

BSc (Hons) Crop Technology (Specialisation: Landscape Management) - A326 (Subject to Approval)

1. Objectives

Mauritius is moving towards a sustainable development within the context of the 'Maurice Ile Durable'. As such, two ideologies that are being implemented actively locally are (1) Food security, (2) Green living.

With respect to food security, it is essential to have recourse to technologies in crop production to increase the level of production and the quality of the products. Such technologies ensure a homogenous quality and products at more competitive prices to the ever conscious Mauritian. It is also essential to develop further mechanisms that ensure food locally.

Landscaping is gaining in importance in Mauritius given that the people are no longer only contending with primary needs and the quality/standard of living has increased. Indeed, landscaping in the form of 'Parcours de Sante' can aid in the psychological illness faced by the modern Mauritian. The association of landscaping at home and prestige is becoming more and more common. Over the years, the tourist industries have become one of the most important local revenue. Landscaping aims at attracting tourists in a setting that imitates those natural settings that would attract more and more tourists through the concept of eco-tourism. Landscaping is central to the development in the IRS and luxury villa sector, public spaces, golf sectors, sports turfs and business parks locally.

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

- Explain the scientific, economic and business principles underpinning crop production methods in various types of production systems.
- Identify technological problems encountered in current crop production systems.
- Understand the principles that guide landscape design in terms of patterns, focal points, balance and colors.
- Set up a business in landscaping.
- Design gardens & parks and implement such plans based on aesthetic palette of plants.
- Understand the need for ecology, ecosystems, the erosion of genetic diversity in nature and how this affects landscapes.
- Restore existing landscapes which have been badly designed and under-managed.
- Implement concepts of sustainability and good landscape design, management and implementation practices in hotels and in nature.
- Evaluate the wider consequences of agricultural activities and promote sustainable agricultural practices.
- Provide an understanding of the latest technologies used in agriculture including farm machinery, implements, hydroponics, green-houses and tissue culture techniques for micro-propagation purposes.

- Appreciate the importance of crop improvement in agriculture using such techniques as plant breeding and molecular biology methods of marker assisted selection.

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, Chemistry, Physics, Biology, Food Studies, Botany, Zoology, Computer Science or Computing).

4. Programme Duration

	Normal (Years)	Maximum (Years)
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:

	Credits from			
	Core Modules	Taught	SUPER-GEM	Project
Degree	93	6	6	9

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

Students may exit with

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

An overall total of 40% for combined Continuous Assessment and Written Examination is required 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>Credits</u>
L+P			
<u>Year 1</u>			
COMS1010(1)	Communication Skills	DE	3
CSE 1010e(1)	Introduction to Information Technology	OE	3
AGRI 1050Y(1)	Crop Production: Science and Technology	60+60	6
AGRI 1018Y(1)	Agricultural Chemistry & Soil Science	45+60	5
AGRI 1020Y(1)	Biology and Control of Plant Pests, Diseases, and Weeds	45+60	5
AGRI 1051Y(1)	Botany & Garden Plant Chemistry	60+60	6
Super-GEM			6
<u>Year 2</u>			
AGRI 2073Y(3)	Agricultural Engineering, GIS and Remote Sensing	60+60	6
AGRI 2045Y(3)	Statistical Methods for Agricultural Sciences	45+45	4
AGRI 2256Y(3)	Biochemistry & Applied Crop Physiology	60+45	5
AGRI 2074Y(3)	Crop Propagation, Nutrition & Fruit Production	60+45	5
AGRI 2078Y(3)	Genetics & Plant Breeding of Crops & Ornamentals	60+60	6
AGRI 2025Y(3)	Introductory Applied Systems, Economics, Management and Extension	30+30	3
AGRI 2077Y(5)	Landscape Construction, Design & Management	75+30	6
AGRI 2075Y(3)	Environmental and Sustainable Horticulture	45+0	3

One elective from:

AGRI 2076Y(3)	Biotechnology & Bioethics in Horticulture	45+0	3
MGT 1111	Organisation & Management	45+0	3

Year 3

AGRI 3000Y(5)	Project		9
AGRI3026Y(5)	Crop Production Technologies	60+45	5
AGRI 3071Y(5)	Indoor & Outdoor Plant Production & Management	75+30	6
AGRI 3072Y(5)	Lawn & Turfgrass Physiology & Management	60+30	5
AGRI 3073Y(5)	Landscape & Ecology	60+30	5
AGRI 3013Y(5)	Agribusiness and Entrepreneurship	45+0	3
AGRI 3100	Scientific Communication	20+0	

SUPER - GEM (1) 1 module (to be taken in Year 1) - 6

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. Outline Syllabus

MGT 1111 – ORGANISATION & MANAGEMENT

Management Concepts and Functions. Development of Management Theories. The Internal and External Environments of the Organisation. Social Responsibility and Ethics in Management. Managerial Decision Making. The planning process. The nature of Organisation Structure. Organisational Control. Contemporary issues in Management. Management in Future.

