

BSc (Hons) Food Science and Technology – A400/12

1. Objectives

The programme will provide knowledge and skills in subjects related to food science and technology so as to develop the necessary competence for a career in the food industry, conducting research and pursuing further studies.

The programme also offers students the opportunity of a 6-month work placement in a food-related institution to develop communications, real-life problem solving and team-working skills. The student will thus graduate with a firm foundation for the real world of work.

By the end of this programme graduates will have developed knowledge and skills to:

- Apply scientific principles to control the chemical, physical, microbiological, nutritional and sensory properties of food during manufacture and storage;
- Apply methods of preservation and processing to control deterioration and spoilage mechanisms in foods and to produce safe foods;
- Apply methods of food analysis to assess quality, nutritive value, safety and compliance with standards;
- Participate in the development, implementation and maintenance of comprehensive food safety management systems to protect consumer health;
- Contribute to the development and growth of small and medium food enterprises, and food industries;
- Identify, relate and apply the content of academic courses to specific work practices and make a worthwhile contribution in the workplace;
- Display people related skills - communications, interpersonal, and team working;
- Display conceptual skills - researching, collecting and organising information, problem solving, planning and organising, innovation and creativity, systems thinking and self-reliance;
- Apply the steps involved in a research process;
- 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' Level passes in related approved Science subjects (Mathematics, Chemistry, Physics, Biology, Food Studies).

4. Programme Duration

	Normal (Years)	Maximum (Years)
Degree	3½	5½

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

6. Minimum Credits Required For Award of Undergraduate Degree: 103

Breakdown as follows:

	Credits from		
	Core Taught Modules	Project	Work Placement
Degree	88	9	6

Students may exit with a

- Certificate after having earned 30 credits in core modules.
- 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 Faculties/Departments/Centres concerned. 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 components would be required to pass the module, without minimum thresholds within the individual continuous assessment and written examination.

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 credits in the range of 3 to 6. Project – AGRI 3000Y(5) will carry 9 credits.

Assessment of the module AGRI 3100 - Scientific Communication Skills will be based on continuous assessment of students throughout the module and/or submission of a portfolio. The module carries no credits. For satisfactory completion of the module, a minimum of 40% should be attained.

Assessment of work placement will be by continuous assessment solely and will be based on employer's assessment report, submission of work placement report and a presentation thereon. A minimum of 50% should be attained to pass this module.

Assessment of the module AGRI 3069Y(5) - Food Product Development, 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.

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

Submission Deadlines for Dissertation:

- First Draft: by last week day of February 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 March of the Academic Year by 4.00 p.m at latest.

8. 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.

9. List of Modules

CORE MODULES

<u>Code</u>	<u>Module Name</u>	<u>Hr / Yr</u>	<u>Credits</u>
		<u>L+P</u>	
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 1052Y(1)	Chemistry Fundamentals and Laboratory Techniques	30+60	4
AGRI 1010Y(1)	Basic Food Engineering	60+60	6
AGRI 1071Y(1)	Data Handling and Research Methodology	30+30	3
AGRI 1041Y(1)	Introduction to Agricultural Production	45+0	3
AGRI 1072Y(1)	Introduction to Management in Food Industries	30+30	3
AGRI 2018Y(3)	Unit Operations in Food Processing	30+30	3
AGRI 2019Y(3)	Molecular Biology	30+30	3
AGRI 2112Y(3)	Experimental Designs and Sampling Techniques	30+30	3
AGRI 2015Y(3)	Food Chemistry and Food Analysis II	75+30	6
AGRI 2105Y(3)	Food Processing	75+30	6
AGRI 2113Y(3)	Food Economics and Marketing	30+30	3
AGRI 2114Y(3)	Food Hygiene and Safety	45+30	4
AGRI 2087Y(3)	Food Quality Management	45+30	4
AGRI 2020Y(3)	Sensory Analysis	30+30	3
AGRI 3000Y(5)	Project	–	9
AGRI 3014Y(5)	Food Legislation	45+0	3
AGRI 3017Y(5)	Developments in Food Science and Technology	45+0	3
AGRI 3021Y(5)	Instrumentation and Process Control in the Food Industries	45+0	3
AGRI 3070Y(5)	Water and Waste Management in Food Industries	45+0	3
AGRI 3088Y(5)	Postharvest Management	45+0	3
AGRI 3069Y(5)	Food Product Development	15+0	1
AGRI 3100	Scientific Communication Skills	20+0	–
WORK PLACEMENT			
<u>Code</u>	<u>Module Name</u>	<u>Wk / Yr</u>	<u>Credits</u>
AGRI 2103(5)	Work Placement	24	6
Total Number of Credits = 103			

