

# **BSc (Hons) Agriculture (Specialisation: Agricultural Extension) – A323** (Subject to Approval by Senate)

## **1. Objectives**

Economic development and the changing socio-economic pattern of the Mauritian society has led to an increasing demand for agricultural produce of good quality. Agricultural production is now increasingly being characterised by the use of modern technology. It is the Government policy for the future to adopt a technology-based approach to render the local agricultural sector more productive, service-oriented, sustainable and competitive whilst responding to the environmental and ethical standards demanded by society. Government is also striving to alleviate poverty and democratise economic opportunities so that prosperity reaches all households and all people, particularly the vulnerable ones.

The further development of agriculture and its related industries is challenging and requires appropriate knowledge, skills and technology to keep pace with the latest international technological developments in that sector. This has led to the need for well-trained agricultural scientists who have the technical and practical skills in addition to in-depth knowledge of the science to meet these new challenges facing the Mauritian agriculture. Viewed the increasing complexity of agricultural practice, there is a need for enhanced capacity in technology transfer. This programme fills that requirement.

The programme is designed to develop technology transfer and entrepreneurial skills of students in the area of agriculture and food production.

### **On completion of this programme, learners will be able to:**

- explain the scientific, economic and business principles underpinning crop and animal production methods in various types of production systems;
- identify technological problems encountered in current crop and livestock production systems;
- provide an understanding of the principles and tools available for agribusiness management and development;
- prepare themselves to serve in the field of Agriculture and Agribusiness in governmental, parastatal or private organisations;
- promote their ability to serve producer groups in improving their standards of living and managing agricultural enterprises;
- set up and operate their own agricultural enterprise;
- adopt innovative approaches to agricultural production
- familiarise themselves with regional and global agricultural policy and strategy and its implications and regional agricultural development.
- Perform as researchers, extensionists, producers, farm managers, sales representatives and educationists.

## **2. General Entry Requirements**

In accordance with General Entry Requirements for Admission to the University for Undergraduate Degrees.

## **3. Programme Requirements**

SC: Credit in Mathematics and Chemistry.

2 GCE 'A' Level passes in related approved Science subjects (Mathematics, Physics, Chemistry, Biology, Food Studies, Botany, Zoology, Computer Science or Computing).

Preference will be given to candidates holding an 'A' Level in Chemistry, Mathematics, Biology or Physics.

**4. Programme Duration**

	<b>Normal (Years)</b>	<b>Maximum (Years)</b>
Degree	3	5

**5. Credits per Year:** Minimum 18 credits, Maximum 48 credits subject to Regulation 4.

**6. Minimum Credits Required for the Award of Undergraduate Degree: 108**

Breakdown as follows:

	<b>Credits from</b>			
	<b>Core Modules</b>	<b>Taught</b>	<b>Project</b>	<b>Elective</b>
<b>Degree</b>	96		9	3

Practical Training and the Scientific Communication module must be completed satisfactorily for the award of the degree.

Students may exit with

- (a) a Certificate after having earned 30 credits in core modules.
- (b) a Diploma after having earned 60 credits in core modules.

**7. Assessment**

Each module will be assessed over 100 marks (i.e. expressed as %) with details as follows (unless otherwise specified):

Assessment will be based on a Written Examination of 2-3 hour duration, carrying a weighting of 70%, and Continuous Assessment carrying 30% of total marks for AGRI modules. Modules from other Faculties/Departments/Centres will carry weighting in the Written Examination and the Continuous Assessment as specified by the concerned Faculties/Departments/Centres. Continuous Assessment will be based on laboratory/field works, and/or assignments, **and should include at least 1 class test.**

A minimum of at least 30% should be attained in each of Continuous Assessment and Written Examination, with an overall total of 40% for a candidate to pass a module.

Modules will carry the weightings of 1, 3 or 5 depending on their status (Introductory, Intermediate or Advanced). Weighting for a particular module is indicated within parentheses in the module code.

Modules will carry credits in the range of 3 to 6. Project will carry 9 credits.

Assessment of practical training will be based on supervisor's report and student's report. For satisfactory completion of the practical training, a minimum of 40% should be attained. The 'Practical Training' will be offered either at the end of year 1/or at the end of year 2, depending on placement opportunities.

