

**Restructured and revised syllabi of PG Courses from the
Department of Agricultural Economics**

Course Code	Course Title	Credit Hours
AEC- 501	Micro Economic Theory and Applications	3 (3+0)
AEC- 502	Agricultural Production Economics	2 (1+1)
AEC- 503	Agricultural Marketing and Price Analysis	3 (2+1)
AEC- 504	Macro Economics and Policy	2 (2+0)
AEC- 505	Econometrics	3 (2+1)
AEC- 506	Agricultural Development and Policy Analysis	2 (2+0)
AEC- 507	Agricultural Finance and Project Management	3 (2+1)
AEC- 508	Linear Programming	2 (1+1)
AEC- 509	Research Methodology for Social Sciences	2 (1+1)
AEC- 510	Indian Economy: History and Contemporary Issues	2 (2+0)
AEC- 511	International Economics	2 (1+1)
AEC- 512	Institutional Economics	1 (1+0)
AEC- 513	Natural Resource and Environmental Economics	2 (1+1)
AEC- 514	Commodity Future Trading	2 (2+0)
AEC- 515	Development Economics	2 (2+0)
AEC- 516	Rural Marketing	2 (2+0)
AEC- 517	Evolution of Economic Thought	1 (1+0)
AEC- 518	Mathematics for Agricultural Economics	3 (2+1)
COMP - 501	Computer Applications for Agri-Business & Economics	3 (2+1)
COMP- 502	Computing Techniques for Social Sciences	3 (2+1)
COMP- 503	Computing Techniques for Applied Sciences	3 (2+1)

Major Course Contents

M.Sc. (Ag) in Agricultural Economics

I. Course Title: Micro Economic Theory and Applications

II. Course Code: AEC- 501

III. Credit Hours: 3+0

IV. Why this course?

Markets form an integral part of the economy. They are governed by demand and supply mechanism with profit making its ultimate goal. Thus, it is imperative to expose the students towards how the markets function, their types and how the buyers and sellers behave. That will help them make correct decision when it comes to price setting and choice of product.

V. Aim of the course

The course envisages the concepts and principles embodying micro-economics. The economic problems, functioning of price mechanism, theory of household behaviour and consumer's demand function. Theory of firm, supply determinants, determination of price under different market structures and factor pricing (micro economic components).

VI. Organisation of the course

The course is organised as follows:

No.	Block	Unit
1.	Introduction to micro-economics	1. Basic Concepts: A review
2.	Insight of consumer, production	1. Consumer Choice and cost involved 2. Production and Cost
3.	Overview of market	1. Market Forms 2. Factor Markets

VII. Theory

Block 1: Introduction to micro-economics

Unit 1: Basic Concepts: A review

Scarcity and Choice; Production possibility frontier, Positive and normative economics; concepts of opportunity cost, Demand and Supply: determinants of individual demand/supply; demand/supply schedule and demand/supply curve; market versus individual demand/supply; shifts in the demand/supply curve

Block 2- Insight of consumer, production and cost involved

Unit 1: Consumer Choice

Cardinal Utility Approach – Ordinal Utility Approach -Budget sets and Preferences under different situations – Hicks and Slutsky income and substitution effects – Applications of Indifference curve approach – Revealed Preference Hypothesis –Consumer surplus – Derivation of Demand curve – Elasticity of demand – Demand and supply together; how prices allocate resources; controls on prices – price floor and price ceiling – applications in agriculture.

Unit 2: Production and Cost

Production functions: single variable - average and marginal product, variable proportions, stages of production. Two variables - isoquants, returns to scale and to a factor; factor prices; Technical progress; cost minimization and output maximization; Elasticity of substitution. Expansion path and the cost function Concept of economic cost; Short run and long run cost curves; increasing and decreasing cost industries; envelope curve; L-shaped cost curves; economies of scale; revenue and expenditure, elasticity and marginal revenue; Firm equilibrium and profit.

Block 3: Overview of market

Unit 1: Market Forms

Behaviour of profit maximizing firms and the production process- Perfect competition: Equilibrium of the market. Long run industry supply, applications: effects of taxes and subsidies; Monopoly: Equilibrium; supply; multiplant firm; monopoly power; deadweight loss; price discrimination; Monopolistic Competition: Product differentiation; equilibrium of the firm in the industry-with entry of new firms and with price competition. Comparison with pure competition. Duopoly: Cournot model and reaction curves; Stackelberg's model, Bertrand model; Oligopoly.

Unit 2: Factor Markets

Labour and land markets - basic concepts (derived demand, productivity of an input, marginal productivity of labour, marginal revenue product); demand for labour; input demand curves; shifts in input demand curves; competitive labour markets; Economic rent and quasi rent.

VIII. Teaching Methods/Activities

- Lectures
- Case studies
- Assignments (Group/individual)
- Group Discussions on practises done by firms.
- Power point presentations by students.
- Exploring the agricultural market and identification of industries and their type.

IX. Learning outcome

After completion of the course the student will be able to:

- Get acquainted with the basic concepts of market functions.
- Build up vision towards how consumers make choices and market reaches the equilibrium.
- Develop decision making skill for firms about product selections and scale of production to ensure maximum profit.
- Understand about different types of markets existing in the real world, their principles and whereabouts.

I. Course Title: Agricultural Production Economics

II. Course Code: AEC- 502

III. Credit Hours: 1+1

IV. Why this course?

Production in agriculture is the outcome of the input factors involved. In this competitive and uncertain market, it is important that the farmers take the right decision about the combination of inputs that will result in higher income. Thus, as an economist it is a pre-requisite that the students understand the interaction between output and input. And work out the most effective production plan.

V. Aim of the course

To expose the students to develop the concept, significance and uses of production economics. To understand the relationships between factors and output. To learn how to decide the combination of inputs to be used as per the resources available. Ensure that the production process works efficiently.

VI. Organization of the course

The course is organised as follows-

No.	Block	Unit
1.	Introduction to production economics	1. Concepts of production economics
2.	Factors and costs	1. Factors and theory of production 2. Concepts of costs
3.	Assessment	1. Dynamics of assessment

VII. Theory

Block 1: Introduction to Production Economics

Unit 1: Concepts of production economics

Nature, scope and significance of agricultural production economics- Agricultural Production processes, character and dimensions-spatial, temporal - Centrality of production functions, assumptions of production functions, commonly used forms - Properties, limitations, specification, estimation and interpretation of commonly used production functions.

Block 2: Factors and costs

Unit 1: Factors and theory of production

Factors of production, classification, interdependence, and factor substitution -Determination of optimal levels of production and factor application -Optimal factor combination and least cost combination of production - Theory of product choice; selection of optimal product combination.

Unit 2: Concepts of cost

Cost functions and cost curves, components, and cost minimization -Duality theory – cost and production functions and its applications -Derivation of firm’s input demand and output supply functions -Economies and diseconomies of scale.

Block 3: Assessment

Unit 1: Dynamics of economic assessment

Technology in agricultural production, nature and effects and measurement - Measuring efficiency in agricultural production; technical, allocative and economic efficiencies - Yield gap analysis-concepts-types and measurement - Nature and sources of risk, modelling and coping strategies.

