SYLLABI OF UG PROGRAMME

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(According to 5th Dean's Committee)
B.Sc. (Hons.) Agriculture

Abbreviations	
AGR: Agronomy	CPH: Crop Physiology
ACB: Agricultural Biochemistry	GPB: Genetics & Plant Breeding
AEC: Agricultural Economics	HOR: Horticulture
AEG: Agricultural Engineering	PED: Physical Education
AEN: Agricultural Entomology	PPC: Plant Pathology
AEX: Agricultural Extension	SSC: Soil Science & Agricultural Chemistry
AIN: Agricultural Informatics	ELP: Experiential Learning Programme
ANS: Animal Science	RAWE & AIA: Rural Agriculture Work Experience & Agro-industrial Attachment
STAT: Statistics	

SUMMARY

Semester	**No. of Courses**	**Theory (hours)**	**Practical (hours)**	**Total credit (hours)**
I	10	16	18	34
II	11	18	16	34
III	10	17	18	35
IV	11	17	18	35
V	11	13	22	35
VI	11	13	22	35
*VII		0	20	20
**VIII		0	20	20
TOTAL CREDITS				**248**

*RAWE & AIA: Rural Agriculture Work Experience & Agro-industrial Attachment
**ELP: Experiential Learning Programme

AGRICULTURAL ECONOMICS

AEC 121	Fundamentals of Agricultural Economics	2(2+0)

Objectives:
To develop the theoretical concept of the subject matter and its' application in the field of agriculture in general.

Theory:
Economics: Meaning, scope and subject matter, definitions, activities, approaches to economic analysis; micro and macro economics, positive and normative analysis. Nature of economic theory; rationality assumption, concept of equilibrium, economic laws as generalization of human behavior. Basic concepts: Goods and services, desire, want, demand, utility, cost and price, wealth, capital, income and welfare. Agricultural economics: meaning, definition, characteristics of agriculture, importance and its role in economic development. Agricultural planning and development in the country. *Demand:* meaning, law of demand, demand schedule and demand curve, determinants, utility theory; law of diminishing marginal utility, equi-marginal utility principle. Consumer's equilibrium and derivation of demand curve, concept of consumer surplus. Elasticity of demand: concept and measurement of price elasticity, income elasticity and cross elasticity. Production: process, creation of utility, factors of production, input output relationship. *Laws of returns*: Law of variable proportions and law of returns to scale. *Cost:* Cost concepts, short run and long run cost curves. Supply: Stock v/s supply, law of supply, supply schedule, supply curve, determinants of supply, elasticity of supply. Market structure: meaning and types of market, basic features of perfectly competitive and imperfect markets. Price determination under perfect competition; short run and long run equilibrium of firm and industry, shut down and break even points. Distribution theory: meaning, factor market and pricing of factors of production. Concepts of rent, wage, interest and profit. *National income:* Meaning and importance, circular flow, concepts of national income accounting and approaches to measurement, difficulties in measurement. Population: Importance, Malthusian and Optimum population theories, natural and socio-economic determinants, current policies and programmes on population control. Money: Barter system of exchange and its problems, evolution, meaning and functions of money, classification of money, money supply, general price index, inflation and deflation. Banking: Role in modern economy, types of banks, functions of commercial and central bank, credit creation policy. Agricultural and public finance: meaning, micro v/s macro finance, need for agricultural finance, public revenue and public expenditure. *Tax:* meaning, direct and indirect taxes, agricultural taxation, VAT. *Economic systems:* Concepts of economy and its functions, important features of capitalistic, socialistic and mixed economies, elements of economic planning.

Learning Outcome:
Students will be able to develop theoretical concepts regarding the subject matter and will be able to understand the possible application in the field of agriculture

AEC 211	Agricultural Finance and Co-Operation	3(2+1)

Objectives:
To understand the concept, role and importance of Agricultural Finance in India and to develop the knowledge of functioning of different financial organizations and financial policies pertaining to agriculture sector.

