

BSc (Hons) Food Science and Technology - A304

1. Objectives

The programme is designed to develop the necessary competence for a career in the food industry. The training is broad-based so that graduates can also enter employment in other sectors of the food chain. The programme offers adequate background for specialisation through further studies/research at postgraduate level both locally and overseas.

Upon successful completion of this programme, learners will be able to:

- apply scientific principles to control the chemical, physical, microbiological, nutritional and sensory properties of food during manufacture and storage;
- specify raw food materials characteristics in relation to processing methods;
- apply methods of preservation and processing to control deterioration and spoilage mechanisms in foods and to produce safe foods;
- describe underlying engineering principles of food processing operations and relate process variables to food quality indicators;
- apply methods of food analysis to assess quality, nutritive value, safety and compliance with standards;
- relate the composition of foods to nutritional status and health;
- participate in the development, implementation and maintenance of comprehensive food safety management systems to protect consumer health;
- apply the steps involved in a research process;
- demonstrate both written and oral communication skills;
- work effectively both independently and in a team;
- contribute to the development and growth of small and medium food enterprises, and food industries.
- embark on training programmes at postgraduate level.

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' Levels passes in related approved Science subjects.

Preference will be given to candidates holding “A” level passes in Chemistry and Mathematics.

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 Award of Undergraduate Degree: 111**

Breakdown as follows:

	Credits from			
	Core Taught Modules	Project	Electives	GEMs
Degree	93	9	3	6

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 to 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 shall 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.

Each module will carry 1 to 7 credits and the Project will carry 9 credits.

Assessment of the Food Product Development module, which will carry 1 credit, will be based on group presentation and submission of group portfolio in the first week of the second semester of the final year.

Assessment of practical training will be based on the on-site supervisor's evaluation and the student's portfolio. For satisfactory completion of the practical training, a minimum of 40% should be attained.

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 AGRI 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

CORE MODULES

Module Code	Module Name	Hr / Yr L+P	Credits
COMS 1010	Communication Skills	45+0	3
CSE 1010e (1)	Introduction to Information Technology	45+0	3
MGT 1111(1)	Organisation & Management	45+0	3
AGRI 1010Y (1)	Basic Food Engineering	60+60	6
AGRI 1011Y (1)	Food Microbiology	60+60	6
AGRI 1012Y (1)	Biochemistry & Nutrition	75+30	6
AGRI 1014Y (1)	Food Chemistry & Food Analysis I	60+60	6
AGRI 1041Y (1)	Introduction to Agricultural Production	45+0	3
AGRI 2015Y (3)	Food Chemistry & Food Analysis II	90+45	7
AGRI 2016Y (3)	Principles of Food Preservation & Agricultural Produce Processing	75+30	6
AGRI 2068Y (3)	Food Quality Assurance	75+0	5
AGRI 2069Y (3)	Food Safety	75+0	5
AGRI 2018Y (3)	Unit Operations in Food Processing	30+30	3
AGRI 2019Y (3)	Molecular Biology	30+30	3
AGRI 2039Y (3)	Statistics and Research Methodology	60+45	5
AGRI 2053Y (3)	Applied Economics, Management, Systems and Extension to Agro-Industries	60+60	6
AGRI 3000Y (5)	Project	-	9
AGRI 3014Y (5)	Food Legislation	45+0	3
AGRI 3092Y (5)	Advances in Food Science and Technology	60+0	4
AGRI 3021Y (5)	Instrumentation and Process Control in the Food Industries	45+0	3
AGRI 3063Y (5)	Water and Waste Management in Food Industries	45+0	3
AGRI 3069Y(5)	Food Product Development	15+0	1
AGRI 3020Y(5)	Food Packaging	45+0	3
AGRI 3100	Scientific Communication	20+0	-

AGRI2000 - Practical Training can be undertaken either in year 1 and/or in year 2

AGRI3100 - Scientific Communication will take place in year 3

ELECTIVES (CHOOSE ONE)

AGRI 2020Y(3)	Sensory Evaluation of Foods	30+30	3
AGRI 2070Y(3)	Postharvest Technology	45 +0	3

GEMs

-	(_) (1 Module)	-	6
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10. Programme Plan – BSc (Hons) Food Science and Technology