Assessment of the scientific communication module will be based on continuous assessment of students throughout the module and/or submission of a portfolio. For satisfactory completion of the module, a minimum of 40% should be attained.

Written examinations for all the modules will be carried out at the end of the year.

## 8. Important Note

The rules as stipulated in this Programme Structure and Outline Syllabus will replace all other rules and regulations.

## 9. List of Modules

<u>Code</u>	<u>Module Name</u>	<u>Hr / Yr</u> <u>L+P</u>	<u>Credits</u>
COMS 1010 (1)	Communication Skills	DE	3
CSE 1010e (1)	Introduction to Information Technology	OE	3
AGRI 1018Y(1)	Agricultural Chemistry and Soil Science	45+60	5
AGRI 1019Y(1)	Crop Science	45+60	5
AGRI 1020Y(1)	Biology and Control of Plant Pests, Diseases, and Weeds	45+60	5
AGRI 1022Y(1)	Animal Science	45+60	5
AGRI 1023Y(1)	Animal Production	45+60	5
AGRI 1035Y(1)	Agronomy and Horticultural Crop Production I	45+60	5
AGRI 2001Y (3)	Food Science and Technology	60+60	6
AGRI 2024Y (3)	Agricultural Engineering and Applications	45+45	4
AGRI 2025Y (3)	Introductory Applied Systems, Economics, Management and Extension	60+60	6
AGRI 2026Y (3)	Biotechnology	60+60	6
AGRI 2045Y (3)	Statistical Methods for Agricultural Sciences	45+45	4
AGRI 2050Y (5)	Agricultural Extension: Principles, Methods and Management	60+60	6
AGRI 2051Y (3)	Communication and ICT in Agricultural Extension	30+30	3
AGRI 2052Y (3)	Rural Sociology and Rural Development	30+30	3
AGRI 3000Y (5)	Project	-	9
AGRI 3027Y (5)	Animal Production and Health	60+45	5
AGRI 3061Y (5)	Emerging Technologies in Crop Production	60+45	5
AGRI 3062Y (5)	Agricultural Systems and Agricultural Management Information System	60+60	6
AGRI 3063Y (5)	Participatory approaches in agricultural research and Extension	60+60	6
AGRI 3100	Scientific Communication	20+0	-

### ELECTIVES (Choose one from)

<u>Code</u>	<u>Module Name</u>	<u>Hr / Yr</u> <u>L+P</u>	<u>Credits</u>
AGRI 3030Y(5)	International and Regional Agricultural Trade	30+30	3
AGRI 3031Y(5)	Agro-industrial Development for SMEs	30+30	3

**AGRI2000 - Practical Training can be done in either Year 1 or Year 2**

**AGRI3100 – Scientific Communication will be done in Semester 1 in Year 3**

**Total no. of credits : 108**

## 10. Programme Plan - BSc (Hons) Agriculture (Specialisation: Agricultural Extension)

### YEAR 1

<u>Code</u>	<u>Module Name</u>	<u>Hr / Yr</u> L+P	<u>Credits</u>
COMS 1010 (1)	Communication Skills	DE	3
CSE 1010e (1)	Introduction to Information Technology	OE	3
AGRI 1018Y(1)	Agricultural Chemistry and Soil Science	45+60	5
AGRI 1019Y(1)	Crop Science	45+60	5
AGRI 1020Y(1)	Biology and Control of Plant Pests, Diseases, and Weeds	45+60	5
AGRI 1022Y(1)	Animal Science	45+60	5
AGRI 1023Y(1)	Animal Production	45+60	5
AGRI 1035Y(1)	Agronomy and Horticultural Crop Production I	45+60	5

### YEAR 2

<u>Code</u>	<u>Module Name</u>	<u>Hr / Yr</u> L+P	<u>Credits</u>
AGRI 2001Y (3)	Food Science and Technology	60+60	6
AGRI 2024Y (3)	Agricultural Engineering and Applications	45+45	4
AGRI 2025Y (3)	Introductory Applied Systems, Economics, Management and Extension	60+60	6
AGRI 2026Y (3)	Biotechnology	60+60	6
AGRI 2045Y (3)	Statistical Methods for Agricultural Sciences	45+45	4
AGRI 2050Y(5)	Agricultural Extension: Principles, Methods and Management	60+60	6
AGRI 2051Y(3)	Communication and ICT in Agricultural Extension	30+30	3
AGRI 2052Y(3)	Rural Sociology and Rural Development	30+30	3