Theory:
Agricultural Finance- meaning, scope and significance, credit needs and its role in Indian agriculture. Agricultural credit: meaning, definition, need, classification. Credit analysis: 4 R's, and 3C's of credits. Sources of agricultural finance: institutional and non-institutional sources, commercial banks, social control and nationalization of commercial banks, Micro financing including KCC. Lead bank scheme, RRBs, Scale of finance and unit cost. An introduction to higher financing institutions – RBI, NABARD, ADB, IMF, world bank, Insurance and Credit Guarantee Corporation of India. Cost of credit. Recent development in agricultural credit. Preparation and analysis of financial statements – Balance Sheet and Income Statement. Basic guidelines for preparation of project reports- Bank norms – SWOT analysis.
Agricultural Cooperation – Meaning, brief history of cooperative development in India, Objectivess, principles of cooperation, significance of cooperatives in Indian agriculture. Agricultural Cooperation in India- credit, marketing, consumer and multi-purpose cooperatives, farmers' service cooperative societies, processing cooperatives, farming cooperatives, cooperative warehousing; role of ICA, NCUI, NCDC, NAFED.

Practical:
Determination of most profitable level of capital use. Optimum allocation of limited amount of capital among different enterprise. Analysis of progress and performance of cooperatives using published data. Analysis of progress and performance of commercial banks and RRBs using published data. Visit to a commercial bank, cooperative bank and cooperative society to acquire firsthand knowledge of their management, schemes and procedures. Estimation of credit requirement of farm business – A case study. Preparation and analysis of balance sheet – A case study. Preparation and analysis of income statement – A case study. Appraisal of a loan proposal – A case study. Techno-economic parameters for preparation of projects. Preparation of Bankable projects for various agricultural products and its value added products. Seminar on selected topics.

Learning Outcome:
On the completion of the course, students will be able to develop knowledge about the financial system prevailing in India and functioning of different financial organization along with developing quantitative ability to judge financial statements.

AEC 221	Agricultural Marketing, Trade and Prices	3(2+1)

Objectives:
To understand the concept and process of marketing of farm products produced
by farmers and of farm inputs and services required by them in the production of these farm products.

Theory:

Agricultural Marketing: Concepts and definitions of market, marketing, agricultural marketing, market structure, marketing mix and market segmentation, classification and characteristics of agricultural markets**;** demand, supply and producer's surplus of agri-commodities: nature and determinants of demand and supply of farm products, producer's surplus – meaning and its types, marketable and marketed surplus, factors affecting marketable surplus of agri-commodities; product life cycle (PLC) and competitive strategies: Meaning and stages in PLC; characteristics of PLC; strategies in different stages of PLC; pricing and promotion strategies: pricing considerations and approaches – cost based and competition based pricing; market promotion – advertising, personal selling, sales promotion and publicity – their meaning and merits & demerits; marketing process and functions: Marketing process-concentration, dispersion and equalization; exchange functions – buying and selling; physical functions – storage, transport and processing; facilitating functions – packaging, branding, grading, quality control and labeling (Agmark); Market functionaries and marketing channels: Types and importance of agencies involved in agricultural marketing; meaning and definition of marketing channel; number of channel levels; marketing channels for different farm products; Integration, efficiency, costs and price spread: Meaning, definition and types of market integration; marketing efficiency; marketing costs, margins and price spread; factors affecting cost of marketing; reasons for higher marketing costs of farm commodities; ways of reducing marketing costs; Role of Govt. in agricultural marketing: Public sector institutions- CWC, SWC, FCI, CACP & DMI – their Objectivess and functions; cooperative marketing in India; Risk in marketing: Types of risk in marketing; speculation & hedging; an overview of futures trading; Agricultural prices and policy: Meaning and functions of price; administered prices; need for agricultural price policy; Trade: Concept of International Trade and its need, theories of absolute and comparative advantage. Present status and prospects of international trade in agri-commodities; GATT and WTO; Agreement on Agriculture (AoA) and its implications on Indian agriculture; IPR.