VIII. Practical

- Different forms of production functions
- Specification, estimation and interpretation of production functions
- Returns to scale, factor shares, elasticity of production
- Physical optima-economic optima
- Least cost combination
- Optimal product choice
- Cost function estimation, interpretation
- Estimation of yield gap
- Incorporation of technology in production functions
- Measuring returns to scale-risk analysis.

IX. Teaching Methods/Activities

- Lectures
- Assignments (Group/individual)
- Group Discussions on working out
- Power point presentations by students
- Exploring the agricultural market and identification of industries and their type.

X. Learning outcome

After the successful completion of the course the student will be able to— Understand how the factors and output interact with each other. - Work out whether the production system is working efficiently and point out the loopholes- Apply the knowledge of costs and profits to work out the demand and supply functions. This will result into more efficient decision making.

I. Course Title: Agricultural Marketing and Price Analysis

II. Course Code: AEC- 503

III. Credit Hours: 2+1

IV. Why this course?

The ultimate aim of production process is to sell the produce in the market and generate income. Markets serves as platform where this exchange takes place. Agriculture markets are different from other markets due to the nature of the commodity. Thus, it is important to develop a strong foundation of agricultural marketing, its components and issues. The student needs to know about the multipronged ways of marketing the produce, agencies involved. In this modern era, it is important to understand how technology is transforming this sector.

V. Aim of the course

The course is designed to acquaint the students about the basics of dynamics of agricultural marketing. The content includes supply, demand and marketing of farm production, marketing functions and channels, marketing costs, margins and efficiency, agricultural prices, new marketing formats like e-marketing, e-NAM future trading, supply chain management, market intelligence etc.

VI. Organization of the course

The course is organised as follows:

No.	Block	Unit
1.	Introduction to agricultural marketing	1. Introduction to agricultural marketing
2.	Agricultural markets	1. Aspects of agricultural marketing 2. Future marketing and government
3.	Advances in agricultural marketing	1. Use of information technology 2. Dynamics of price

VII. Theory

Block 1: Introduction to Agricultural Marketing

Unit 1: Introduction to agricultural marketing

New Concepts in Agricultural Marketing - Characteristic of Agricultural product and Production – Problems in Agricultural Marketing from Demand and Supply and Institutions sides. Market intermediaries and their role - Need for regulation in the present context - Marketable & Marketed surplus estimation. Marketing Efficiency - Structure Conduct and Performance analysis - Vertical and Horizontal integration - Integration over space, time and form-Vertical co-ordination.

Block 2: Agricultural Markets

Unit 1: Aspects of agricultural marketing

Different Forms of marketing: Co-operatives Marketing – APMC Regulated Marketing - Direct marketing, Farmer Producer Companies, e-NAM and marketing under e-NAM, e-marketing Contract farming and Retailing, Organized retailing - Supply Chain Management - State trading, Warehousing and other Government agencies -Performance and Strategies -Market infrastructure needs, performance and Government role - Value Chain Finance.

Unit 2: Future marketing and government

Introduction to Commodities markets and future trading - Basics of commodity futures - Operation Mechanism of Commodity markets – Price discovery – Hedging and Basis - Fundamental analysis - Technical Analysis – Role of Government/SEBI in promoting commodity trading and regulatory measures.

Block 3: Advances in Agricultural Marketing

Unit 1: Use of Information Technology

Role of Information Technology and Market Intelligence in marketing of agricultural commodities, - electronic auctions (e-bay), e-Chaupals, Agmarknet and Domestic and Export market Intelligence Cell (DEMIC).

Unit 2: Dynamics of price

Price forecasting – time series analysis – time series models – spectral analysis. Price policy and economic development – non-price instruments.

VIII. Practical

- Supply and demand elasticities in relation to problems in agricultural marketing.
- Price spread and marketing efficiency analysis.
- Marketing structure analysis through concentration ratios.
- Performance analysis of Regulated market and marketing societies. Analysis on contract farming and supply chain management of different agricultural commodities, milk and poultry products.
- Supply Chain Analysis - quantitative estimation of supply chain efficiency.
- Market Intelligence – Characters, Accessibility, and Availability Price forecasting.
- Online searches for market information sources and interpretation of market intelligence reports – commodity outlook.
- Technical Analysis for important agricultural commodities.
- Fundamental Analysis for important agricultural commodities.
- Presentation of the survey results and wrap-up discussion.

IX. Teaching Methods/Activities

- Lectures.
- Case studies.
- Assignments (Group/individual).
- Group Discussions on price volatility and control measures prevailing.
- Power point presentations by students on government schemes.
- Visit to eNAM mandies, Warehouses, etc.

X. Learning outcome

After the completion of this course the student will be able to–

- Understand the whereabouts of agricultural marketing.
- The different forms of marketing existing in this sector.
- Gain expertise in market intelligence and price forecasting.

I. Course Title: Macro Economics and Policy**II. Course Code: AEC- 504****III. Credit Hours: 2+0****IV. Why this course?**

The economy of the nation is governed by certain rules, regulation and principles. The students have to gain knowledge of the mechanism through which the large economies are controlled and ensure that welfare prevails. They are entitled to know the transactions between different markets and policies framed to keep value of money under control.

V. Aim of the course

The course envisages the concepts and principles of macroeconomics from classical to Keynesian theories. The other component deals with the monetary system money, credit and banking system, value of money and economic activities, national income accounting and approaches to estimate national income theory of income and employment determination and inflation.

VI. Organization of the course

The course is organised as follows:

No.	Block	Unit
1.	Conceptualising Macro economics	1. Introduction: Measurement and Concepts
2.	Theories of macroeconomics	1. Classical Macroeconomics 2. Income and spending: Keynesian Framework
3.	Money, Consumption and Inflation	1. Money, Interest and Income 2. Theories of Aggregate Consumption and Investment 3. Inflation and Unemployment

VII. Theory**Block 1: Conceptualising Macro Economics****Unit 1: Introduction: Measurement and Concepts**

Basic concepts and scope of Macro-economics, National Income Accounting: Methods of measurement of key macro-economic aggregates, relationship of national income and other aggregates (with numerical exercises), real and nominal income

Block 2: Theories of macroeconomics**Unit 1: Classical Macroeconomics**

Say's Law, Quantity Theory of Money, aggregate labour supply and demand of labour, Classical theory of determining output, wages and prices.

Unit 2. Income And Spending: Keynesian Framework

Simple Keynesian model of income determination; Keynesian Multiplier- aggregate spending, taxation, transfer payments, foreign spending, balanced budget; budget surplus (with numerical exercises).

Block 3- Money, Consumption and Inflation**Unit 1: Money, Interest and Income**

Goods market equilibrium-IS curve; Demand for Money, the Liquidity Preference Theory – Liquidity Trap; asset market equilibrium- LM curve; simultaneous equilibrium in goods and asset market- effect of fiscal and monetary policy

Unit 2: Theories of Aggregate Consumption and Investment

Absolute Income Hypothesis, Relative Income Hypothesis, Fisher's Inter-temporal Choice Model, Life-Cycle and Permanent Income Hypotheses; Profits and Accelerator Theory.

