Faculty of Science and Technology

Dean: Professor Michael Taylor

Message

The Faculty of Science and Technology is delighted at your interest to do postgraduate study at University of the West Indies, Mona Campus. Our faculty provides an exceptional environment for the advancement and enhancement of your ideas through scholarship and professional growth and development. The Faculty of Science and Technology has an extensive history of eminence in education and research at both the undergraduate and graduate levels. As a graduate student in the faculty you will have the opportunity to interact and network with inspiring, stimulating and motivating researchers, academics and scholars, many of whom are leaders in their fields. The faculty and administrative staff are committed to your success and advancement in the academy. You will have the opportunity to contribute to and be a part of the cutting-edge developments in many exhilarating research areas of strategic importance to the growth and development of the Caribbean region.

Faculty Information

Currently the Faculty of Science and Technology, Mona, has 438 graduate students registered with 174 in research programs and 243 in taught master's programs. The Faculty of Science and Technology provides the environment for postgraduate training in agricultural entrepreneurship, biotechnology, botany, chemistry, computer science, disaster management, digital technology, environmental biology, environmental management, experimental biology, food and agro-processing technology, geography, geology, information technology, integrated urban & rural environment management, marine biology, marine and terrestrial ecosystems: assessment, conservation and management, mathematics, medical physics, natural resource management, oceanography, occupational & environmental safety & health, physics, plant production & protection, sustainable urbanization and zoology.

The research (MPhil and PhD) and taught master's (MSc) programmes in the Faculty of Science and Technology have been crafted in response to national and regional strategic needs. For instance, the master's degree in renewable energy management and renewable energy technology were recently introduced due to a great demand in the market for highly skilled technical personnel and other professionals with specialization in the area of sustainable energy systems.

The MSc in medical physics was designed to build local capacity for sustainable education, training and research in medical physics, and to provide education and clinical training for careers in areas of diagnostic imaging, nuclear medicine, radiation therapy, and health physics. Additionally, the MSc programmes in plant production & protection and in agricultural entrepreneurship will help to propel the growth, expansion and improved productivity of the agricultural sector.

Research programs in marine biology, oceanography and environmental biology, along with the MSc in natural resource management provide our scientists and policy makers with the competence required for the effective management of our coastal areas and other natural recourses which are integral to the development of the region with particularly importance for sustainable tourism and other areas.

Interdisciplinary research in the faculty is greatly enhanced by extensive collaborations with national and international collaborators, including faculties and campuses within the University of the West Indies, other domestic, regional and international universities, research institutions, non-government organizations, government ministries, and business organizations. Faculty and graduate students have frequent opportunities for networking and interactions with local and global cohorts by publication of research in scientific journals and presentation of abstracts at local and international conferences, consultations, meetings and discussion forums.

DEPARTMENT OF CHEMISTRY

Head: Dr. Roy Porter

The Department of Chemistry, with 16 faculty members, is one of the largest academic departments and has one of the strongest research profiles on the Mona campus. The department offers two postgraduate degrees, Master of Philosophy (MPhil) and Doctor of Philosophy (PhD), both of which are research-based.

MPhil / PhD Chemistry

Programme Objectives:

To produce a cadre of leaders in science for academia (research and teaching), government and quasi-governmental organizations and industry: exponents of science and technology and conduits for S & T driven change and development.

To generate new knowledge and publishable results

To produce graduates with:

thorough knowledge of their specific areas of research (current state, trends, prospects) and good familiarity with allied high levels of technical and analytical skill; ability to collect, collate and interpret large volumes of information; the ability to communicate clearly and effectively, orally and in writing; the capacity to establish independent research programs (PhD holders).

Entry Requirements

The prerequisite for entry to the MPhil (Chemistry) program is a BSc degree in Chemistry with a minimum GPA of 3.00. Candidates holding Masters degrees in Chemistry are admitted directly into the PhD program, but the more general route to a PhD is via upgrading of registration from MPhil.