YEAR 1				
Module Code		Module Name	Hr / Yr L+P	Credits
CORE				
COMS 1010	(1)	Communication Skills	45+0	3
CSE 1010e	(1)	Introduction to Information Technology	45+0	3
MGT 1111(1)		Organisation & Management	45+0	3
AGRI 1010Y	(1)	Basic Food Engineering	60+60	6
AGRI 1011Y	(1)	Food Microbiology	60+60	6
AGRI 1012Y	(1)	Biochemistry and Nutrition	75+30	6
AGRI 1014Y	(1)	Food Chemistry and Food Analysis I	60+60	6
AGRI 1041Y	(1)	Introduction to Agricultural Production	45+0	3
GEM				
-	(<u> </u>)	(1 Module)		6
YEAR 2				
Module Code		Module Name	Hr / Yr L+P	Credits
CORE				
AGRI 2015Y	(3)	Food Chemistry and Food Analysis II	90+45	7
AGRI 2016Y	(3)	Principles of Food Preservation and Agricultural Produce Processing	75+30	6
AGRI 2068Y	(3)	Food Quality Assurance	75+0	5
AGRI 2069Y	(3)	Food Safety	75+0	5
AGRI 2018Y	(3)	Unit Operations in Food Processing	30+30	3
AGRI 2019Y	(3)	Molecular Biology	30+30	3
AGRI 2039Y	(3)	Statistics and Research Methodology	60+45	5
AGRI 2053Y	(3)	Applied Economics, Management, Systems and Extension to Agro-Industries	60+60	6
ELECTIVES (Choose One)				
AGRI 2020Y	(3)	Sensory Evaluation of Foods	30+30	3
AGRI 2070Y	(3)	Postharvest Technology	45 +0	3
YEAR 3				
Module Code		Module Name	Hr / Yr L+P	Credits
CORE				
AGRI 3000Y	(5)	Project	-	9
AGRI 3014Y	(5)	Food Legislation	45+0	3
AGRI 3092Y	(5)	Advances in Food Science and Technology	60+0	4
AGRI 3021Y	(5)	Instrumentation and Process Control in the Food Industries	45+0	3
AGRI 3063Y	(5)	Water and Waste Management in Food Industries	45+0	3
AGRI 3069Y	(5)	Food Product Development	15+0	1
AGRI 3020Y	(5)	Food Packaging	45+0	3
AGRI 3100		Scientific Communication	20+0	-

Total number of credits: 111

11. Outline Syllabus

COMS 1010 (1) – COMMUNICATION SKILLS (DE)

Theory and models of communication. Effective use of English. Written communication. Oral presentation. Communication flow in organisations. Using media.

CSE 1010e (1) – INTRODUCTION TO INFORMATION TECHNOLOGY (OE)

Introduction to computers. Hardware and Software. Input/output devices and storage. Introduction to word processing. Introduction to systems analysis design. Introduction to spreadsheets. Organisation of data. Data communications and emerging applications. Workplace issues and your future in computing.

MGT 1111Y(1) – 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.

AGRI 1010Y (1) – BASIC FOOD ENGINEERING

Basic engineering principles of food processing operations: units, dimensions and system conversions. Material and energy balance. Thermodynamics. Heat and mass transfer. Heat exchangers. Solid and fluid rheology. Fluid flow. Pumps.

AGRI 1011Y (1) – FOOD MICROBIOLOGY

Microbial diversity, structures and functions. Microbial physiology. Growth and survival. Control of microorganisms.

Food spoilage. Food-borne illness. Useful micro-organisms. Microbiological examination of foods. Specifications and standards. New technologies in the detection of micro-organisms.

AGRI 1012Y (1) – BIOCHEMISTRY AND NUTRITION

Basic concepts of biochemistry and cell biology. Structure and function of biological molecules. Enzymes and reaction kinetics. Metabolic pathways. Essential principles and processes of cell and molecular biology.

Sources and functions of nutrients. Major Diet-related diseases. Nutritional requirements. Concept of Healthy eating. Energy balance and weight control. Digestion and absorption of food. The effect of processing on nutrients.

AGRI 1014Y (1) – FOOD CHEMISTRY AND FOOD ANALYSIS I

pH and acid-base equilibria. Buffers: functions and uses. Acid-base titrations, indicators and titration curves. Potentiometric titration. Chemical kinetics. Partition coefficients. The chemistry of food constituents: water, carbohydrates, lipids, proteins, vitamins and minerals. Browning in foods. Colloid chemistry of food systems.