AGRI2000 - Practical Training can be done in either Year 1 or Year 2

### YEAR 3

<u>Code</u>	<u>Module Name</u>	<u>Hr / Yr</u> L+P	<u>Credits</u>
AGRI 3000Y(5)	Project	-	9
AGRI 3027Y(5)	Animal Production and Health	60+45	5
AGRI 3061Y(5)	Emerging Technologies in Crop Production	60+45	5
AGRI 3062Y(5)	Agricultural Systems and Agricultural Management Information System	60+60	6
AGRI 3063Y(5)	Participatory approaches in agricultural research and Extension	60+60	6
AGRI 3100	Scientific Communication	20+0	-

ELECTIVES (Choose one from)

<u>Code</u>	<u>Module Name</u>	<u>Hr / Yr</u> L+P	<u>Credits</u>
AGRI 3030Y(5)	International and Regional Agricultural Trade	30+30	3
AGRI 3031Y(5)	Agro-industrial Development for SMEs	30+30	3

Total no. of credits : 108

## **11. Outline Syllabus**

### **COMS 1010(1) - COMMUNICATION SKILLS**

Writing skills, non-verbal communication, modes of speech delivery and presentation aids, speeches, perception and listening skills, business and technical writing.

### **CSE 1010e(1) - INTRODUCTION TO INFORMATION TECHNOLOGY**

Information Technology and Computers; Stepping in the Computer; Input and Output Devices; Secondary Storage; Programming; Systems Software; Applications Software; Systems Development; Computer Networks; The Internet; Computer Security; Software Utilities; Issues and Trends in IT.

### **AGRI 1018Y (1) – AGRICULTURAL CHEMISTRY AND SOIL SCIENCE**

Agrochemicals, their properties, metabolism, and mode of action. Chemistry of fertilisers: straight, complex, compound mixed, blended fertilisers. Fertiliser solutions. Foliar fertilisers. Manures, municipal sewage, compost. Chemistry of pesticides: Organochlorines, organophosphates, carbamates, pyrethroids, dinitrophenols, phthalimides, substituted ureas, triazines, inorganics, botanical pesticides, bio-pesticides. Analysis of pesticides and fertilizers.

Soil as a natural body. Weathering. Factors and processes in soil formation. Physical, physio-chemical, biological and mineralogical properties of soil. Soil profile. Soil air, water, temperature, soil organic matter and soil organisms. Concepts of soil fertility and land suitability. Soil taxonomy. Soil biology. Soil amendments. Soil pollution. Heavy metals. Polyaromatic hydrocarbons (PAH), persistent organic pollutants (POP) in soils. Soil bioremediation.

### **AGRI 1019Y(1) - CROP SCIENCE**

Classification, identification, morphology, ecology and uses of economically important crops. Mendelian Inheritance. Linkage and chromosome mapping. Sex linked and extra-nuclear inheritance. Quantitative and population genetics.

Objectives of plant breeding. Selection techniques. Methods of crop improvement. Genetic variation and manipulation of variability. Breeding of selected crops. Legislative framework.

Environmental influences on crop growth and development. Vegetative and reproductive plant physiology. Plant water relations. Plant growth substances. Plant growth analysis. Yield determination and crop productivity.

### **AGRI 1020Y(1) - BIOLOGY AND CONTROL OF PLANT PESTS, DISEASES AND WEEDS**

Taxonomy, systematic, biology, ecology and economic importance of pests, plant pathogens and weeds affecting crops. Control and management of pests, diseases and weeds of crop plants. Concept and principles of IPM. Biological, physical, chemical, cultural and biology-based methods of pest control. Economics of crop protection.

### **AGRI 1022Y(1) - ANIMAL SCIENCE**

Anatomy of non ruminant and ruminant animals digestive systems. Principles of nutritional physiology and biochemistry. Meeting nutritional objectives of farm animals. Feeds and feed evaluation. Production of compound feeds: quality assurance framework.

Avian Reproductive Systems and The mammary gland structure. Endocrine effects on animal products: Milk production, egg production.