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

The World of Computers; Main components of the computer; The evolution of computers; Input and output devices; Secondary storage; Programming, Systems Software; Application software; Systems analysis and design; Communications and connectivity; The internet; Information technology and society.

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. New sources of soil amendments : seaweed, raw and transformed wastes from various sources, minerals, etc.

Chemistry of pesticides: Organochlorines, organophosphates, carbamates, pyrethroids, dinitrophenols, phthalimides, substituted ureas, triazines, inorganics, botanical pesticides, bio-pesticides. Analysis of pesticides, fertilisers, growth promoters, etc.

Soil as a natural body. Weathering. Factors and processes in soil formation. Physical, physico-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 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, biology-based, genetic, biotechnological and legal methods of pest control. Botanical pesticides and biopesticides. Pest-resistant transgenic crops (GMOs). Economics of crop protection.

Quarantine for plant health and biological control agents; pest-free areas; Sanitary & phytosanitary issues; the SPS Agreement of the WTO; Pest risk assessment, surveillance and mitigation; Phytosanitary inspection, quarantine treatments and disposal of plants/produce; Standards, certification and legislation. Climate change and crop protection. GIS and Remote Sensing for crop protection.

AGRI 1050Y(1) CROP PRODUCTION: SCIENCE & TECHNOLOGY

Principles of agronomy. Cropping systems. Field operations and techniques in crop production. Introduction to seed production. Sexual & asexual propagation. Crop-environment interactions. Manipulation of aerial environment. Water relations & management. Crop storage & post-harvest quality. Crop Management. Vegetable harvesting. Fertilizers. Vegetable production.

AGRI 1051Y(1) – BOTANY AND GARDEN PLANT CHEMISTRY

Aims and principles behind botany. Botanical gardens. Herbarium collections. Identification of different parts of plants based on morphology. Learning how to classify plant families. Naming and classification of economically important crops. Ecology of plants. Investigating plant families. Studying useful Ferns, Bryophytes, Fungi, Bacteria & Viruses. Investigating plant genus with medicinal and industrial applications.

Chemical Diversity of plants. Ecological role & Biochemistry of natural products. Colour and scent products in garden plants.

AGRI 2000 - PRACTICAL TRAINING

Student is required to undergo a practical training of 6-8 weeks duration during winter vacation either in Year 1 or Year 2. The aim is to expose the student to the real work environment, acquaint him/her of what employers would expect of a graduate. Student is required to submit a report on her/his training placement.

This module does not carry any credit, but training must be completed satisfactorily for the award of the degree.

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. 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 & extension.

AGRI 2078Y(3) - GENETICS & PLANT BREEDING OF CROPS & ORNAMENTALS

Mendelian Inheritance. Linkage and chromosome mapping. Sex linked and extranuclear 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 & ornamentals. Biotechnology tools used in plant breeding

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 2256(3) – BIOCHEMISTRY & APPLIED CROP PHYSIOLOGY

Basic biochemistry. Using Spectrophotometers. Carbohydrates, Amino acids, Proteins, Lipids, Cell membrane, Enzymes. Physiology of growth and development. Flowering and reproductive physiology. Plant bioregulators. Growth analysis & dry matter accumulation. Phenology. Plant population & variability. Rate of development. Solar radiation & irradiance. Light & Dark reactions. Leaf net photosynthesis. Canopy photosynthesis. Respiration. Assimilate translocation & partitioning. Drought stress. Quantitative analysis. Instrumentation & growth analysis. Growth analysis.

Plants/Crops Growth Responses to Environmental Factors & Climactic Changes. Plant/Crop Physiology and Physiological Aspects of Plant/Crop Production Processes. Plant Growth Regulators: The Natural Hormones (Growth Promoters and Inhibitors) and Plant Genes. Photosynthetic Efficiency and Crop Yield.