10. Programme Plan – BSc (Hons) Food Science and Technology (with 6-month work placement)

YEAR 1

CORE MODULES

<u>Code</u>	<u>Module Name</u>	<u>Hr / Yr</u>	<u>Credits</u>
		<u>L+P</u>	
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 1052Y(1)	Chemistry Fundamentals and Laboratory Techniques	30+60	4
AGRI 1010Y(1)	Basic Food Engineering	60+60	6
AGRI 1071Y(1)	Data Handling and Research Methodology	30+30	3
AGRI 1041Y(1)	Introduction to Agricultural Production	45+0	3
AGRI 1072Y(1)	Introduction to Management in Food Industries	30+30	3

YEAR 2

CORE MODULES

<u>Code</u>	<u>Module Name</u>	<u>Hr / Yr</u>	<u>Credits</u>
		<u>L+P</u>	
AGRI 2018Y(3)	Unit Operations in Food Processing	30+30	3
AGRI 2019Y(3)	Molecular Biology	30+30	3
AGRI 2112Y(3)	Experimental Designs and Sampling Techniques	30+30	3
AGRI 2015Y(3)	Food Chemistry and Food Analysis II	75+30	6
AGRI 2105Y(3)	Food Processing	75+30	6
AGRI 2113Y(3)	Food Economics and Marketing	30+30	3
AGRI 2114Y(3)	Food Hygiene and Safety	45+30	4
AGRI 2087Y(3)	Food Quality Management	45+30	4
AGRI 2020Y(3)	Sensory Analysis	30+30	3
<u>Code</u>	<u>Module Name</u>	<u>Wks / Yr</u>	<u>Credits</u>
AGRI 2103(5)	Work Placement	24	6

YEAR 3

CORE MODULES

<u>Code</u>	<u>Module Name</u>	<u>Hr / Yr</u>	<u>Credits</u>
		<u>L+P</u>	
AGRI 3000Y(5)	Project	–	9
AGRI 3014Y(5)	Food Legislation	45+0	3
AGRI 3017Y(5)	Developments in Food Science and Technology	45+0	3
AGRI 3021Y(5)	Instrumentation and Process Control in the Food Industries	45+0	3
AGRI 3070Y(5)	Water and Waste Management in Food Industries	45+0	3
AGRI 3088Y(5)	Postharvest Management	45+0	3
AGRI 3069Y(5)	Food Product Development	15+0	1
AGRI 3100	Scientific Communication Skills	20+0	–

Total Number of Credits = 103

11. Outline Syllabus

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

The chemistry of food constituents: water, carbohydrates, lipids, proteins, vitamins and minerals. Browning in foods. Colloid chemistry of food systems.

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. Instrumental methods of food analysis.

AGRI 1052Y(1) - CHEMISTRY FUNDAMENTALS AND LABORATORY TECHNIQUES

Basics of organic, inorganic and physical chemistry. Structures of atoms, molecules, bonding, orbitals. Reactions and stoichiometry. Reaction rates and equilibrium. Acid/base redox reactions. Isomerism. Stereochemistry. Free radicals. Electrophilic, nucleophilic reactions. Spectroscopic techniques.

pH and acid-base equilibria. Buffers: functions and uses. Acid-base titrations, indicators and titration curves. Potentiometric titration. Chemical kinetics. Partition coefficients. Physical and chemical methods of analysis. Preparation of standard solutions. Standardisation of reagents. Volumetric methods (acid-base titrations; redox titrations). Spectrophotometric methods.