Muscle structure and biology. Growth and body composition. Farm Animal Reproductive systems (Male and female). Reproductive physiology (Oestrous cycles, puberty, pregnancy and parturition). Genetic and physiological adaptation to the environment, especially in hot climate.

Principles of Meat science: chemical composition. Post Mortem Muscle Chemistry. Effects of pre and post slaughter treatments on carcass /meat quality and hygiene. Carcass appraisal.

An introduction to the basic principles of quantitative and qualitative genetics. Breeding systems of various farm animals.

Disease causing agents. Major Pests and diseases of farm animals. The impact of diseases at the animal, enterprises and national and global levels. Spread and transmission of diseases. The immune system: structure and function. Natural and acquired immunity. Food Borne Diseases. Zoonotic diseases.

#### **AGRI 1023Y(1) - ANIMAL PRODUCTION**

Role and importance of animal production systems in agricultural enterprises: poultry, pigs, beef and dairy cattle, deer, sheep, goats, rabbits, production potential of novel species. Constraints to animal productivity and production. Public concerns over animal production practices.

Fundamental stockmanship for managing farm animals: rationing; weighing and tagging; usage of preventive and diagnostic equipment; handling and restraining animals, animal's environment; evaluation of body condition score; performance records. Diagnosing farm animal abnormal behaviour. Animal housing evaluation.

#### **AGRI 1035Y(1) - AGRONOMY AND HORTICULTURAL CROP PRODUCTION I**

Principles of field crop agronomy. Crop-environment interactions. Cropping systems. Crop propagation.

Plant Nutrition. Nutrient deficiency symptoms and their corrections. Nutrient requirements and fertiliser recommendations for specific crops / cropping systems.

Applied crop physiology. Husbandry and production of economically important horticultural crops. Field operations and techniques in crop production.

#### **AGRI 2001Y(3) - FOOD SCIENCE AND TECHNOLOGY**

Classification, chemical structure and properties of food constituents and food additives. Chemical composition, properties and nutritional value of food commodities. Primary sensory attributes of foods and perception of food quality. Microbial food spoilage. Useful micro-organisms. Incidence and causes of food borne disease. Characteristics of major food-borne disease micro-organisms. Physical, chemical, sensory and microbiological analysis of foods. Types of nutrients and their role in the human body. Planning a balanced diet.

Food laws and standards. Concepts of food quality and safety. Factors which affect quality and safety. Food hazards. Food preservation by heating, chilling, freezing, dehydration, chemicals and ionizing radiation. Packaging materials. Processing of selected food products. Process control, application of principles of food hygiene and relevant codes of practice/guidelines to ensure quality and safety. Traceability. Importance of food safety management throughout the food chain. Comprehensive food safety management systems.

#### **AGRI 2024Y(3) – AGRICULTURAL ENGINEERING AND APPLICATIONS**

Basic engineering science relevant to agriculture, soil systems and water.

Soil tillage. Agricultural machinery: tractors, rotovators, mechanical planters and harvesters, and fertigators. Tractor Technology. Field mechanisation. Pesticide sprayers and fertiliser applicators. Farm roads. Water logging and drainage. Precision agriculture, remote sensing, and GIS.

Irrigation systems: Equipment and operation. Soil moisture and soil moisture characteristic curves. Soil water movement. Infiltration rate. Hydraulic conductivity of soil. Nuclear methods of soil moisture determination. Irrigation systems: surface, overhead irrigation and drip Irrigation. Planning and design of various irrigation systems based on soil-water plant climate relationships. Use and maintenance of irrigation systems.

Farm structures and farm buildings. Waste management technology. Agro-meteorology. Introduction to controlled environment technology.

### **AGRI 2025Y(3) - INTRODUCTORY APPLIED SYSTEMS, ECONOMICS, MANAGEMENT AND EXTENSION**

Introduction to agricultural systems concepts: holistic approach to agriculture; an overview of farming systems in the World with particular reference to the SADC region.

Applied Economics in Agriculture: Introducing microeconomics and macroeconomics theories.

Agriculture and Economic Development: Evolution of the Mauritian agricultural sector from beginnings to present days; challenges facing the Mauritian agricultural sector.

Agricultural management: The framework of farm management; introductory farm budgeting. Business management issues.