Practical:

Plotting and study of demand and supply curves and calculation of elasticities**;** Study of relationship between market arrivals and prices of some selected commodities; Computation of marketable and marketed surplus of important commodities; Study of price behaviour over time for some selected commodities; Construction of index numbers; Visit to a local market to study various marketing functions performed by different agencies, identification of marketing channels for selected commodity, collection of data regarding marketing costs, margins and price spread and presentation of report in the class; Visit to market institutions – NAFED, SWC, CWC, cooperative marketing society, etc. to study their organization and functioning; Application of principles of comparative advantage of international trade.

Learning Outcome:

Students will develop the theoretical concept of process of marketing of farm products and cultivate the quantitative skills to analyse different marketing functions and efficiency of different markets

AEC 321	Farm Management, Production and Resource Economics	2(1+1)

Objectives:
To develop the understanding of production process and the guiding economic principle for agricultural production; to apply the appropriate economic principle under different production scenario to optimize the production process

Theory:
Meaning and concept of farm management, Objectives and relationship with other sciences. Meaning and definition of farms, its types and characteristics, factor determining types and size of farms. Principles of farm management: concept of production function and its type, use of production function in decision-making on a farm, factor-product, factor-factor and product-product relationship, law of equi-marginal/or principles of opportunity cost and law of comparative advantage. Meaning and concept of cost, types of costs and their interrelationship, importance of cost in managing farm business and estimation of gross farm income, net farm income, family labor income and farm business income. Farm business analysis: meaning and concept of farm income and profitability, technical and economic efficiency measures in crop and livestock enterprises. Importance of farm records and accounts in managing a farm, various types of farm records needed to maintain on farm, farm inventory, balance sheet, profit and loss accounts. Meaning and importance of farm planning and budgeting, partial and complete budgeting, steps in farm planning and budgeting-linear programming, appraisal of farm resources, selection of crops and livestock's enterprises. Concept of risk and uncertainty occurs in agriculture production, nature and sources of risks and its management strategies**,** Crop/livestock/machinery insurance – weather based crop insurance, features, determinants of compensation. Concepts of resource economics, differences between NRE and agricultural economics, unique properties of natural resources. Positive and negative externalities in agriculture, Inefficiency and welfare loss, solutions, Important issues in economics and management of common property resources of land, water, pasture and forest resources etc.

Practical
Preparation of farm layout. Determination of cost of fencing of a farm. Computation of depreciation cost of farm assets. Application of equi-marginal returns/opportunity cost principle in allocation of farm resources. Determination of most profitable level of inputs use in a farm production process. Determination of least cost combination of inputs. Selection of most profitable enterprise combination. Application of cost principles including CACP concepts in the estimation of cost of crop and livestock enterprises. Preparation of farm plan and budget, farm records and accounts and profit & loss accounts. Collection and analysis of data on various resources in India.

Learning Outcome:
Students will be able to acquire necessary theoretical and analytical skills to optimise the agricultural production and analyse the financial health of any farm for possible progress towards maximisation of profit.

AEC 322	Intellectual Property Rights	1(1+0)

Objectives:
To understand the concept of Intellectual property rights and its implications.

Theory:
Introduction and meaning of intellectual property, brief introduction to GATT, WTO, TRIPs and WIPO, Treaties for IPR protection: Madrid protocol, Berne Convention, Budapest treaty, etc. Types of Intellectual Property and legislations covering IPR in India:-Patents, Copyrights, Trademark, Industrial design, Geographical indications, Integrated circuits, Trade secrets. Patents Act 1970 and Patent system in India, patentability, process and product patent, filing of patent, patent specification, patent claims, Patent opposition and revocation, infringement, Compulsory licensing, Patent Cooperation Treaty, Patent search and patent database.
Origin and history including a brief introduction to UPOV for protection of plant varieties, Protection of plant varieties under UPOV and PPV&FR Act of India, Plant breeders rights, Registration of plant varieties under PPV&FR Act 2001, breeders, researcher and farmers rights. Traditional knowledge-meaning and rights of TK holders.
Convention on Biological Diversity, International treaty on plant genetic resources for food and agriculture (ITPGRFA). Indian Biological Diversity Act, 2002 and its salient features, access and benefit sharing.