AGRI 2077Y(5) - LANDSCAPE CONSTRUCTION, DESIGN & MANAGEMENT

History of landscape gardening. Origin of parks. Roman, Dutch, Italian styles. Byzantine Garden history. Gardening Innovations through the Centuries. Landscape as cultural criticism. The social art & art of social landscape design within different movement.

Garden styles. Visual design in landscape. Framework for aesthetic structure. Patterns in landscape. Sustainable landscaping. Site evaluation: Engineering techniques, site analysis & surveying. Principles of design. Designing with plants. Creating a plan. Choosing materials. Assessing the garden. Design case study. Choosing plants & materials for the right situations.

Studying selected gardens themes and their applications in selected gardens. Gardening without flowers. Garden city: International movement. Herb Garden Design Basics. Herb garden themes. Pots in the garden: elements of design. Create garden pond. Fish care. Pond plants. Pond maintenance. Types of garden lighting.

AGRI 2073Y(3) - AGRICULTURAL ENGINEERING, GIS & REMOTE SENSING

Basic engineering science relevant to agriculture, soil and water. Agricultural mechanization, Soil tillage. Tractor Technology. Agricultural machinery: tractors, mechanical planters and harvesters, rotovators, pesticide sprayers, and fertilizer applicators.

Soil-water-plant relationships. Soil water movement: Infiltration rate, hydraulic conductivity of soil. Crop water requirements. Irrigation Methods: surface, overhead irrigation and drip Irrigation. Irrigation systems: Equipments and operation. Use and maintenance of irrigation systems. Planning and design of various irrigation systems based on soil-water-plant relationships. Drainage and water logging system. Farm structures and farm buildings. Introduction to controlled environment technology. Farm roads. Waste management technology. Agro-meteorology.

Introduction to Geographic Information Systems (GIS) and Remote Sensing. Data analysis and interpretation. Precision agriculture.

AGRI 2074Y(3) - CROP PROPAGATION, NUTRITION & FRUIT PRODUCTION

Techniques in seed production. Harvesting, processing, packaging, labelling and storage. Seed processing. Seed production, germination, storage & quality. Testing and certification. International trade and regulations. Viability, dormancy and germination. Seed Laws. Asexual propagation techniques for specific cases for rhizomes, bulbs, corms, tubers, ferns from spores, specific species, difficult cases and cultivars of annuals, bulbs, perennials, shrubs, trees. The physiological aspects of asexual propagation. Graft compatibility issues.

Nutrient requirements and fertiliser recommendations for specific crops/cropping systems. Soil Fertility Management. Fertiliser application technologies. Biological techniques for sustainable production.

Diversity of fruit species in the tropics and subtropics. Orcharding techniques, practices and management. Orchard floor management. Fruit tree pruning and training. Principles of production and husbandry practices of economically important tropical and subtropical fruits.

AGRI 2075Y(3) - ENVIRONMENTAL & SUSTAINABLE HORTICULTURE

Use of plants to enhance the physical, visual and social environment. Ecological principles in developing sustainable, low-maintenance landscape systems.

Principles and practices of planning and managing urban vegetation. Basics of tree appraisal, natural resource inventory, and development of long-term vegetation management plans

Farming systems for sustainable crop production. Sustainable development issues. Sustainability indicator. Sustainable crop protection measures. Composting. Soil health management. Integrated nutrient management. Nutrient use efficiency.

Integrated crop management. Principles and components of GLOBAL GAP and its applications. Traceability. Organic farm inputs. Sustainable production of key landscape plants.

AGRI 2076Y(3) - BIOTECHNOLOGY & BIOETHICS IN HORTICULTURE

General overview & aims. Enzymes. DNA translation, transcription, replication. Genome organisation. Molecular Phylogeny. Genetic diversity. Genetic markers & crop improvement. Genetic engineering. Molecular aspects of plant defence against pests & diseases. Stress tolerance & development of new varieties. Genetics of flower development. Genetics of senescence. Arabidopsis, model plant. Plant hormones. Tissue culture methods. Cryopreservation. Applications for the future.

Definition of bioethics; Ethics - argument and reasoning; an overview of ethical controversies about biotechnology and specific ethical issues in plant, animal, and human biotechnology. Animal ethics and welfare; Tissue and organ transplantation – legal, ethical, practical issues; Environmental ethics. Case studies with stakeholder analyses: including genetic engineering, cloning, patenting of biological material.