Agricultural Marketing: from commodity marketing to value-addition in agricultural products; marketing functions; marketing channels and costs.

Agricultural Extension: Introductory concepts and principles; Participatory approach in agricultural research, production and extension.

### **AGRI 2026Y (3) – BIOTECHNOLOGY**

Structure and functions of cells and organelles; Bio molecules: Polysaccharides, sugars; storage polysaccharides; Lipids, classification and properties, biological membranes; Proteins, amino acids, covalent and three-D structure of proteins; Enzymes, properties and mechanism of actions, enzyme kinetics. Glycolysis.

Organisation of genetic material, gene structure, expression and transmission. Control of gene expression. Structure and properties of DNA. DNA replication. Protein synthesis. Principles of gene cloning. Recombinant DNA technology.

Concept and basis of biotechnology. Tissue culture techniques and applications. Application of biotechnology in agriculture and crop improvement.

### **AGRI 2045Y(3) - STATISTICAL METHODS FOR AGRICULTURAL SCIENCES**

Introducing statistics in agriculture. Descriptive statistics – displaying and summarising data. Probability distributions. Point and interval estimation. Hypothesis testing. Analysis of categorical data. Correlation and regression analysis. Design and analysis of experiments: Principles of agricultural experimentation. Analysis of variance. Completely randomized design, Randomized block design, Latin square design. Factorial treatment structure. Non-parametric methods. Data entry and analysis using EXCEL and MINITAB.

Introduction to research methodology. Qualitative and quantitative research. Sampling methods. Questionnaire development, design and administration. Data coding and processing using SPSS. Elements of scientific and technical writing.

### **AGRI 2050Y(5) - AGRICULTURAL EXTENSION: PRINCIPLES, METHODS AND MANAGEMENT**

History and development of Agricultural Extension. Agricultural Extension and rural development. Theoretical basis for Agricultural Extension. Human behaviour and learning – perception. Principles of Teaching and learning. Learner centred approaches. Adult education. Technology Transfer models. Innovations & the adoption process and technology diffusion. Approaches, methods and techniques of extension. Design and running of training courses. Extension ethics.

Management issues related to the organisation of an extension service. Organisational culture – leadership. Motivation. Staff management and staff development. Gender sensitivity. Managing extension programmes : Working objectives and preparation of extension programmes. Selection of appropriate methods, tools and techniques. Monitoring and Evaluation. Adoption Research and Impact Assessment Extension organisation in Mauritius.

Emerging issues: alternative models for provision of extension. Role of NGOs and Farmer Organisations. Entrepreneurship and promotion of SMEs.

#### **AGRI 2051Y(5) - COMMUNICATION AND ICT IN AGRICULTURAL EXTENSION**

Theory of Communication. Information transfer in agriculture. Communication methods: individual, group and mass media. Group dynamics. Other media. Information and Communication technologies: Internet, World Wide Web and databases. Design and production of communication materials. Technical and scientific writing. Production and use of films (Video), radio and TV programmes.

Networking at national, regional and international level.

#### **AGRI 2052Y(5) - RURAL SOCIOLOGY AND RURAL DEVELOPMENT**

Characteristics of rural and urban areas. Country differences. Characteristics of small rural farmers. Gender issues and sensitivity. Traditional farming and modern, intensive agriculture. Rural institutions and organisations. Role of cooperatives. Rural development and policy issues. Poverty alleviation and sustainable livelihoods.

#### **AGRI 3000Y(5) - PROJECT**

Every student will be allocated a research topic related to agricultural extension and technology transfer. The research work will be carried out under academic supervision. Students should demonstrate good practice in using skills and knowledge acquired during the programme and follow dissertation guidelines as laid down by the Faculty of Agriculture.

#### **AGRI 3027Y(5) - ANIMAL PRODUCTION AND HEALTH**

Principles of managing animals in typical production systems for biological and economic sustainability: poultry, pigs; rabbits; deer; goats and sheep; beef and dairy cows and novel species. Best management practices for their efficient and profitable production: nutrition, reproduction and fertility, housing and equipment, waste management technologies.

Food chain management from primary production to consumer use. Trends and current issues related to production and consumption of animal products: meeting the needs of a global market and public concerns.

