

MSc Sustainable Agrochemical Management

1. Objectives

Agricultural production worldwide is increasingly being influenced by the imperative need to match the food requirements of the population with maintenance and improvement of environmental quality. While the use of fertilisers and pesticides is inevitable in agriculture, it is imperative that this be done in an environmentally sustainable way. This programme aims to give graduates in various areas of agriculture and allied fields the opportunity to develop their knowledge and skills to make conventional agriculture more environmentally sustainable and eco-friendly. It is in line with Government policy and vision for sustainable development in all sectors of the economy, including agriculture. The programme aims to keep abreast of the latest technologies being developed in this area.

On completion of this programme, the students will have developed knowledge and skills to:

- Demonstrate an understanding and appreciation of the environmental and health implications of the use of conventional agrochemicals;
- Demonstrate an understanding of the various principles and practices that contribute to making the management (which includes import, utilisation, storage, transport, disposal, etc) of agrochemicals more environmentally friendly and sustainable;
- Apply the principles and skills related to the sustainable use of agrochemicals;
- Evaluate appropriate agrochemical technology in line with the emerging trends in the field of agrochemicals.

2. General Entry Requirements

Successful completion of an undergraduate degree with

- At least a Second Class or a CPA \geq 50%, whichever is applicable or
- A GPA not less than 2.5 out of 4 or equivalent, from a recognised higher education institution.

OR alternate qualifications acceptable to the University of Mauritius.

3. Programme Requirements

A Degree in Agriculture or allied fields.

4. General and Programme Requirements – Special Cases

The following may be deemed to have satisfied the General and Programme requirements for admission:

- Applicants who do not satisfy any of the requirements as per Regulations 2 and 3 above but submit satisfactory evidence of having passed examinations which are deemed by the Senate to be equivalent to any of those listed.
- Applicants who do not satisfy any of the requirements as per Regulations 2 and 3 above but who in the opinion of Senate, submit satisfactory evidence of the capacity and attainments requisite to enable them to pursue the programme proposed.

5. Programme Duration

	Normal (Years)	Maximum (Years)
Master's Degree (F/T)	1	2
Master's Degree (P/T)	2	4
Postgraduate Diploma (F/T)	1	2
Postgraduate Diploma (P/T)	2	4

6. **Credits per Year:** Minimum 12 credits subject to Regulation 5.

7. **Minimum Credits Required for the Award of:**

Master's Degree: 36
Postgraduate Diploma: 24
Postgraduate Certificate: 12

Breakdown as follows:

	Credits from	
	Core Taught Modules	Project
MSc degree	24	12
Postgraduate Diploma	24	
Postgraduate Certificate	12	

8. **Assessment**

Each module will carry 100 marks and will be assessed as follows (unless otherwise specified):

Assessment will be based on a written examination of 2 to 3-hour duration, carrying a weighting of 70%, and continuous assessment carrying 30% of total marks. Written examination for all modules, whether taught in semester 1 or in semester 2 or both, will be carried out at the end of the academic year. There will be a compulsory class test for all modules taught in semester 1, at the end of semester 1 of the given academic year. Continuous assessment will be based on practical classes in and outside the laboratory, case studies, Problem-Based Learning, visits, student-led seminars, literature based research and/or assignments, but should include at least 1 class test.

Written examinations for all the modules, whether taught over one semester or one academic year, will be carried out at the end of the academic year.

An overall total of 40% for combined Continuous Assessment and Written Examination components would be required to pass a module, without minimum thresholds within the individual Continuous Assessment and Written Examination.

Submission Deadlines for Dissertation:

- First Draft: by last week day of July of the Academic Year.
- Final Copy: three copies of the dissertation (2 spiral-bound copies and 1 copy on electronic storage media) by last week day of August of the Academic Year by 4.00 p.m at latest.

9. **Academic Teaching in Case of an Emergency**

To ensure minimal disruption of normal academic teaching in case of an emergency (eg. closure of the University for more than 2 weeks), the Moodle e-Learning Platform of VCILT will be used to deliver Teaching and Learning content. Relevant learning resources will be posted on the Platform. Assignments (if any) will be submitted using the online submission box. Arrangements will be made to register students on the Moodle platform at the beginning of the academic year.