Unit 3: Inflation and Unemployment

Inflation: Nature, Effects and control; Types of inflation – demand pull, cost push stagflation, core inflation, hyperinflation; Phillips curve.

VIII. Teaching Methods/ Activities

- Lectures.
- Case studies.
- Assignments (Group/individual).
- Group Discussions on inflation.

IX. Learning outcome

After the completion of the course the student will be able to-Understand the concepts of national income, theories build up to understand macroeconomics. Understand better about the policies and government steps taken to control the economic transaction of the nation. Workout how the investment acts as a catalyst in national development.

I. Course Title: Econometrics

II. Course Code: AEC- 505

III. Credit Hours: 2+1

IV. Why this course?

Development of analytical skills is imperative to make students proficient in conducting quality research work. The knowledge of variables, their models, and problems encountered when dealing with variables will build up a compatibility with the analytical aspects.

V. Aim of the course

The course provides knowledge of the econometric methods like time series analysis, linear regression models and their application in economic analysis. The course provides an insight into the econometric problems in analysing time series and cross section data.

VI. Organization of the course The course is organised as follows:

No.	Block	Unit
1.	Introduction to econometrics	1. Introduction
2.	Classical Regression	1. Classical Linear Regression 2. Breaking down of Classical assumptions
3.	Qualitative Variables	1. Qualitative variables and simultaneous equation models

VII. Theory

Block 1: Introduction to Econometrics

Unit 1: Introduction

Relationship between economic theory, mathematical economics, models and econometrics, methodology of econometrics-regression analysis.

Block 2: Classical Regression

Unit 1: Classical Linear Regression

Basic two variable regression – assumptions estimation and interpretation approaches to estimation – OLS and their properties – extensions to multi-variable models-multiple regression estimation and interpretation.

Unit 2: Breaking down of Classical assumptions

Violation of assumptions – identification, consequences and remedies for Multicollinearity, heteroscedasticity, autocorrelation – data problems and remedial approaches – model misspecification.

Block 3: Qualitative Variables

Unit 1: Qualitative variables and simultaneous equation models

Use of dummy variables- Introduction to simultaneous equations- identification problem

VIII. Practical

- Single equation two variable model specification and estimation
- Hypothesis testing transformations of functional forms and OLS application
- Estimation of multiple regression model
- Testing and correcting specification errors
- Testing and managing Multicollinearity
- Estimation of regressions with dummy variables

IX. Teaching Methods/Activities

- Lectures.
- Assignments (Group/individual).

X. Learning outcome

After the completion of the course, the student will be able to-Understand the variables and the properties of regression models. Identify the problems in variables and remove them before conducting the analysis and avoid biased results.

I. Course Title: Agricultural Development and Policy Analysis**II. Course Code: AEC- 506****III. Credit Hours: 2+0****IV. Why this course?**

The ultimate aim of the economies is to attain a satisfactory level of development. Development ensures that there is not only increase in income but also the distribution is such that lesser inequalities exist. The students need to know what is development and its related concepts. All the policies framed are with one sole objective of increasing the welfare. Thus, once concept of development is built up, students can better understand policies and their genesis.

V. Aim of the course

Concept of economic development and policy, theories of development, performance of Indian agriculture. The process and implementation of policies over a period of time.

VI. Organization of the course

The course is organised as follows:

No.	Block	Unit
1.	Basic concepts	1. Introduction
2.	Theoretical Concepts	1. Theories of Agricultural Development
3.	Performance and policies	1. Performance of Indian Agriculture 2. Agricultural Policy: Process and Implementation

VII. Theory**Block 1: Introduction****Unit 1: Introduction**

Role of agriculture in economic/rural development – Evolution of thinking on agriculture and development; Agricultural development – meaning, stages and determinants – Population and food supply – need for sound agricultural policies

Block 2: Theoretical Concepts**Unit 1: Theories of Agricultural Development**

Resource exploitation model- Conservation model- Location (Urban impact) model-Diffusion model-High pay-off input model-Induced Innovation Model- Agricultural R&D and Linkages

Block 3: Performance and policies**Unit 1: Performance of Indian Agriculture**

Agrarian structure and land relations; trends in performance and productivity; agrarian structure and technology; credit, commerce and technology; capital formation; subsidies; pricing and procurement; Post Green Revolution agriculture; Production and productivity crisis in agriculture; Regional differences; Food Security, PDS system and Malnutrition.

Unit 2: Agricultural Policy: Process and Implementation

Instruments of Agricultural Policy; Process of agricultural policy formulation, implementation, Monitoring and Evaluation in India; Global experiences in participatory approach to Agricultural policy process; critical review of various elements of Indian agricultural policy-resource policies – credit policies – input and product marketing policies – price policies; WTO – Agreement on Agriculture; Planning models. Planning for utilization of resources and Indian Five-Year Plans.

VIII. Teaching Methods/Activities

- Lectures.
- Assignments (Group/individual).
- Group Discussions on evolution of Indian Agriculture and Development indices.
- Power point presentation by students on policies and their relevance.

IX. Learning outcome

After the completion of the course the student will be able to-Understand the concept of development and its preference over growth. Visualize how the agriculture sector is performing in this aspect. Understand the motive behind the policies and their implementation.

I. Course Title: Agricultural Finance and Project Management**II. Course Code: AEC- 507****III. Credit Hours: 2+1**

IV. Why this course?

Money is the fuel of driving all the economic activities. India is a land of small and marginal farmers. The financial conditions of the farmers are not so strong that they can finance themselves. They require credit to meet the requirements of inputs. Thus, the student should know the sources, principles involved and types of credit available. The institutions involved and on what grounds the finance is given to the farmer. What are the risks involved and how to overcome them.

V. Aim of the course

This course is designed with an objective to deliver knowledge of the principles, procedures, problems and policies relating to financing agricultural firms. In addition to this the students are also given knowledge about the research developments in the subject. The approach is analytic.

VI. Organization of the course

The course is organised as follows:

No.	Block	Unit
1.	Introduction to Agricultural Finance	1. Basic Concepts: A review
2.	Credit and financial analysis	1. Credit and its aspects 2. Financial analysis
3.	Project and risk management	1. Project Overview 2. Risk and its Management

VII. Theory

Block 1: Introduction to Agricultural Finance

Unit 1: Basic concepts: A Review

Role and Importance of Agricultural Finance. Financial Institutions and credit flow to rural/priority sector. Agricultural lending – Direct and Indirect Financing - Financing through Co-operatives, NABARD and Commercial Banks and RRBs. District Credit Plan and lending to agriculture/priority sector. Micro-Financing and Role of MFIs - NGOs, and SHGs.

Block 2: Credit and Financial Analysis

Unit 1: Credit and its aspects

Lending to farmers – The concept of 3 C's, 7 P's and 3 R's of credit. Estimation of Technical feasibility, Economic viability and repaying capacity of borrowers and appraisal of credit proposals. Understanding lenders and developing better working relationship and supervisory credit system. Credit inclusions – credit widening and credit deepening.