Prevention and control of farm animal disease. Management of disease risks. Principles of vaccination. Classification and mode of action of the major classes of drugs. Use and control of drugs. Disease control using non chemical methods. Animal health management schemes for various farm animals.

Animal welfare concepts and definition (eg; the five freedom). Specific requirements for the welfare of named ruminants and non-ruminants. Methods for assessing animal welfare status.

#### **AGRI 3061Y (5) - EMERGING TECHNOLOGIES IN CROP PRODUCTION**

Plant characteristics for mechanised crop production. Minimal tillage cropping. Seed priming and enhancement. Direct sowing. Plug production. Mechanical transplanting. Plastic mulching. Good Agricultural Practices (GAP). Tissue culture technologies for commercial micro propagation.

Greenhouse design, structures and construction. Cladding materials. Natural light optimisation. Supplementary lighting. Temperature management. Climate control systems. Irrigation and water quality. Carbon dioxide enrichment. Growth control.

Hydroponics: concepts and systems. Growing media. Open and closed cultivation systems. Substrate hydroponics. Nutrient film technique. Ebb and flow technique. Aeroponics. Plant nutrition and control. Crop fertilisation systems. Plant culture. Greenhouse crop protection. Technologies and Extension linkage.



**AGRI 3062Y(5) - AGRICULTURAL SYSTEMS AND AGRICULTURAL MANAGEMENT INFORMATION SYSTEM**

The systems theory applied to agriculture. Models in agriculture. Process of simulation modelling. Examples of simulation models in agriculture. Decision Support Systems. Application in extension systems.

Concept of Information Systems. Management Information Systems in organisations. Agricultural Information Systems. Case studies and the development of systems for local use.

**AGRI 3063Y (5) - PARTICIPATORY APPROACHES IN AGRICULTURAL RESEARCH AND EXTENSION**

Historical perspective. Key stakeholders, stakeholder analysis. Agricultural Organisations and Services in Mauritius. Institutional set-up and development. Producer groups. Lobbying.

The Green Revolution and historical perspectives. Conventional research and rapid appraisals: RRAs and PRAs. Characteristics and process. Validity and use. Case studies.

Farming systems and evolution of FSR approach. Features and Relevance of FSR to agricultural extension. Participatory diagnosis of farm problems. On-farm research. Farmer empowerment. Role of research and extension organizations. Research-Extension-Farmer linkages. Sustainable Agricultural development. Agricultural legislation and enforcement. Regulations Consumer led issues.

**AGRI 3100 - SCIENTIFIC COMMUNICATION**

Avenues of communication in science. Scientific and technical writing. Oral and poster presentations. Ethics of scientific publishing.

The dissertation guidelines. Planning and managing the dissertation writing up process – effective literature search and review, introduction, methodology, results, discussion, conclusions, referencing rules and plagiarism.

**ELECTIVES (CHOOSE ONE FROM)**

**AGRI 3030Y(5) - INTERNATIONAL AND REGIONAL AGRICULTURAL TRADE**

International agricultural trade: The Law of Comparative Advantage. The Standard Theory of International Trade . Demand and Supply, Offer Curves, and the Terms of Trade. Factor Endowments and the Heckscher-Ohlin Theory. Economies of Scale, Imperfect Competition, and International Trade. Economic Growth and International Trade. Trade Restrictions: Tariff. Non tariff Trade Barriers and the New Protectionism. Economic Integration: Customs Unions and Free Trade Areas. International Trade and Economic Development. International Resource Movements and Multinational Corporations.

Regional agricultural trade initiatives: Institutional support (SADC, COMESA, IOC, AGOA). Emerging issues and impact of WTO rules and regulations. Market structure and access. Sanitary and phyto sanitary measures. Food safety and traceability issues. Case studies. Agribusiness opportunities in the region.

**AGRI 3031Y(5) - AGRO-INDUSTRIAL DEVELOPMENT FOR SMES**

Classification of agro-industries. Linkages between the primary agricultural production sector and agro-industries. Agro-industries and economic development: The case of Mauritius. Strategies for agro-industrial development: Entrepreneurship Clustering. Institutional support and incentives for Small and Medium agro-industries. Agro-industrial project analysis. Regional trade opportunities. Emerging issues and case studies.