Areas of Research

Bauxite/Alumina Chemistry, Catalysis, Chemical Education, Computer-assisted Chemistry, Electro- chemistry, Food Chemistry, Inorganic Reaction Mechanisms, Metal Organic Framework Materials, Microbial Chemistry,Molecular Structure and Phase Transition, Nanomolecules, Natural Products, Nitrovasodilator Studies, Nutrient Pollution, Organic Synthesis, Organometallic Catalysis, Pesticide Degradation, Physical Chemistry of Interfaces, Pollution Chemistry, Quantum-dots, Structural Inorganic Chemistry, Structure and Properties of Electrochemical Interfaces, Supramolecular Chemistry, Surface Chemistry, Ultratrace Organic Toxin Analysis.

Duration of programme:

MPhil approximately 3.5 years
PhD approximately 5.5 years

Programme Structure:

Incoming graduate students register for the MPhil and, in the first semester, take a compulsory four-credit course, C60M (Research Methods). In the first and/or subsequent semesters candidates who intend to read for an M Phil take an additional two-credit course; those who plan to upgrade to a PhD must take courses (inclusive of Research Methods) which total nine credits.

In the second semester each graduate student begins a research project in the program of his/her chosen Supervisor(s). The research programs of the individual academic staff members in the Department are, for the most part, executed by graduate students. After 2-3 years of research a student is expected to either write a thesis and graduate with an MPhil or transfer from the MPhil to the PhD program; the latter process entails the production of a document comprising a report of work completed and a proposal, delivery of a seminar and an oral examination.

Core Courses

Course Code	Course Name	No. of Credits	Assessment
C 60M CHEM 6904	Research Methods	4	Two in-course tests - 20% Computer exercise and submission of spectra - 15%Report - 40% Oral presentation - 25%

Electives

Course Code	Course Name	No. of Credits	Assessment
C 60C CHEM 6002	Literature-based Project	2	Continuous Assessment - 15% Written review - 60% Oral presentation - 25%
C 61A CHEM 6101	Advanced Inorganic Chemistry	2	Examination50% Assignments (3) and oral presentation (1) - 50%
C 62A CHEM	Reaction Mechanisms in Organic and	2	Examination - 50% Assignments (3) and oral

6201	Bioorganic Chemistry		presentation (1) - 50%
C 62B CHEM 6202	Organic Synthesis: Methods, Design and Strategy	2	Examination - 50% Assignments (3) and oral presentation (1) - 50%

Graduate Course Description

C 60M CHEM6904: Research Methods

Introduction to the concepts of scientific research, logical progression, methods of data collection and analysis, scientific writing and oral presentation, and research ethics.

Applications of computers in chemistry introduction to some chemistry software packages available in the department or online.

Training in the use of instruments available in the department: NMR, FT-IR and UV/Vis spectrometers. The use of available software for data collection and manipulation.

C 60CCHEM6002: Literature-based Project

Each student will choose a topic in an area of chemistry undergoing new and continuing developments and, using original papers, reviews and books as source material, write an organized and comprehensive review of the topic. Students will also deliver a short oral presentation which encapsulates the key elements of the review.

C 61A CHEM6101: Advanced Inorganic Chemistry

Two of the following three modules will be delivered.

Bioinorganic chemistry - Coordination chemistry and the role of metal ions in biology. Metal ions in metalloproteins and metalloenzymes. Interactions of metal ions with biomolecules. Metals in medicine. Inorganic bio- transformations. Tuning of metals in the active sites of proteins. Frontiers in bioinorganic chemistry.
Homogeneous & Heterogeneous Catalysis - Principles of catalysis. Thermodynamics and kinetics of catalytic processes. Homogeneous versus heterogeneous catalysts. Catalytic actions using inorganic catalysts.

Chemistry of Materials - Bonding in solids, electronic conductivity - simple metals, insulators, semiconductors; photoconductors; superconductors; low-dimensional solids; laser, phosphor and quantum dot materials; inorganic polymers; clays; surface active materials; biomaterials; ceramics; nano-materials, dielectrics, electro-optics and ferro-electrics.

C 62A CHEM6201: Reaction Mechanisms in Organic and Bioorganic Chemistry

Two of the following three modules will be delivered.
Physical organic chemistry and radical reactions - Kinetic vs thermodynamic control of reactions. Linear free energy relationships. Kinetic isotope effects. Hard and soft acids and bases. Mechanisms of some free radical reactions.