10. List of Modules

CORE MODULES

<u>Code</u>	<u>Module Name</u>	<u>Hr / Yr</u>	<u>Credits</u>
		<u>L+P</u>	
AGRI 6001Y(1)	Research Methodology	30+45	3
AGRI 6062Y(1)	Soil & Plant Health, Fertilizers and Micronutrients	45+30	4
AGRI 6063Y(1)	Sustainable Chemical Crop Protection	45+30	4
AGRI 6064Y(1)	Chemistry of Agrochemicals, Formulation and Mode of Action	45+30	4
AGRI 6065Y(1)	Environmental and Toxicological Effects of Agrochemicals	30+30	3
AGRI 6066Y(1)	Agrochemical Import, Storage, Transport and Disposal	45+0	3
AGRI 6077Y(1)	Animal Health Products	45+0	3
AGRI 6000Y(1)	Project	-	12
Total Number of Credits = 36			

11. Programme Plan – MSc Sustainable Agrochemical Management

For Full -Time:

YEAR 1

CORE MODULES

<u>Code</u>	<u>Module Name</u>	<u>Hr / Yr</u>	<u>Credits</u>
		<u>L+P</u>	
AGRI 6001Y(1)	Research Methodology	30+45	3
AGRI 6062Y(1)	Soil and Plant Health, Fertilizers and Micronutrients	45+30	4
AGRI 6063Y(1)	Sustainable Chemical Crop Protection	45+30	4
AGRI 6064Y(1)	Chemistry of Agrochemicals, Formulation and Mode of Action	45+30	4
AGRI 6065Y(1)	Environmental and Toxicological Effects of Agrochemicals	30+30	3
AGRI 6066Y(1)	Agrochemical Import, Storage, Transport and Disposal	45+0	3
AGRI 6077Y(1)	Animal Health Products	45+0	3
AGRI 6000Y(1)	Project	-	12

For Part-Time:

YEAR 1

CORE MODULES

<u>Code</u>	<u>Module Name</u>	<u>Hr / Yr</u>	<u>Credits</u>
		<u>L+P</u>	
AGRI 6001Y(1)	Research Methodology	30+45	3
AGRI 6062Y(1)	Soil and Plant Health, Fertilizers and Micronutrients	45+30	4
AGRI 6063Y (1)	Sustainable Chemical Crop Protection	45+30	4

YEAR 2**CORE MODULES**

Code	Module Name	Hr / Yr	Credits
		L+P	
AGRI 6064Y(1)	Chemistry of Agrochemicals, Formulation and Mode of Action	45+30	4
AGRI 6065Y(1)	Environmental and Toxicological Effects of Agrochemicals	30+30	3
AGRI 6066Y(1)	Agrochemical Import, Storage, Transport and Disposal	45+0	3
AGRI 6077Y(1)	Animal Health Products	45+0	3
AGRI 6000Y(1)	Project	-	12

Total Number of Credits = 36

12. Outline Syllabus**AGRI 6001Y(1) - RESEARCH METHODOLOGY**

The research process. Review of basic statistical methods. Experimental design and analysis. Regression models and analysis. Introduction to Multivariate Analysis. Probit analysis. Survey Methodology. Elements of Scientific Communication. Use of statistical softwares for data processing.

AGRI 6062Y(1) - SOIL AND PLANT HEALTH, FERTILIZERS AND MICRONUTRIENTS

Soil chemical, physical and biological characteristics and profiles. Soil types. Soil biodiversity. Soil health and fertility. Soil macronutrients and micronutrients, and their management. Uptake of nutrients by plants. Plant nutrition and health. Auxins and other growth promoters. Types of fertilisers – single, compound, manures and compost, compost teas, green manures, biofertilisers, VAMs, natural microbial plant growth promoters. Deficiencies and toxicities. Calculation of dosages. Dilutions. Application techniques and efficacies. Effects on SOM, soil carbon stocks and carbon sequestration. Climate change effects on soil health and fertility. Vulnerability, Adaptation and Mitigation.