Learning Outcome:
Students will be able to grasp the concept of Intellectual Property rights and different acts related to IPR issues.

COMPUTER APPLICATION

AEC 211	Agricultural Informatics	2(1+1)

Objectives:
To understand the basic function of a computer and the computing process; to understand the operation of different hardware and software used in computer; to have first hand knowledge in using different mobile applications; to develop the knowledge of different application software and use the internet

Theory:
Introduction to Computers, Anatomy of Computers, Memory Concepts, Units of Memory, Operating System, definition and types, Applications of MS-Office for creating, Editing and Formatting a document, Data presentation, tabulation and graph creation, statistical analysis, mathematical expressions, Database, concepts and types, creating database, uses of DBMS in Agriculture, Internet and World Wide Web (WWW), Concepts and components.
Computer Programming, General Concepts, Introduction to Visual Basic, Java, Fortran, C/ C++, etc, concepts and standard input/output operations.
e-Agriculture, concepts, design and development. Application of innovative ways to use information and communication technologies (IT) in Agriculture. Computer Models in Agriculture: statistical, weather analysis and crop simulation models, concepts, structure, inputs-outputs files, limitation, advantages and application of models for understanding plant processes, sensitivity, verification, calibration and validation. IT application for computation

of water and nutrient requirement of crops, Computer-controlled devices (automated systems) for Agri-input management, Smartphone mobile apps in Agriculture for farm advises, market price, postharvest management etc; Geospatial technology, concepts, techniques, components and uses for generating valuable agri-information. Decision support systems, concepts, components and applications in Agriculture, Agriculture Expert System, Soil Information Systems etc for supporting Farm decisions. Preparation of contingent crop-planning and crop calendars using IT tools.

Practical:
Study of Computer Components, accessories, practice of important DOS Commands. Introduction of different operating systems such as windows, Unix/ Linux, Creating, Files & Folders, File Management. Use of MS-WORD and MS Power-point for creating, editing and presenting a scientific Document. MS-EXCEL - Creating a spreadsheet, use of statistical tools, writing expressions, creating graphs, analysis of scientific data, handling macros. MS-ACCESS: Creating Database, preparing queries and reports, demonstration of Agri-information system. Introduction to World Wide Web (WWW) and its components. Introduction of programming languages such as Visual Basic, Java, Fortran, C, C++. Hands on practice on Crop Simulation Models (CSM), DSSAT/Crop-Info/CropSyst/ Wofost. Preparation of Inputs file for CSM and study of model outputs, computation of water and nutrient requirements of crop using CSM and IT tools. Use of smart phones and other devices in agro-advisory and dissemination of market information. Introduction of Geospatial Technology, for generating information important for Agriculture. Hands on practice on preparation of Decision Support System. Preparation of contingent crop planning.

Learning Outcome:
Students will excel in using modern day computing techniques and will effectively amalgamate the knowledge to different uses in everyday life.

ELECTIVE COURSES

AEC 222	**Agri-business Management**	**3(2+1)**

Objectives:
To learn the managerial aspects in the field of agribusiness.