Unit 2: Financial analysis

Financial Decisions – Investment, Financing, Liquidity and Solvency. Preparation of financial statements - Balance Sheet, Cash Flow Statement and Profit and Loss Account. Ratio Analysis and assessing the performance of farm/firm.

Block 3- Project and Risk Management

Unit 1: Project Overview

Project Approach in financing agriculture. Financial, economic and environmental appraisal of investment projects. Identification, preparation, appraisal, financing and implementation of projects. Project Appraisal techniques – Undiscounted measures. Time value of money – Use of discounted measures - B-C ratio, NPV and IRR. Agreements, supervision, monitoring and evaluation phases in appraising agricultural investment projects. Network Techniques – PERT and CPM.

Unit 2: Risk and its Management

Risks in financing agriculture. Risk management strategies and coping mechanism. Crop Insurance programmes – review of different crop insurance schemes – yield loss and weather-based insurance and their applications.

VIII. Practical

- Development of Rural Institutional Lending; Social Sciences: Agricultural Economics
- Branch expansion, demand and supply of institutional agricultural credit and Over dues and Loan waiving;
- An overview, Rural Lending Programmes of Commercial Banks, Lead Bank Scheme;
- Preparation of District Credit Plan, Rural Lending Programmes of Co-operative Lending Institutions;

- Preparation of financial statements using farm/firm level data, Farm credit appraisal techniques and farm financial analysis through financial statements;
- Performance of Micro Financing Institutions;
- NGO's and Self-Help Groups, Identification and formulation of investment projects;
- Project appraisal techniques – Undiscounted Measures and their limitations;
- Project appraisal techniques – Discounted Measures;
- Network techniques – PERT and CPM for project management;
- Case Study Analysis of an Agricultural project;
- Financial Risk and risk management strategies – crop insurance schemes;
- Financial instruments and methods – E banking, Kisan Cards and core banking.

IX. Teaching Methods/Activities

- Lectures
- Case studies
- Assignments (Group/individual)
- Group Discussions on inflation

X. Learning outcome

After the completion of the course the student will be able to-Understand the key issues of finance in Agriculture. Learn the techniques of assessing the worth of a project.

I. Course Title: Linear Programming

II. Course Code: AEC- 508

III. Credit Hours: 1+1

IV. Theory

Unit I

Decision Making- Concepts of decision making, introduction to quantitative tools, introduction to linear programming, uses of LP in different fields, graphic solution to problems, formulation of problems.

Unit II

Simplex Method: Concept of simplex Method, solving profit maximization and cost minimizations problems. Formulation of farms and non-farm problems as linear programming models and solutions.

Unit III

Extension of Linear Programming models: Variable resource and price programming, transportation problems, recursive programming, dynamic programming.

Unit IV

Game Theory- Concepts of game theory, two-person constant sum, zero sum game, saddle point, solution to mixed strategies, the rectangular game as Linear Programming.

V. Practical

- Graphical and algebraic formulation of linear programming models.
- Solving of maximization and minimization problems by simplex method.
- Formulation of the simplex matrices for typical farm situations.

I. Course Title: Research Methodology for Social Sciences

II. Course Code: AEC- 509

III. Credit Hours: 1+1

IV. Why this course

Planning of research is very crucial to conduct successful research. There is need to give an insight to the student about how to conduct research, right from data collection to analysis and finally writing the references.

V. Aim of the course

The course deals with scientific methods of research, the initiation of an inquiry, formulation of research problems and hypotheses, the role of induction and deduction in research, collection and analysis of data and interpretation of results

VI. Organization of the course

The course is organised as follows:

No.	Block	Unit
1.	Introduction to research methodology	1. Concepts of research methodology
2.	Building up hypothesis and sample selection	1. Hypothesis: Framing and Testing 2. Sampling
3.	Data collection and analysis	1. Data collection 2. Data Analysis

VII. Theory

Block 1: Concepts of research methodology

Unit 1: Concepts of research methodology

Importance and scope of research in agricultural economics. Types of research – Fundamental vs. Applied. Concept of researchable problem – research prioritization – selection of research problem. Approach to research – research process. Social Sciences: Agricultural Economics

Block 2- Building up hypothesis and sample selection

Unit 1: Hypothesis: Framing and Testing

Hypothesis – meaning – characteristics – types of hypothesis – review of literature – setting of Course Objective and hypotheses – testing of hypothesis.

Unit 2: Sampling

Sampling theory and sampling design – sampling error - methods of sampling – probability and non-probability sampling methods - criteria to choose. Project proposals – contents and scope – different types of projects to meet different needs – trade-off between scope and cost of the study. Research design and techniques – Types of research design.

Block 3- Data Collection and Analysis

Unit 1: Data Collection

Data collection – assessment of data needs – sources of data collection – discussion of different situations. Mailed questionnaire and interview schedule – structured, unstructured, open ended and closed-ended questions. Scaling Techniques. Preparation of schedule – problems in measurement of variables in agriculture. Interviewing techniques and field problems - methods of conducting survey – Reconnaissance survey and Pre testing.

Unit 2: Data Analysis

Data coding, tabulation, cleaning. –Multivariate analysis –factor analysis’ PCA’ cluster analysis. Universal procedures for preparation of bibliography – writing of research articles.

VIII. Practical

- Exercises in problem identification.
- Project proposals – contents and scope.
- Formulation of Objective and hypotheses.
- Assessment of data needs – sources of data – methods of collection of data.
- Methods of sampling – criteria to choose – discussion on sampling under different situations.
- Scaling Techniques – measurement of scales.
- Preparation of interview schedule.
- Field testing. Method of conducting survey.
- Exercise on coding, editing, tabulation and validation of data.
- Preparing for data entry into computer.
- Hypothesis testing – Parametric and Non-Parametric Tests.
- Exercises on format for Thesis/Report writing.
- Presentation of the results.

IX. Teaching Methods/Activities

- Lectures.
- Case studies.
- Assignments (Group/individual).
- Group Discussions

X. Learning outcome

After the successful completion of this course, student will be able to-Understand fundamentals of research. How to carefully plan out the research work and conduct it.

I. Course Title: Indian Economy: History and Contemporary Issues

II. Course Code: AEC- 510

III. Credit Hours: 2+0

IV. Why this course?

India is a developing economy. The evolution of the Indian economy will enlighten the student with how an economy develops. Students will understand how the policies and measures taken shape up the economy of the country.

V. Aim of the course

To introduce the students to the economic history over a period of time. It also highlights the contemporary issues of Indian economy.

VI. Organization of the course The course is organised as follows:

No.	Block	Unit
1.	History of Indian Economy	1. India from Independence to Liberalization 2. India since 1980's (Liberalization and Beyond): Overview 3. Macro Trends Since 1990
2.	Contemporary Issues	1. Contemporary Issues

VII. Theory

Block 1- History of Indian Economy

Unit 1: India from Independence to Liberalization

An overview of the economic developments during the period 1947-1980; Objectives and strategies of planned economic development and the role of the State; Sectoral growth performance; savings and investment; Demographic trends and issues; education; health and malnutrition; Trends and policies in poverty; inequality and unemployment.