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. Solid and fluid rheology. Fluid flow. Pumps.

AGRI 1071Y(1) - DATA HANDLING AND RESEARCH METHODOLOGY

Introducing statistics. Levels of measurements. Collection, organisation and presentation of numerical data. Averages and measures of variation and skewness. Probability distributions. Point and interval estimation. Hypothesis testing. Analysis of categorical data. Correlation and Regression Analysis. Introduction to research methodology. Elements of scientific and technical writing. Data entry and analysis using EXCEL and MINITAB.

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.

Climatic requirements; planting. Classification of food crops and their economic importance. Fundamentals of food crop production: agro-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 1072Y(1) - INTRODUCTION TO MANAGEMENT IN FOOD INDUSTRIES

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. Human Resource Management. Category Management.

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

Applications of engineering principles in selected unit operations used in food processing including, refrigeration, freezing, heat exchangers, evaporation and dehydration. Operation of equipment. Problem solving.

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 2112Y(3) - EXPERIMENTAL DESIGNS AND SAMPLING TECHNIQUES

Design and analysis of experiments. Analysis of variance. Completely randomized design, Randomized block design, Latin square design. Factorial treatment structure. Non-parametric methods. Data entry, analysis and interpretation using EXCEL and MINITAB. Qualitative and quantitative research. Sampling methods. Questionnaire development, design and administration. Data coding and processing using SPSS.

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

The chemistry of natural pigments, flavours and major food products including dairy products, seafood products, fat products, meat, egg, cereals, fruits and vegetables. Chemistry and applications of food additives: sugar replacers; antimicrobial agents; antioxidants; colouring agents. Chemistry and mechanisms of fat modification processes to control formation of trans fatty acids.

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.

AGRI 2105Y(3) – FOOD PROCESSING

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

AGRI 2113Y(3) - FOOD ECONOMICS AND MARKETING

Basic tools of Economics; Concepts of Economics: Microeconomics: and Macroeconomics; Demand and supply; principles of production economics. Economic aspects of the food supply chain. International economics. Introduction to marketing. Agricultural and Food Marketing: from commodity marketing to value-addition in agricultural products; marketing functions; marketing channels and costs. Food policies.

AGRI 2114Y(3) – FOOD HYGIENE AND 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 2087Y(3) – FOOD QUALITY MANAGEMENT

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 2020Y (3) - SENSORY ANALYSIS

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 3100 – SCIENTIFIC COMMUNICATION SKILLS

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.

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). Occupational health and safety laws. Regulations regarding GM and novel foods.

AGRI 3017Y(5) – DEVELOPMENTS 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 3070Y (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 3088Y(5) – POSTHARVEST MANAGEMENT

Introductory postharvest biology. Postharvest losses, loss assessment and loss reduction technologies. Pre-harvest factors and postharvest quality. Maturity indices. Quality standards. Field harvesting. Handling and packinghouse operations. Cool chain management. Storage. Case-studies: fresh produce transportation; commercial fruit ripening; and marketing standards. Field trips: postharvest enterprises.

Role and functions of packaging. Packaging materials. Selection and evaluation of packaging. Package design. Modified atmosphere packaging. Sustainable packaging. Case-studies: packaging of selected food products.

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 2103(5) – WORK PLACEMENT

Students will be placed in an industrial or other relevant work environment for 6 months after the second year. They will be expected to make a significant contribution to a relevant project under the supervision of an industrial and an academic mentor. Students will be expected to actively participate in the Work Placement Programme and to attend scheduled interviews. Students are required to prepare a final report on their placement, and make a presentation on their work.