Pericyclic reactions, photochemistry and singlet oxygen - The principle of Conservation of Orbital Symmetry. Frontier Molecular Orbital analysis of electrocyclic reactions, cycloadditions and sigmatropic rearrangements. Correlation diagrams. The Diels-Alder reaction a detailed treatment. Properties of photochemical excited states. Special features of photochemical reactions. Sensitization. Non-pericyclic photochemical reactions of alkenes. Photochemical reactions of carbonyl compounds. Singlet oxygen: formation, properties, reactions.
Reaction mechanisms in bioorganic chemistry - Introduction to enzymes and coenzymes. Catalytic activity of enzymes. Hydrolytic and group transfer reactions. Biosynthetic redox processes. Enzymatic carbon-carbon bond formation. Enzymatic addition/elimation reactions. Selected enzyme-catalyzed isomerizations and rearrangements.

C 62B CHEM6202: Organic Synthesis: Methods, Design and Strategy

The aim of this course is to enlarge and deepen students knowledge of key methods in organic synthesis and to equip them with the techniques for planning and designing their own organic syntheses. Topics covered: oxidation and reduction; asymmetric synthesis; synthesis of alkenes; organometallics in synthesis; carbenes and carbene complexes in synthetic transformations; retrosynthetic analysis.

Department Contact Information:

The Department of Chemistry2 Plymouth Crescent
The University of the West Indies Mona Campus
Kingston 7
Jamaica, West Indies

MSc /MPhil/PhD Occupational & Environmental Safety and Health

The Department of Chemistry, through the OESH Programme, offers the following Graduate programmes:

MSc Occupational & Environmental Safety and Health (face to face, intense delivery mostly during evenings, weekends and holidays)

MPhil/PhD Occupational & Environmental Safety and Health (Research degrees)

MSc Occupational & Environmental Safety andHealth (MSc (OESH))

The objectives of the programme are:
To develop advanced understanding of concepts and issues of Occupational & Environmental safety and Health

To provide training in the recognition, evaluation and control of occupational and environmental safety and health challenges

To address the urgent and growing need for the development of a cadre of professionals with competencies in Occupational and Environmental Safety and Health (OESH).

To enhance the development, design implementation and management of complex OESH issues both in the private and public sector.

To encourage functional awareness of the key issues related to environmental and occupational safety and the development of a proactive attitude to the expectations and demands of occupational and environmental safety and health on governments, environmental management, business enterprises, educational institutions, trade unions, workers and the public.

To ensure that issues of cultural and individual diversity that are relevant to the Caribbean experience are fully integrated into training and practice.

Entry Requirements (MSc Occupational &Environmental Safety and Health):

Applicants must have either a First Degree or its equivalent in basic or applied sciences or related areas. Advanced placement will be made to applicants with prior training in health and safety and suitable work experience while arrangements will be made to bring up to the required level the knowledge base of those without prior OESH training or experience.

Areas of Research

Industrial hygiene, workplace safety, all aspects of environment, ergonomics, toxicology, standards and policy development.

Seminars

Research students are required to attend all seminars arranged by the programme

Duration of programme:

One year Full time: MScTwo years Part-time: MScTwo years: MPhil
Four years: MPhilThree years: PhDSix years: PhD

Programme Structure:

The MSc. in OESH will have; eight (8) - 4 credit- taught courses and two (2) one credit-seminars over two semesters for full-time students and over four semesters for part-time students. A nine credit Research paper is required to complete the programme.
Courses are taught weekday evenings and on week-ends and holidays as required.

Semester (Core Courses)

Course Code	Course Name	No. of Credits	Course Weighting
SH60J/ OESH 6000	OESH and Public Policy	4	50% Coursework 50% Exam
SH61J/ OESH 6100	Advanced Environ-mental Health	4	50% Coursework 50% Exam
SH62J/ OESH 6200	Advanced Occupa-tional Safety & Health	4	50% Coursework 50% Exam
SH66J/ OESH 6600	Independent Study & Research Methods	4	50% Coursework 50% Exam
SH63J/ OESH 6300	Seminar	1	

Semester 2 (Core Courses)

SH60K/ OESH 6010	Advanced Topics in OESH - A (Measure-ment Methods and Ventilation)	4	50% Coursework 50% Exam
SH60L/ OESH 6030	Advanced Topics in OESH - B (OESH Disorders)	4	50% Coursework 50% Exam
SH60M/ OESH 6040	Advanced OESH Management Systems	4	50% Coursework 50% Exam
SH60N/ OESH 6050	Advanced Topics in OESH - C (Ergonomics)	4	50% Coursework 50% Exam
SH63J/ OESH	Seminar	1	