Unit 2: India Since 1980's (Liberalization and Beyond): Overview

Policy Changes since 1980s. The 1990 Crisis. Causes and Effects of liberalization. Regional differences: infrastructure, primary, secondary and tertiary sector.

Unit 3: Macro Trends Since 1990

Growth; Savings and Investment, Employment; productivity; diversification; Agrobased industries; competition policy; foreign investment, Regional differences.

Block 2- Contemporary Issues

Unit 1: Contemporary Issues

Monetary and Financial trends- areas of government spending in India, Capital expenditure, revenue expenditure, plan expenditure, non-plan expenditure, Deficits (fiscal, primary, revenue), impact of fiscal deficit on economy, Capital receipts, revenue receipts, tax and non-tax revenue, direct and indirect taxes, need to rationalize tax structure. Goods and Services Tax (GST). Union Budget, Zero base budgeting, Gender budgeting, Fiscal devolution and centre state financial relations in India, WPI, CPI implicit deflators. Foreign Trade policy.

VIII. Teaching Methods/ Activities

- Lectures
- Power point presentation by students on monetary and fiscal policy in past and present.
- Assignments (Group/individual).
- Group Discussions on Tax and its reforms.

IX. Learning outcome

After the completion of the course the student will be able to-Visualize how the Indian economy has evolved. Get acquainted with the basic steps involved in the working of the national economy.

I. Course Title: International Economics

II. Course Code: AEC- 511

III. Credit Hours: 2+1

IV. Why this course?

The era of Globalisation, liberalization and privatization has unified the whole world. There is trade across national boundaries and one economy has effect on the other. Getting familiar with national

economy is not sufficient to understand the mechanism of trade and economic aspects. Thus, this course is designed to teach student about the trade as international level.

V. Aim of the course

The major objective of this course is to give an insight of the interactions between national economies. What are the theories governing the trade across national boundaries. The methods involved to regulate the international trade and institutions involved.

VI. Organization of the course

The course is organised as follows:

No.	Block	Unit
1.	Introduction	1. Concepts of International Economics
2.	Models, Rate and terms of trade	1. Barriers to trade 2. Models of trade 3. Rates and Terms of trade
3.	Institutions	1. Trades Institutions

VII. Theory

Block 1- Introduction

Unit 1: Concepts of International Economics

Scope and Significance of International Economics – The role of trade- General Equilibrium in a Closed Economy (Autarky Equilibrium) – Equilibrium in a Simple Open Economy - Possibility of World Trade - Trade gains and Trade Equilibrium.

Block 2- Models, Rate and Terms of Trade

Unit 1: Barriers to trade

Tariff, Producer Subsidy, Export Subsidy, Import Quota and Export Voluntary Restraints- The Case of Small Country and Large Country Case.

Unit 2: Models of trade

Ricardian Model of Trade- Specific Factors Model- Heckscher - Ohlin Model – Trade Creation and Trade Diversion – Offer Curve - Export Supply Elasticity and Import Demand Elasticity – Comparative Advantage and Absolute Advantage.

Unit 3: Rates and Terms of trade

Official Exchange Rate and Shadow Exchange Rate - Walra's Law and Terms of Trade – Trade Blocks.

Block 3- Institutions

Unit 1: Trades Institutions

IMF, World Bank, IDA, IFC, ADB – International Trade agreements – Uruguay Round – GATT – WTO.

VIII. Practical

- Producer's Surplus, Consumer's Surplus, National Welfare under Autarky and Free Trade Equilibrium with small and large country assumption.
- Estimation of Trade Gains
- Estimation of competitive and comparative measures like NPC, EPC, ERP and DRC
- Estimation of Offer Curve Elasticity
- Estimation of Effect of Tariff, Export Subsidy, Producer Subsidy, Import Quota and Export Voluntary Restraints on National Welfare
- Estimation of Ricardian Model
- Estimation of Effect of Trade under Specific Factor Model
- Estimation of trade Equilibrium under Heckscher -Ohlin model Social Sciences: Agricultural Economics
- Trade Creation and Diversion.

IX. Teaching Methods/Activities

- Lectures.
- Case studies.
- Assignments (Group/individual).
- Power point presentation on International Trade in current scenario.

X. Learning outcome

After successful completion of the course the student will be able to –Understand how trade take place between nations. Be able to work out strategies to maintain a favourable trade balance. Understand how the institutions play role in regulating the cross country trade and deal with the issues.

I. Course Title: Institutional Economics

II. Course Code: AEC- 512

III. Credit Hours: 1+0

IV. Why this course?

Institutions are involved in framing of economic development. The human behaviour is governed by the institutions working in their environment. Thus, the student needs to understand the institutions and their working.

V. Aim of the course

To develop critical and informed understanding about institutions, their role in the working of economy. Exposure of issues, policies & regulations and its application in agricultural system

VI. Organization of the course The course is organised as follows–

No.	Block	Unit
1.	Introduction	1. Basics of Institutional Economics
2.	Approaches	1. Institutional changes & Resource allocation 2. Group and collective Approach
3.	Law Protection and Institutions	1. Property rights 2. Agrarian Institutions

VII. Theory

Block 1: Introduction

Unit 1: Basics of Institutional Economics

Old and New Institutional Economics – Institutional Economics vs Neo-classical Economics. Definition of institutions – Distinction between institutions and organizations – Institutional evolution.

Block 2: Approaches

Unit 1: Institutional changes & Resource allocation

Institutional change and economic performance - national and international economic institutions. Transaction cost economics – Transaction costs and the allocation of resources. Transaction costs and efficiency. Asymmetric information - Moral hazard and Principal-Agent problem.

Unit 2: Group and collective Approach

Free rider problem – path dependency – Interlinked transactions. Collective action and the elimination of free-rider problem - The logic of collective action and its role in reducing free rider problem – theory of Groups. Rent seeking – interest groups and policy formulation.

Block 3: Law Protection and Institutions

Unit 1: Property rights

Economic analysis of property rights- property rights regimes – private property – State Property - Common property Resources (CPRs) – public goods and club goods.

Unit 2: Agrarian Institutions

Special features of institutional arrangements in agriculture – Transaction costs in agriculture - Case Studies - Theories of agrarian institutions - tenancy institutions.

VIII. Teaching Methods/Activities

- Lectures.
- Case studies.
- Assignments (Group/individual).
- Group Discussions on Property rights

IX. Learning outcome

After successful completion of this course the student will be able to-Understand institutions and their roles in economic development. Know about the policies and their issues in an institution.

I. Course Title: Natural Resource and Environmental Economics

II. Course Code: AEC- 513**III. Credit Hours: 1+1****IV. Why this course?**

Sustainable development is the need of the hour. The economic activities affect not only the society but also the environment. Every activity has its social cost. The students, hence will be taught about the economic aspect of environment.

V. Aim of the course

To understand about economics of environment and social costs incurred due to economic development. Work out methods to maintain environment quality and reduce social costs.