AGRI 3000Y(5) - PROJECT

Every student will be allocated a research topic related to agriculture. 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 3013Y(5) - AGRIBUSINESS & ENTREPRENEURSHIP

Types of business organisations. Agribusiness finance. Investment appraisal. Business environment. Characteristics of small and medium agribusinesses. Public and private organisations facilitating the setting up of an agribusiness in Mauritius. Setting up of an agribusiness unit and development of a

business plan. Marketing strategies for an agribusiness. Case studies. Entrepreneurship: generation of business ideas and innovation. Clustering. Incubators. Regional outlook.

AGRI3026Y(5) - CROP PRODUCTION TECHNOLOGIES

Mechanised vegetable crop production. Plant characteristics for mechanised crop production. Soil conditioning for vegetable production. Seed priming and enhancement. Fluid drilling. Direct sowing for crop establishment. Plug production. Mechanical transplanting. Plastic mulching in horticulture. New trends in vegetable crop production. Good agricultural practices in crop production. Tissue Culture technologies for crop improvement.

Cropping and production of high value horticultural crops in plastic tunnels, shade houses and greenhouses. Types of structures for protected cultivation and their characteristics. Greenhouse design and site considerations. Greenhouses and their operation.

Plant culture in hydroponics. Plant nutrition in Soilless Culture. Hydroponics media. Hydroponics systems. Cropping and production of selected vegetables, fruits and ornamentals in soilless culture systems: water culture systems and substrate culture systems. Aeroponics.

AGRI 3071Y(5) – INDOOR & OUTDOOR PLANT PRODUCTION & MANAGEMENT

Selected plants falling into different categories and which are commonly used for landscaping purposes: Herbs, succulents, ferns, flowers, shrubs and trees will be studied in terms of propagation & management/care although there will be more focus on ornamentals. General culture of: cut-flowers; cut-foliage; bedding plants; ornamental bulbs and corms, palms and border plants. Models of potted flowering plants, cut flowers, and bedding plant production systems. Pests and diseases of economically important ornamental plants and their control.

The practical classes will consist of planting a select few of such plants and looking after them. Site visits especially to nurseries will also be part of the practical. Plant palette. Companion plants. Studying the agronomic requirements of selected herbs and spices.

Nursery management layout & structures. Low cost alternatives. Tools & Equipment in conventional and hi-tech nurseries. Location & layout. Management. Soil preparation and treatment. Bed preparation, water, nutrient and input management for specific plants. Nutrient deficiency & corrections. Weed, disease & pest management. Temperature, humidity and light regulation. Transplanting operations. Propagating materials. Planting systems. Technological information. Credit facilities and programme management.

AGRI 3072Y(5) – LAWN & TURFGRASS PHYSIOLOGY & MANAGEMENT

Nature of grasses. Grass families and botany. Grass aesthetics. Color diversity. Prevention Strategies in Weed Management. Cultural Weed Management. Cover Crops and Weed Management. Planning green lawn. Options to correct lawn problems. Climate and turf types. Understanding & preparing soils. Lawn from seeds & reseeding. Lawn from sod. Mowing & Maintenance.

Pest Management for Turfgrass: Evasive species. Diseases problems in lawn. Slow-release fertilisers. Height of cut (HoC). Assessing a lawn's design. Rating lawn's condition. Philosophy & History of golf courses. Planning - Site, layout, guidelines, rehearsal. Carbon Metabolism. Fertilisation.

AGRI 3073Y(5) - LANDSCAPE & ECOLOGY

Humans, Nature and Interactions. Introduction to Ecology and Biodiversity. Effect of time on Ecology. Population & Communities. Ecology of Landscapes. Conservation Planning. Nature in neighborhood. Restoration and Management. Ecologically based Planning & Design Techniques. Waterwise options. Safe solutions to pest problems.

Naturalistic planting in urban landscapes. Planned and natural cities in the landscape. History of ecological planting (1800-1980). Dynamic nature/ pattern & process of plant communities. Method for ecological landscape & planting design - site planning & spatial design. Creative management.

Social & cultural context of ecological plantings. Formation of soil-vegetation patterns. Genetic diversity in ecosystem management. Managing biodiversity across landscapes.

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.

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