Theory:
Transformation of agriculture into agribusiness, various stakeholders and components of agribusiness systems. Importance of agribusiness in the Indian economy and New Agricultural Policy. Distinctive features of Agribusiness Management: Importance and needs of agro-based industries, Classification of industries and types of agro based industries. Institutional arrangement, procedures to set up agro based industries. Constraints in establishing agro-based industries. Agri-value chain: Understanding primary and support activities and their linkages. Business environment: PEST & SWOT analysis. Management functions: Roles & activities, Organization culture. Planning, meaning, definition, types of plans. Purpose or mission, goals or Objectives, Strategies, polices procedures, rules, programs and budget. Components of a business plan, Steps in planning and implementation. Organization staffing, directing and motivation. Ordering, leading, supervision, communications, control. Capital Management and Financial management of Agribusiness.

Financial statements and their importance. Marketing Management: Segmentation, targeting & positioning. Marketing mix and marketing strategies. Consumer behavior analysis, Product Life Cycle (PLC). Sales & Distribution Management. Pricing policy, various pricing methods. Project Management definition, project cycle, identification, formulation, appraisal, implementation, monitoring and evaluation. Project Appraisal and evaluation techniques.

Practical:
Study of agri-input markets: Seed, fertilizers, pesticides. Study of output markets: grains, fruits, vegetables, flowers. Study of product markets, retails trade commodity trading, and value added products. Study of financing institutions- Cooperative, Commercial banks, RRBs, Agribusiness Finance Limited, NABARD. Preparations of projects and Feasibility reports for agribusiness entrepreneur. Appraisal/evaluation techniques of identifying viable project- Non-discounting techniques. Case study of agro-based industries. Trend and growth rate of prices of agricultural commodities. Net present worth technique for selection of viable project. Internal rate of return.

Learning Outcome:
Student will be acquainted with managerial concepts and aspects of Agribusiness.

AEC 311	**Emerging Issues in Agricultural Economics**	**3(2+1)**

Objectives:
To learn the novel initiatives and recent development in the field of agricultural economics.

Theory:
Economic thoughts: Evolution of Economic Thoughts: Ancient economic thought – medieval economic thought – modern economic thoughts. Economic Thoughts in India – Gandhian Economics vs Nehru's economic philosophy. Globalization and Agricultural Economy: Concept of globalization and its impact on agriculture in India. International Trade agreements – GATT – WTO – AoA. Free trade versus Protectionism, Trade Blocks, and Business Cycle. Agricultural Policy: Agricultural Policies- National Agriculture Policy, National Water Policy, National Seed Policy, National Fertilizer Policy, Agricultural Price Policy, Land Policy, EXIM Policy, etc. Monetary policy and Fiscal policy- Effectiveness of Monetary and Fiscal policy. IS & LM frame work. Growth and Development: Economic growth and development –concept, meaning, and theories. Role of agriculture in economic development. Income and Wealth distribution- Gini Coefficient and Lorenz Curve. Development Issues – Inflation, Unemployment, Poverty, Food Security, Sustainability and HDI. Business Laws and Ethics: Important laws and acts related to agriculture: Companies Act, APMC Act, Consumer Protection Act, PPV&FR Act, RTI Act, MRTP Act, etc. Quality standards for agriculture- FSSAI, AGMARK, ISO, CODEX, HACCP, etc. Ethics in business management. Rural Marketing and Rural Industrialization: Concept and scope of rural marketing, nature and characteristics of rural markets, potential of rural markets in India. Rural industrialization in India. Agro-industries in India. Research Methodology for Social Science: Concept and definition of Research Methodology. Types of data- Time Series, Cross-sectional, and Panel Data. Basic concepts of sampling & survey procedures. Regression analysis and Simultaneous Equation System. Basic concepts of econometrics and programming techniques. Linear programming- concept, definition, assumptions, and uses.

Practical:
Estimation of competitive and comparative measures like NPC, EPC, ERP and DRC. Estimation of Gini-coefficient and Lorenz Curve. Estimation of HDI, TOT, Index Number, etc. Formulation and solution of LP Problems. Regression Analysis. Policy analysis. Market survey & Labeling.

Learning Outcome:
Student will be acquainted with new concepts in the field of agricultural economics.