VI. Organization of the course

The course is organised as follows:

No.	Block	Unit
1.	Introduction to natural resource	1. Basic Foundation
2.	Insight of the subject	1. Theories and economics of natural resources 2. Functioning of Market
3.	Dealing with Issues and sustainability	1. Environmental Issues 2. Regulations 3. Sustainability aspects

VII. Theory**Block 1- Introduction to natural resource and environmental economics****Unit 1: Basic Foundation**

Concepts, Classification and Problems of Natural Resource Economics – Economy Environment interaction – The Material Balance principle, Entropy law-Resources Scarcity - Limits to Growth - Measuring and mitigating natural resource scarcity – Malthusian and Recardian scarcity – scarcity indices - Resource Scarcity and Technical Change.

Block 2- Insights of the subject**Unit 1: Theories and economics of natural resources**

Theory of optimal extraction renewable resources –economic models of oil extraction efficiency - time path of prices and extraction - Hotelling’s rule, Solow-Harwick’s Rule. Theory of optimal extraction exhaustible resources – economic models of forestry and fishery.

Unit 2: Functioning of Market

Efficiency and markets – market failures - externalities – types - property rights – transaction costs – Coase’s theorem and its critique - public goods – common property and open access resource management - Collective action.

Block 3- Dealing with the issues and sustainability**Unit 1: Environmental Issues**

Environmental perspectives - biocentrism, sustainability, anthropocentrism - Environmental problems and quality of environment - Sources and types of pollution -air, water, solid waste, land degradation – environmental and economic impacts - Economics of pollution control - efficient reduction in environmental pollution.

Unit 2: Regulations

Environmental regulation – economic instruments - pollution charges – Pigovian tax - tradable permits – indirect instruments – environmental legislations in India.

Unit 3: Sustainability aspects

Concept of sustainable development – Economic Perspective – Indicators of sustainability Relation between development and environment stress-Environmental Kuznet’s curve Environmental Accounting – resource accounting methods – International Environmental Issues – climate change – likely impacts – mitigation efforts and international treaties.

VIII. Practical

- Exhaustible resource management – optimum rate of oil extraction.
- Renewable resource management – optimum harvest of Forestry/fishery.
- Exercise on pollution abatement-I.
- Exercise on pollution abatement-II.
- Concepts in valuing the environment.

- Taxonomy of valuation techniques.
- Productivity change method – substitute cost method – Hedonic price method –Travel cost method – Contingent valuation methods.
- Discount rate in natural resource management.
- Environment impact assessment
- Visit to Pollution Control Board.

IX. Teaching Methods/Activities

- Lectures.
- Case studies.
- Assignments (Group/individual).

X. Learning outcome

After successful completion of this course, the student will be able to-Work out the plan for extraction/use of natural resource in most economical way. Understand the environment and its pollution. Learn how markets are affected if environment is not taken into consideration. Gain proficiency in rules and regulation governing economic aspect of environment.

I. Course Title: Commodity Future Trading

II. Course Code: AEC- 514

III. Credit Hours: 2+0

IV. Why this course?

Risk is involved in marketing. Price fluctuation is a very common phenomenon in agriculture marketing. In such situation selling of commodity in future market serves as a resort to insulate from this uncertainty. Thus, knowledge of futures market is helpful in ...

V. Aim of the course

To disseminate the knowledge about risk mitigating measures especially future trading. The future trading in agricultural commodities is increasing day by day therefore the role of SEBI, functioning of commodity exchanges are discussed.

VI. Organization of the course

The course is organised as follows:

No.	Block	Unit
1.	Introduction to commodity market	1. Concepts of commodity future trading
2.	Techniques and risks in commodity market	1. Technical aspects 2. Risk and its Management
3.	Commodity exchange and market analysis	1. Commodity Exchange–A review 2. Analysis of commodity market

Theory

Block 1- Introduction to commodity market

Unit 1: Concepts of commodity future trading

History and Evolution of commodity markets – Terms and concepts: spot, forward and futures Markets – factors influencing spot and future markets. Speculatory mechanism in commodity futures.

Block 2- Techniques and Risks in Commodity Market

Unit 1: Technical aspects

Transaction and settlement – delivery mechanism - role of different agents – trading strategies - potential impact of interest rate, Foreign Exchange, FDI in Commodity Markets.

Unit 2: Risk and its Management

Risk in commodity trading, importance and need for risk management measures - managing market price risk: hedging, speculation, arbitrage, swaps - pricing and their features.

Block 3- Commodity exchange and market analysis

Unit 1: Commodity Exchange – A review

Important global and Indian commodity exchanges - contracts traded – special features -Regulation of Indian commodity exchanges - FMC and its role.

Unit 2: Analysis of commodity market

Fundamental Vs Technical analysis – construction and interpretation of charts and chart patterns for analyzing the market trend – Market indicators – back testing. Introduction to technical analysis software – analyzing trading pattern of different commodity groups.

VII. Teaching Methods/Activities

- Lectures.
- Case studies.
- Assignments (Group/individual).
- Group Discussions.
- Power point presentations by students.

VIII. Learning outcome

After successful completion of this course, the student will be able to-The basic concepts of commodity markets. The national and international commodity markets.

I. Course Title: Development Economics

II. Course Code: AEC- 515

III. Credit Hours: 2+0

IV. Why this course?

Development is more important than growth. The development of a nation ensures that condition of welfare prevails. The students have to understand different measures of development. How to measure them and relevant theories.

V. Aim of the course

To develop concept of growth and development. Methods and theories of measuring development. Study of different developed economies will give exposure towards measures to create economic upliftment.

VI. Learning outcome

After successful completion of this course, the student will be able to-Measure the development using different methods. Understand the theories of development and relate it to real world.

VII. Organization of the course

The course is organised as follows:

No.	Block	Unit
1.	Introduction to development economics	1. Conceptions of Development
2.	Theories and comparison	1. Theories of Economic growth and development 2. Comparative Economic Development

VIII. Theory

Block 1- Introduction to Development Economics

Unit 1: Conceptions of Development

Development Economics – Scope and Importance - Economic development and economic growth - divergence in concept and approach - Indicators and Measurement of Economic Development –GNP as a measure of economic growth – New Measures of Welfare – NEW and MEW – PQLI – HDI – Green GNP - Criteria for under development – Obstacles to economic development –Economic and Non-Economic factors of economic growth- Development issues, poverty, inequality, unemployment and environmental degradation.

Block 2- Theories and comparison

Unit 1: Theories of Economic growth and development

Classical theories- Adam smith - Ricardo- Malthus, Marx’s theory of economic development; Schumpeter’s theory, Approaches to development- low income equilibrium trap - critical minimum effort- The Strategy of economic development- Balanced vs. Unbalanced growth, choice of technique, investment criteria, big push theory, Rostow’s stages of Economic Growth, unlimited supply of labour; social and technological dualisms; roles of capital accumulation, human capital and technological change in economic development, Models of economic growth Harrod-Domar, Kaldor, Mahalanobis, Lewis, FeiRanis, Input-Output, multisectoral models.