Sampling and errors in food analysis. Sample preparation. Instrumental methods of food analysis.

AGRI 1041Y (1) – INTRODUCTION TO AGRICULTURAL PRODUCTION

Fundamentals of animal management and production: nutrition; feeds and feeding; reproduction and breeding; animal welfare and health; housing and equipment; Introduction to farm animal industries, their products and by-products: matching production of quality and safe food with protection and care of the environment. Sustainable food production. Food security concepts.

Classification of food crops and their economic importance. Fundamentals of food crop production: agro-climatic requirements; planting materials; crop establishment; plant nutrition; irrigation; crop protection; harvesting and postharvest practices. Good Agricultural Practices and sustainable crop production. Introduction to food crop production enterprises. Processed products from commercial food crops.

AGRI 2015Y(3) – FOOD CHEMISTRY AND FOOD ANALYSIS II

The chemistry of natural pigments, flavours, food additives and major food products including dairy products, fat products, meat, egg, cereals, fruits and vegetables.

Qualitative and quantitative methods of food analysis. Control of factors which affect the reliability of analyses. Good Laboratory Practices. Sampling plans and methods. Sample preparation. Validated and standard methods of food analysis. Application of physical, chemical, biochemical, immunological, instrumental and sensory methods to determine nutritive value, quality, safety and compliance with food standards. Analysis of selected food products. Structure and content of scientific reports. Recent developments in methods of food analysis including food authentication, detection of Genetically Modified foods and allergens.

AGRI 2016Y (3) – PRINCIPLES OF FOOD PRESERVATION and AGRICULTURAL PRODUCE PROCESSING

Principles of food preservation using low and high temperatures, reduced water activity, chemicals, radiation. Modified atmospheres in food preservation. Post harvest technology. Processing of agricultural produce including milk, egg, meat, poultry, fish, fruits and vegetables, and cereals.

AGRI 2068Y(3) – FOOD QUALITY ASSURANCE

Definitions and relationships between quality and quality management concepts. Food laws, standards and specifications. Evolution of quality management approaches. Factors which affect food quality. Quality management principles. Quality management system standards (ISO 9001). Quality management system documentation and auditing. Inherent and assignable causes of process variation. Development and application of variable and attribute Shewart Control Charts in food industries. Operation of Codex sampling plans. Codes of practice and quality standards for food laboratories. Certification and standardisation. British Retail Consortium food safety standards.

AGRI 2069Y(3) – FOOD SAFETY

Food safety definitions and concepts. Relationship between food safety and quality. Food safety and food security. Factors which affect food safety. Importance of food safety management throughout the food chain. Food safety hazards: primary sources, characteristics, adverse health effects, implicated foods and control measures. Comprehensive food safety management systems. Pre-Requisite Programmes (PRPs). Codex general principles of food hygiene. Codex guidelines for mass catering. Relationship between quality, environment and food safety management. Codex guidelines for the Hazard Analysis Critical Control Point (HACCP) system. Application of the seven HACCP principles to selected food processing operations. HACCP experience of food industries. ISO 22000 food safety management system standard. Food risks and consumer perception. Risk analysis. Food safety issues. Safety evaluation of food additives. Food toxicology.

AGRI 2018Y (3) – UNIT OPERATIONS IN FOOD PROCESSING

Engineering principles behind selected unit operations used in food processing including refrigeration, freezing, evaporation, dehydration and comminution.

AGRI 2019Y (3) – MOLECULAR BIOLOGY

Gene structure and organisation. DNA replication, repair and recombination. Gene expression and modification processes. Modification of genetic content. Principles of gene cloning. Recombinant DNA technology and genetically modified organisms.

AGRI 2039Y(3) - STATISTICS AND RESEARCH METHODOLOGY

Introducing statistics in food science. Descriptive statistics – summarising and displaying data. Probability distributions. Point and Interval Estimation. Hypothesis Testing. Analysis of Categorical data. Regression Analysis. Design and Analysis of Experiments. Data entry and analysis using EXCEL & MINITAB.

Elements of 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 2053Y(3) – APPLIED ECONOMICS, MANAGEMENT, SYSTEMS AND EXTENSION TO AGRO-INDUSTRIES

Agricultural economics: Demand and supply; principles of production economics. Agricultural management fundamentals. Agricultural marketing: Marketing functions; marketing channels and costs.