6300

Summer (Core Courses)

SH67J/ OESH 6700	Research Project	9	100% Coursework

Elective(s)

Course Code	Course Name	No. of Credits	Course Weighting
SH60X (a series of courses offered on demand)	Advanced Topics in OESH	4	50% Coursework 50% Exam

(SH60J/OESH6000) (OESH and Public Policy)

Course Description: This course aims to; enable students to develop an understanding of the complex, dynamic and delicate relationship between business pursuits, public interests and public policy, explore and analyze the process of public policy development, formulation and implementation and analyze the cost-benefit of OESH public policies. The course will discuss and explain the legal basis for OESH litigation, and expert witnesses and review the principles which drive the development of a viable business model for OESH consulting and ownership

(SH61J/OESH6100) (Advanced Environmental Health)

Course Description: Aims: This courses aims to provide students with a thorough knowledge of contemporary concepts and issues of environmental health and the impact of these are being impacted by key industries in the region- tourism, mining, oils/gas, agriculture. The course will allow students to understand the roles of environmental professional in recognizing and assessing environmental hazards and how to source and use international guidelines, standards and regulations in addressing the issues that arise.

SH62J/OESH6200(Advanced Occupational Safety)

Course Description: This course will enable students to develop a deep understanding of advanced concepts of occupational safety and hygiene. The course will review concepts for hazards, exposure, toxicity and risks. These concepts will be used to guide the recognition, evaluation and selection of control technologies to optimize occupational safety and health as well as the evaluation of the role of OSH professional and the resources available for their work

SH66J/OESH6600 (Independent Study and Research Methods)

Course Description: The course is designed to prepare students for a productive research Project. Learning modules will include use of statistics, in the collection, summarizing and analysis of data for experiments on OESH and the application of epidemiology concepts to the issues of occupational and environmental health. The course will review all the principles involved in developing the research paper from development of the critical and extensive literature review, the development of the research question, research goals, objectives and methodologies and ethics through to the results and their interpretation, discussion, conclusion and the citing of literature.

SH6OK/OESH6010 - (Measurement Methods andVentilation)

Course Description: The course is designed to provide students with extensive knowledge of the principles involved in air monitoring for toxic exposures. This will include the type of air contaminants, routes of exposure and the potential hazards they pose to people in the work place. This course is designed to explore the use of engineering controls, such as building design and ventilation systems, to reduce the potential risks, while providing hands-on experience with the equipment used in air monitoring and the interpretation of results from the monitoring.

SH6OL/OESH6030 (OESH Disorders)

Course Description: The course will provide students with working knowledge of the principles of Occupational Toxicology, the impact of select toxicants on organ systems and how this knowledge may be to protect workers, the general public, and the environment. The course will look at the nature of the toxicity of various chemicals, the regulatory framework in which these may be managed and the existing standards which may guide how these chemicals are handled. The course will also look at the significance of HIV/AIDS as a workplace issue.

SH6OM/ OESH6040(Advanced OESH Management Systems)

Course Description: The course will cover a number of OESH management issues including, land use planning, environmental conservation, understanding the use of critical resources such as water the management of Asbestos and other hazardous waste and Emergency Management. The course will provide thorough knowledge on the regulatory factors, inclusive of International Environmental Conventions and Recommendations, which impact OESH systems

SH6ON/OESH605(Advanced Ergonomics)

Course Description: The course will review the principles of Ergonomics or Human Factors, discuss the interaction between people and physical and psychological aspects of the work environment and illustrate the application of ergonomics in the prevention of accidents job induced fatigue and work related musculoskeletal disorders. The course will incorporate a working knowledge of specifics aspects of human anatomy as it relates to muscolo-skeletal

disorders, which will allow students to apply that knowledge to the improvement of peoples interaction with products systems, and workplace environments. Students should understand the concepts of designing for human use, optimizing working and living conditions to enhance effectiveness and efficiency of work.

Additional Information/Notes:

The courses SH60K/OESH6010, SH60L/OESH6030 and SH60N/OESH6050 represent optional Advanced Topics in OESH for which the course content could be changed.