Unit 2: Comparative Economic Development

Countries selected for case studies -USA, Japan, China and India; Overview of economic development in selected countries; agrarian surplus and the role of the peasantry in economic development; industrial revolution; division of labour, organisation of work and industrial production, the role of the State in developmental transition

IX. Teaching Methods/Activities

- Lectures.
- Case studies.
- Assignments (Group/individual).
- Group Discussions on inflation

I. Course Title: Rural Marketing

II. Course Code: AEC- 516

III. Credit Hours: 2+0

IV. Why this course?

Rural markets are different from other markets due to the nature of the consumers. Thus, it is important to develop a strong foundation of rural marketing, its components and issues. The student needs to know about the multipronged ways of marketing the produce, agencies involved. In this modern era, it is important to understand how technology is transforming this sector.

V. Aim of the course

To explore the possibilities and potential of the rural market. It aims at critically analysing the market opportunities, consumer trends and patterns and development of better marketing strategies for the rural areas.

VI. Learning outcome

After completion of this course, the students are expected to be able to develop understanding regarding issues in rural markets like marketing environment, consumer behaviour, distribution channels, marketing strategies, etc.

VII. Organization of the course

The Course is organized as follows:

No.	Block	Unit
1.	Rural Marketing Environment	1. Rural Market Concept & Scope 2. Environmental factors 3. Rural finance 4. Rural consumer's behaviour
2.	Rural Marketing Strategy	1. Rural Product strategy 2. Pricing for rural markets 3. Promotion and communication strategy

VIII. Theory

Block 1: Rural Marketing Environment

Unit 1: Rural Market Concept & Scope: Concept, Definition and Scope of rural marketing, nature and characteristics of rural markets, potential of rural markets in India, rural V/S urban market.

Unit 2: Environmental factors: Socio-cultural, economic, demographic, technological and other environmental factors affecting rural marketing.

Unit 3: Rural finance: Concept, demand, banking model; Finance Schemes of NABARD, Other Schemes of State Govt, Central Govt.

Unit 4: Rural consumer's behaviour: Behaviour of rural consumers and farmers; buyer characteristics and buying behaviour; customer relationship management, rural market research.

Block 2: Rural Marketing Strategy

Unit 1: Rural Product strategy: Marketing of consumer durable and non-durable goods and services in the rural markets with special reference to product planning; marketing mix, product mix.

Unit 2: Pricing for rural markets: Pricing policy and pricing strategy, distribution strategy, Rural retailing and modern store formats in rural areas.

Unit 3: Promotion and communication strategy: Media Planning, Distribution channels, personal selling strategies in rural markets, innovations in rural marketing

IX. Teaching methods/activities

- Lectures
- Discussion
- Case Studies
- Student-led presentations

I. Course Title: Evolution of Economic Thought

II. Course Code: AEC- 517

III. Credit Hours: 1+0

IV. Why this course?

The evolution of economic thought is the study of the philosophies of the different thinkers and theories in the subjects that later became political economy and economics, from the ancient world to the present day in the 21st century. This field encompasses many disparate schools of economic thought. Thus, the study of Economic Thought will help us to understand the origin of economics.

V. Aim of the course

To introduce the students to the evolution of economic thought over a period of time, the background of emanation of thoughts and approaches, as acts of balancing and counter balancing events and criticisms. The course will also in a comprehensive way help the students to know and appreciate the contributions of the Galaxy of Economists.

VI. Learning outcome

After completion of the course, the students are expected to know the evolution of economic thought which remains relevant to understand how theory and methods have developed historically in economics.

VII. Organization of the course

The Course is organized as follows:

No.	Block	Unit
1.	Approaches	1. History of Economic Thought 2. Development of Economic Thought
2.	Economic Thought in India	1. Economic Thought of Independent India 2. Structural Adjustment

VII. Theory

UNIT -1

Approaches for the study of history of economic thought – Absolutist vs. Relativist approaches – Evolution of Economic Thought vs. Economic History. Ancient economic thought – medieval economic thought – mercantilism – physiocracy – Forerunners of Classical Political Economy.

UNIT -II

Development of Classical Thoughts (Adam Smith, Robert Malthus and David Ricardo) – Critics of Classical Thoughts- Socialist critics – Socialist and Marxian Economic Ideas – Austrian School of Thought – Origins of Formal Microeconomic Analysis – William Stanley Jevons, Cournot and Dupuit.

UNIT -III

The birth of neoclassical economic thought – Marshall and Walras – General Equilibrium Theory - Welfare Theory – Keynesian economics.

UNIT- IV

The Era of globalization – Experiences of developing world - Rigidity of the past vs. emerging realism – The changing path of international Institutions to economic growth and development approaches.

UNIT- V

Economic Thought in India – Naoroji and Gokhale – Gandhian Economics - Economic thought of independent India – Nehru’s economic philosophy - Experiences of the Structural adjustment programmes of the post liberalization era.

IX. Teaching methods/activities

- Lectures
- Discussion

I. Course Title: Mathematics for Agricultural Economics

II. Course Code: AEC- 518

III. Credit Hours: 3+0

IV. Why this course?

Knowledge of calculus is basic requirement for carrying out simple calculations.

V. Aim of the course

To solve various mathematical problems in economic research. Calculations are integral part of research analysis therefore it has wide application in economic studies.

VI. Organization of the course

The course is organised as follows:

No.	Block	Unit
1.	Introduction	1. Preliminaries
2.	Variables and functions	1. Variables and functions 2. Differentiation of functions
3.	Overview of linear algebra	1. Linear Algebra 2. Optimization of functions 3. Integration of functions

VII. Theory

Block 1- Introduction

Unit 1: Preliminaries

Logic and proof techniques; sets and set operations; relations; functions and their properties; number systems

Block 2- Variables and functions

Unit 1: Variables and functions

Specific functions in economic theory. Elementary analytical geometry-gradient and equation of straight line. Standard equations and simple properties of circle, parabola and rectangular hyperbola.

Unit 2: Differentiation of functions

Limit and continuity. Differentiation, theorems of differentiation, differentiation of logarithmic and exponential functions, function of a function, derivative of higher order, partial derivatives. Application of derivatives to determine average and marginal values in economic analysis; determination of elasticities; points of inflexion; linear homogenous production functions; derivation of average and marginal curves.

Block 3- Overview of Linear Algebra

Unit 1: Linear Algebra

Determinants, evaluation and properties of determinants, Vectors and vector spaces, Matrices, notations and operations, laws of matrix algebra; transpose and inverse of matrix; Solution of linear and quadratic equations involving one variable, simultaneous equations, application of determinants and matrices in solution of equation for economic analysis.

Unit 2: Optimization of functions

Optimization- unconstrained, maxima and minima, constrained optimization, Lagrange multiplier and their economic applications for optimization problems of cost, production, demand and supply.

Unit 3: Integration of functions

Integration as a reverse process of differentiation, methods of integration, reduction formulae, definite integral, use of integration to determine relation between average and marginal value. Capitalization over time, estimation of returns from capital goods over time. Pareto distribution.

VIII. Teaching Methods/Activities

- Lectures.
- Case studies.
- Assignments (Group/individual).
- Power point presentations

IX. Learning outcome

After successful completion of this course, the student will be able to-Develop expertise in calculus operations.

