

sectors, and markets, and the dynamics of responses to exogenous domestic and international economic shocks

Unit IV: Inflation, Unemployment and Expectations

Inflation – Unemployment trade-off and the Phillips curve – short run and long run analysis, Adaptive and Rational expectation hypothesis. The policy ineffectiveness debate. Phillips curve and orthodox Keynesian school. Solow and Tobin's modified Philips curve.

LO: Upon completion of this module, students shall be able to derive the Phillips Curve from the Aggregate Supply Curve, the short-run and long-run Phillips curve, and understand the role of adaptive expectations and rationale expectations.

Text Readings:

- ✓ *Richard T. Froyen (2005): Macroeconomics, 2nd Edition, Pearson Education Asia, New Delhi.*
- ✓ *N. Gregory Mankiw (2010): Macroeconomics, 7th edition, Cengage Learning India Private Limited, New Delhi.*

Suggested References:

- ✓ *Levacic R and Rebmann A (1982): Macroeconomics –An introduction to Keynesian – neoclassical controversies*
- ✓ *Edward Shapiro (2001): Macroeconomics Analysis- Galgotia Publication Private Limited, 5th Edition, New Delhi.*
- ✓ *Dwivedi, D. N. (2018): Macroeconomics -Theory and Policy. 5th Edition, Tata McGraw Hill.*
- ✓ *Blanchard, O. (2013): Macroeconomics. 7th edition, Pearson Edn*

1.15 Environmental Economics

Course Description

This course introduces the students to the basics of environmental economics to understand the fundamentals of environmental concerns and develop insights into valuation of environment.

Course Outcomes:

- To understand the basic concepts/principles of Environmental Economics
- To be able to analyse and apply the concepts to understand specific case studies.
- To develop insights into the valuation of the environment.
- To become capable to execute/create the Project or field assignment as per the knowledge gained in the course.

Unit I: Economy and Environment

Concepts of Environmental Economics, Natural Resource Economics, and Ecological Economics. Important environmental Problems (Air pollution, water pollution, deforestation, climate change and global warming), Economy-Environment inter-linkages, Role of environment for economic development, Effect of economic development (industrialization, urbanisation, modernization of agriculture) on environment, Consequences of environmental degradation on the economy and the wellbeing of the people and other living beings, concept of Environment-Kuznets Curve hypothesis.

LO: This module will aid in acquiring knowledge of the concepts related to Environmental Economics and in understanding the Environment-Economy interlinkage.

Unit II: The Economics of Pollution and Climate change

Environment and Market Failure, Nature of environment quality (Non-rivalry and non- excludability), Pollution as public bad, Pollution as negative externality. Pigouvian tax for optimal pollution, Property rights and bargaining for optimal pollution (Coase Theorem), Government's Command and Control method for controlling pollution. Climate change as market failure (Greenhouse gas externality, lack of incentives for developing low carbon technology), policy measures for mitigations of climate change (carbon taxes and tradable carbon rights).

LO: This module will be useful for the students in understanding the nature of pollution and getting knowledge of pollution control and climate change mitigating tools.

Unit III: Valuation of Environment

Difficulties of valuation of eco-system services, Concepts of Economic value of environment (Use and non- use value, Option value, Existence value); Willingness to pay (WTP) and willingness to accept (WTA) compensation for improvement/deterioration of environment quality, Revealed Preference Method of valuation of environment (The hedonic price approach, Travel Cost approach) Contingent Valuation method.

LO: Upon completion of this module, the learner shall gain knowledge of the different methods of valuing environmental services.

Unit IV: Natural Resources and Sustainable Development

Natural resources; renewable and exhaustible; management of exhaustible resources and the Hotelling's rule; management of renewable resources (case of fishery only) optimally, Concept of carrying capacity of Environment (related to resource use and pollution), Issues of irreversibility, uncertainty in the natural resource use and waste disposal, Sustainable Development: Concepts and Components (Social, Economic and Environmental), Daly's operational principles for sustainability, Sustainable Development Goals (SDGs).

LO: This module shall initiate an understanding of the limits of the use of natural resources from the point of view of their sustainability and Sustainable development.