AGRI 6063Y(1) - SUSTAINABLE CHEMICAL CROP PROTECTION

Chemical control of pests, diseases and weeds. Types of chemical compounds for crop protection – pesticides, growth regulators, chitin inhibitors, juvenile hormone analogues, antijvenile hormone analogues, antifeedants, deterrents. Mechanisms for toxicity, assimilation, breakdown and elimination. Pest tolerance and resistance to chemical compounds. Calculation of dosages. Dilutions. LD₅₀, LD₉₀. Application techniques and efficacies. Safety intervals for application. Compatibility of chemical methods with non-chemical methods, e.g. biological control, biopesticides (botanicals, semiochemicals, allelochemicals, microbials). Advantages and drawbacks of chemical control. Pesticide resistance management.

AGRI 6064Y(1) - CHEMISTRY OF AGROCHEMICALS, FORMULATION AND MODE OF ACTION

Chemistry of pesticides: selected insecticides, acaricides, nematocides, rodenticides, molluscicides, avicides, herbicides, fungicides, bactericides, viricides, growth regulators, chitin inhibitors, juvenile hormone analogues, antijvenile hormone analogues, antifeedants, deterrents. Chemistry of fertilisers and controlled release fertilisers – inorganic, organic, simple, compound, composts, manures, green fertilisers, biofertilisers. VAM. Nutrient values. Compost Quality Index. Structure-Activity relationships. Types and properties of various formulations. Additives and Amendments. Chemical breakdown. Biological decomposition. Synergists, Antagonists. Shelf life and chemical changes in storage. Residual activities. Extraction of pesticidal principles from natural sources. Bioactive compounds and Lead molecules. Synthetic analogues.

AGRI 6065Y(1) - ENVIRONMENTAL AND TOXICOLOGICAL EFFECTS OF AGROCHEMICALS

Agrochemical safety. Safe handling, use and disposal of pesticides and pesticide containers. Environmental effects of agrochemicals – biomagnification, pollution of soil, water, air. Effect on biodiversity and other NTOs. Nitrate, phosphate, heavy metal pollution. Eutrophication. Pesticide and fertiliser assays for OCs, OPs, carbamates, pyrethrins, pyrethroids, nicotinamides, pyridonolides, other new compounds, N, P, K, Ca, Mg, B, S, Fe, Zn, Mn, heavy metals: Chemical techniques (TLC, CC, HPLC, GC, AAS, LC/MS, etc) and bioassays. Effects on natural enemies. Bioindication and bioindicator species. Pesticide and fertiliser residue analyses. Hazards associated with human health and well being. Toxicology in livestock animals and fish. Food safety risk assessment. Codex procedures. Use of nanotechnology for toxicological studies.

AGRI 6066Y(1) - AGROCHEMICAL IMPORT, STORAGE, TRANSPORT AND DISPOSAL

Perception, practices, attitudes, rules, regulations and legislation regarding importation, distribution, sale, transport, use and disposal of pesticides and fertiliser, and pesticide/fertiliser containers. Pesticide registration. Classes of pesticides. Banned, restricted and permitted pesticides. Ecological risk assessments. Soil bioremediation.

Case studies of agrochemical – related accidents. Registration, certification and other legislation. Dangerous Chemical Act. Chemical Fertilisers Control Act. National projects. National strategy and action plans. International conventions, guidelines, regulations and programmes. IPCS. WHOPES.

AGRI 6077Y(1) - ANIMAL HEALTH PRODUCTS

Veterinary drugs: types of drugs. Methods of transfer to animals. Handling and disposal of drugs. Withholding periods in relation to food safety. Cleaning and disinfection agents: types of disinfectants; recommendations precautions for applications and handling; testing efficacy of cleaning and disinfection. Animal growth promoters: types of growth promotants and mode of application. Handling and safe use of other chemicals on animal farms.

AGRI 6000Y(1) - PROJECT

The project provides an opportunity for the students to undertake and contribute to a piece of original research work in an area related to agrochemicals. The project dissertation may be industry-based and may address a specific research problem in the agricultural sector. The students are required to design an experiment (or investigation, survey or other means) to test a hypothesis or proposition, to plan and execute the research work, to evaluate the outcomes and draw valid conclusions.

The research work is carried out individually, under guided supervision. To support the dissertation work, the Faculty has prepared a document on: *Dissertation Guidelines for MSc Degree*.