I. Course Title: Computer Applications for Agri Business & Economics

II. Course Code: COMP- 501

III. Credit Hours: 2+1

IV. Why this course?

Students from Agricultural Economics and Agribusiness programmes should be quite comfortable accessing electronic data sources. Graduates from university programme in Agricultural Economics and Agribusiness are expected to possess expertise in basic computer skills. All graduates must be proficient users of word processing, spreadsheet and database software.

V. Aim of the course

The course aims to instil the significance of computer applications in the organizations and handling recent trends in information technology and system for improved decision making.

VI. Organisation of the course The course is organized as follows:

No.	Block	Unit
1.	Basics of computers	1. Concept of computers 2. System and application software 3. Data base management system
2.	Business value of internet	1. Cloud computing 2. Cyber security and ethical challenges
3.	Management Information System	1. Concept of MIS 2. Introduction to Artificial Intelligence 3. E-commerce agri-business trends

VII. Theory

Block 1: Basics of Computers

Unit I: Concept of Computers- Brief History of Computers, Generation and Its Evolution, Characteristics of Computers, Main Areas of Computers and their Applications; Classification of Computers, Input-Output Devices, Memory Types (Cache, RAM, ROM), Memory Units,

Unit-II: System Software and Application Software, Open source software, introduction to computer languages, Introduction to Operating Systems – Functions, Features and Types., MS Windows and LINUX. Data Base Management System, MS Office (MS Word, MS Power Point, MS Excel, MS-Access and use of various analytical software Like SPSS, STATA, R, E-Views etc.

Block 2: Business Value of Internet

Unit III: The business value of internet, Intranet, extranet and Internet, Introduction to Web page design using HTML, Cloud Computing, Security and ethical challenges: Computer crime – Hacking, cyber theft, unauthorized use at work. Piracy – software and intellectual property. Health and Social Issues, Ergonomics and cyber terrorism.

Block 3: Management Information System

Unit IV: The concept of MIS–Definition, importance, Course Objective, prerequisites, advantages and challenges; Information Needs of organization, MIS and Decision – Making. Types/Classification of Information System for organizations; Introduction to Artificial Intelligence (AI), Neural Networks, Fuzzy logical control systems.

Unit V: e-business/e-commerce: e-business models, e-commerce processes, electronic payment systems, e-commerce trends with special reference to agri-business. Applications of MIS in the areas of Human Resource Management, Financial Management, Production/Operations Management, Materials Management, Marketing Management.

VIII. Practical

- Study of Computer Components and accessories
- Introduction to different Operating Systems (Windows, Linux, Android, Mac OS etc.)
- Creating, Editing and managing Word, PowerPoint, Spreadsheet documents
- Introduction to different analytical software like SPSS, STATA, R, E-Views etc.
- Creating and designing web pages

- Case study on different e-business models (B2B, B2C, C2B etc.)

IX. Teaching methods/activities

- Lectures
- Practical
- Live project
- Assignments
- Presentations

X. Learning outcome

After successful completion of this course, the students are expected to be able to:

- Understand the fundamentals of computers
- Get a clearer idea about the application of Information technology in agri-business management
- Use of e commerce, artificial intelligence and MIS for improved decision making in management

I. Course Title: Computing Techniques for Social Sciences

II. Course Code: COMP- 502

III. Credit Hours: 2+1

IV. Why this course?

Students from social science discipline (Agricultural Economics and Agricultural Extension) should be well versed with latest computing techniques to handle various primary and secondary data for their research purpose. All the students must be well acquainted with the available techniques and know, how to use them to solve their research problems.

V. Aim of the course

This course is meant for exposing the students in the usage of various computing techniques for analysis of data. It would provide the students a hands-on experience in the analysis of their research data. This course is useful especially to the students from social science discipline like Agricultural Economics & Agricultural Extension

VI. Organisation of the course

The course is organized as follows:

No.	Block	Unit
1.	Introduction to analytical packages	1. Overview of the available analytical packages
2.	Basic Data Analysis	1. Testing of normality and testing of hypothesis
3.	Advanced Data Analysis	1. Correlation and Regression Techniques, Logistic Regression tools and techniques 2. Discriminant Function and Discriminant Analysis, Introduction to Time series data.

VII. Theory

Block 1: Introduction to analytical packages

Unit I

Introduction to various statistical packages: Excel, R, SPSS, STATA, E-views. Data Preparation; Descriptive statistics; Graphical representation of data, Exploratory data analysis.

Block 2: Basic Data Analysis

Unit II

Test for normality; Testing of hypothesis using t and F statistics and Z-test.

Block 3: Advanced Data Analysis

Unit III

Analysis of mixed models; Estimation of variance components; Correlation and Regression analysis, Probit, Logit and Tobit Models.

Unit IV

Discriminant function; Factor analysis; Principal component analysis; Introduction to time series data, Introduction to machine learning.

VIII. Practical

- Use of software packages for summarization and tabulation of data, obtaining descriptive statistics, graphical representation of data;

- Testing the hypothesis for one sample t-test, two sample t-test, paired t-test, test for large samples - F test, one-way analysis of variance;
- Linear regression, Multiple regression, Regression plots;
- Discriminant analysis - fitting of discriminant functions, identification of important variables;
- Factor analysis. Principal component analysis - obtaining principal component.

I. Course Title: Computing Techniques for Applied Sciences

II. Course Code: COMP- 503

III. Credit Hours: 2+1

IV. Why this course?

Students from Applied Science discipline should be aware about latest tools and techniques to handle experimental data for their research purpose. All the students must be well acquainted with the available techniques and know, how to use them to solve their research problems.

V. Aim of the course

This course is meant for exposing the students in the usage of various computing techniques for analysis of data. It would provide the students a hands-on experience in the analysis of their research data. This course is useful for all disciplines.

VI. Organisation of the course The course is organized as follows:

No.	Block	Unit
1.	Introduction to analytical packages	1. Overview of the available analytical packages
2.	Basic Data Analysis	1. Testing of normality and testing of hypothesis
3.	Advanced Data Analysis	1. Factorial Experiments

VII. Theory

Block 1: Introduction to analytical packages

Unit I

Introduction to statistical packages and computing: data types and structures, Use of Software packages like, SPSS, STATA “R: The R Project for Statistical Computing”. Data analysis principles and practice, Summarization and tabulation of data, Exploratory data analysis; Graphical representation of data. Statistical Distributions: Fitting and testing the goodness of fit.

Block 2: Basic Data Analysis

Unit II

Test for normality; Testing of hypothesis using t and F statistics and Z-test.

Block 3: Advanced Data Analysis

Unit III

Data preparation for ANOVA and ANCOVA, Factorial Experiments, contrast analysis, multiple comparisons.

VIII. Practical

- Use of software packages for summarization and tabulation of data, obtaining descriptive statistics, graphical representation of data;
- Testing the hypothesis for one sample t-test, two sample t-test, paired t-test, test for large samples - F test, one-way analysis of variance;
- Designs for Factorial Experiments, fixed effect models, random effect models, mixed effect models, estimation of variance components;