Textbook:

- ✓ *Bhattacharya, R. N. (2002): Environmental Economics: An Indian Perspectives, OUP, New Delhi*

Reference Book:

- ✓ *Kolstad, C.D (1999): Environmental Economics. Oxford University Press, New Delhi*

Major II

Credit 04

2.5 Data Analytics using 'R'

Course objectives

- Understand the fundamentals of R programming and its application in economic and social science data analysis.
- Develop skills for importing, cleaning, transforming, and managing datasets obtained from surveys, government reports, and economic databases.
- Apply descriptive statistical techniques and data visualization methods to explore and interpret economic and social data.

Course outcomes

- Demonstrate proficiency in basic R programming concepts, including data types, control structures, functions, and data structures for handling economic datasets.
- Import, clean, organize, and transform data from various sources using R and Tidyverse packages to prepare datasets for analysis.
- Apply descriptive statistics and probability concepts to summarize and interpret economic and demographic data.
- Create effective visualizations using ggplot2 and other R tools to communicate patterns, trends, and relationships in economic data.

Course Content

Unit I: Foundation of R Programming(15 Hours)
Introduction to R and RStudio, Installing and Setting Up R, Variables and Data Types, Operators and Expressions, Control Structures and Functions, Vectors, Lists, and Data Frames
Practical Activities:Writing simple R scripts, Basic arithmetic and statistical calculations, Creating and manipulating vectors

Unit II: Data Manipulation and Cleaning in R (15 Hours)
Importing Data from CSV and Excel Files, Introduction to Tidyverse, Data Frames and Tibbles, Data Cleaning Techniques, Handling Missing Values, Filtering, Sorting, and Transforming Data
Practical Activities:Cleaning survey datasets,Transforming economic and social datasets

Unit III: Data Visualization and Statistical Analysis (15 Hours)
Interpreting Statistical Results: Descriptive Statistics, Probability Distribution, Hypothesis Testing, Data Visualisation with ggplot2, creating histograms, boxplots, scatterplots
Practical Activities: Analyzing demographic datasets, Visualizing trends and distributions, Comparing datasets using graphs

Unit IV: Applied Data Analysis and Reporting (15 Hours)
Correlation and Regression Analysis, Introduction to Predictive Modeling, Time Series Analysis Basics Creating Reports with R Markdown, Introduction to Reproducible Research
Practical Activities: Regression analysis using real-world data, Forecasting trends using time series

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Suggested Readings

- ✓ *R for Data Science*
- ✓ *An Introduction to Statistical Learning with Applications in R*
- ✓ *Using R for Introductory Statistics*
- ✓ *Practical Statistics for Data Scientists*

Major II **Credit 04**

2.6 Data Analytics using Python

Course Objectives

This course introduces students to Python-based data analytics with applications in economics and social sciences. Upon completion of the course, students will be able to:

- Understand the fundamentals of Python programming and data handling.
- Perform data cleaning, preprocessing, and transformation using Python.
- Apply data visualization and exploratory data analysis techniques to economic datasets.
- Conduct statistical inference and hypothesis testing using Python.

Course Learning Outcomes

After successful completion of the course, students will be able to:

- Import, clean, manage, and manipulate large datasets using Python.
- Create effective visualizations and perform exploratory data analysis to identify patterns and relationships.
- Develop, evaluate, and interpret regression and classification models.
- Use time-series techniques to analyse trends and generate forecasts.

Course Content

Unit I: Fundamentals (15 Hours)
Introduction to Data Analytics, Python Basics, NumPy and Pandas, Data Import and Export, Data Cleaning Handling missing values

Unit II: Statistics and Visualization (15 Hours)
Applications of Central Tendency and dispersion, Histograms, Boxplots, Scatterplots, Correlation Analysis and Interpretation

Unit III: Applied Analytics (15 Hours)
Hypothesis Testing, Chi-square Test, Simple Linear Regression, Logistic Regression, Case Studies from Census/Education/Economics

Unit IV: Time Series Analysis and Forecasting (15 Hours)
Time Series Analysis, Moving Averages, Exponential Smoothing, Introduction to Machine Learning, Data Ethics and Privacy

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Suggested Readings

- ✓ *McKinney, W. (2022). Python for Data Analysis: Data Wrangling with Pandas, NumPy, and Jupyter (3rd ed.). O'Reilly Media.*
- ✓ *Swaroop, C. H. (2016). A Byte of Python. Self-published.*
- ✓ *Black, K. (2019). Business Statistics for Contemporary Decision Making (10th ed.). Wiley.*
- ✓ *VanderPlas, J. (2016). Python Data Science Handbook. O'Reilly Media.*
- ✓ *Géron, A. (2022). Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow (3rd ed.). O'Reilly Media.*