Introduction to agricultural systems concepts: holistic approach to agriculture. Farming systems. Introduction to agricultural extension. Research and Extension linkages. Technology Innovation process.

Agro-industry and economic development. Agro-industrial development strategies. Scale issues. Agro-industrial project analysis. Marketing of agro-industry products. Entrepreneurship and setting up of small/medium food enterprises. Business plan development for a small/medium food enterprise.

Facilitation of food trade. Regional Free Trade Areas. Food policy: definition, scope, policy-making and evaluation process.

AGRI 2020Y (3) – SENSORY EVALUATION OF FOODS

Physiology and psychology of perception. The senses. Sensory characteristics of foods. Types of sensory evaluation methods. Establishment of sensory panels. The sensory laboratory. Setting up sensory facilities. Experimental design and statistical analysis of sensory data. Analytical and affective sensory tests. Training of panelists for quantitative descriptive analysis. Writing up a sensory report. Ethical and professional issues. Relevant ISO standards for sensory analysis.

AGRI 2070Y(3) – POSTHARVEST TECHNOLOGY

Characteristics of horticultural crops. Climacteric and non-climacteric fruits. Harvest maturity indices for selected horticultural crops. Produce deterioration. Postharvest losses. Manipulation of postharvest physiological processes to enhance quality of fresh produce. Post-harvest loss assessment . Postharvest loss-reduction technologies. Postharvest storage . Safety and quality of fresh horticultural produce.

AGRI 3000Y (5) – PROJECT

This is a very important component of the programme, allowing students to develop high level skills and cognitive abilities. Every student will be allocated a research topic and the research work will be carried out under supervision. The student is required to investigate a topic/problem, plan and execute the research work, as well as present and discuss the results. The project may be industry based and may address a research problem in the food industry. The student will have to submit a dissertation at the end of the final year. Students should demonstrate good practice in using skills and knowledge acquired and follow guidelines as laid down in the document entitled “*Dissertation guidelines BSc (Hons) Degree*”, prepared by the Faculty.

AGRI 3014Y (5) – FOOD LEGISLATION

FAO guidelines for national food control systems. Mauritius food control system. British food control system. European food legislation. Codex Alimentarius Commission. World Trade Organisation. Elimination of tariff and technical barriers to food trade. Agreements on Sanitary and Phytosanitary measures (SPS) and Technical Barriers to Trade (TBT).

AGRI 3092Y (5) – ADVANCES IN FOOD SCIENCE AND TECHNOLOGY

Reviews on current research and development in food science and technology. Student seminars on defined research topics in food science and technology.

AGRI 3021Y (5) – INSTRUMENTATION AND PROCESS CONTROL IN THE FOOD INDUSTRIES

Measurements systems. Automation and process control. Introduction to Proportional Integral Derivative (PID) control. Process flow sheeting with Process Instrumentation Diagrams.

AGRI 3063Y (5) – WATER AND WASTE MANAGEMENT IN FOOD INDUSTRIES

Treatment of water for domestic and industrial applications. Effects of waste discharges into the environment. Origin, composition, treatment, disposal and utilisation of wastes from food processing operations. Legal and economic aspects of waste disposal.

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.

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

AGRI 3069Y(5) – FOOD PRODUCT DEVELOPMENT

Integration and application of acquired competencies through group learning activities to select and develop a food product based on a valid scientific, business, environmental and social rationale. Group learning activities for selected food product: relevant food standards; literature search and scientific thinking to propose a food product formulation and process; processing inputs and methods; pre-requisite programmes and HACCP plan; appropriate food packaging; food label; nutritional labelling and health claims; target markets and consumers. Communication of guidelines for implementation and assessment of group learning activities by module co-ordinator in the first week of the final year. Interactive sessions with lecturer(s) to guide students and monitor progress of learning activities.

AGRI 3020Y(5) – FOOD PACKAGING

Chemical and physical properties of package materials. Interaction between package and food. Selection and evaluation of packaging materials. Package design. Printing. Computers in packaging.

AGRI 2000 – PRACTICAL TRAINING

Students are required to undergo a full-time practical training of 6-8 week duration during the winter vacation, either in year and/or in year 2. The practical training placement may take place in food industries/research institutions/private or public food laboratories. The aim is to contextualise learning within real-life work environments related to food science and technology. Students are required to submit a training placement portfolio.

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

15 August 2011