Department Contact Information:

OESH Programme,

Department of Chemistry, Faculty of Pure and Applied Sciences.
Programme Coordinator: Mr. Paul F. Brown
Programme Director: Prof. Ishenkumba Kahwa
Programme Assistant: Ms Grace Hosang

MPhil / PhD Occupational & Environmental Safety and Health

Specializations/Options :

i) Environmental Safety and Health

ii) Occupational Safety and Health

iii) Occupational and Environmental Safety and Health

The objectives of the programme are:

The Doctoral Programme prepares persons to provide high level leadership in OESH research; policy design, implementation, analysis and evaluation; standards development.

Entry Requirements

Applicants must have an MSc, MPhil or equivalent degrees. First degree or equivalent holders seeking a PhD must first enroll in the MPhil degree programme from which they can petition the Office of Graduate Studies and Research for transfer of registration to the PhD. This is done following outstanding progress on research the evolution and scope of which exceeds requirements for the MPhil Degree, examination of a written report and its public oral presentation.

Areas of Research
Industrial hygiene, workplace safety, all aspects of environment, ergonomics, toxicology,

standards and policy development.

Seminars

PhD students will register for the Seminar Course (1 credit) each semester, attend regular seminars arranged by the programme and make presentations once per semester.

Duration of programme
Minimum 3 years.

Programme Structure
PhD students must complete a minimum of 9 credits from the MSc OESH program and conduct research leading to a thesis.

Additional Information/Notes
Advice should be sought from Program Director Prof. Ishenkumba Kahwa before applying for PhD OESH degree.

Department Contact Information:

Department of Chemistry
The Faculty of Pure and Applied Sciences
Mona Campus, Kingston 7, Jamaica

Programme Coordinator: Mr. Paul F. Brown
Programme Director: Prof. Ishenkumba Kahwa
Programme Assistant: Ms Grace Hosang

Master of Science and Diploma Food and Agro-Processing Technology (FAPT)

The M.Sc. programme in Food and Agro-processing Technology has been created to meet an identified need for training, education and research in food systems and in response to the general thrust towards food security. It is intended to produce more agri-technology and business-savvy practitioners within the agri-food chain.

Programme Objectives:

This Masters degree and the Diploma in Food and Agro-Processing Technology are self-funded postgraduate programmes. They are designed to equip students with the knowledge and skills to add value to our local agricultural products. It is expected that successful graduates will be able to develop a career in the private or public sector and contribute directly to the growth of the food and agricultural processing sectors.

The programme of study will have a strong problem-solving base which will focus on Food Safety and Quality, Product and Process Development, among other core areas of competence. The modes of instruction will incorporate active and cooperative learning experiences in the core, elective and research courses – to include face-to-face delivery (lectures), practical sessions, peer presentations and seminars. The intended result of this combined learning effort will be to produce highly knowledgeable graduates, thereby building the technological capacity of our human resource.

Entry Requirements:

The minimum qualifications that applicants are expected to have is a B.Sc. (2:2) in any of the following: natural sciences, agriculture, or engineering typically. Applicants with relevant working experience will be favourably considered. Students without appropriate food chemistry laboratory experience will be required to register for a qualifying laboratory course.

Duration of programme:

Masters Degree (full time): 16 months;
Masters Degree (part time): 28 months;
Diploma (full time only): 12 months.

Programme Structure:

Master of Science Degree (45 credits):

All Core Courses (33 credits) **and** either the 6, or 12 credit Research Project **plus** additional credits from Elective courses, if required;

Diploma (22 credits):

Only Core Courses, selected to meet the credit requirement for Diplomas.

Enrollment Option : Full-Time **√** Part-Time **√**

Courses (Core)

Course Code	Course Name	No. of Credits
FAPT6101	Agro-Processing Technologies	4
FAPT6102	Packaging: Materials and Applications	4
FAPT6201	Food Safety and Quality Standards	3
FAPT6202	Food Microbiology and Biotechnology	4

FAPT6301	Research Methods: Principles and Practice in the Food and Agro-processing Sectors	4
FAPT6302	Product Development	4
FAPT6303	Agro-Processing Problem Solving	4
FAPT6401	Agri-Business Management	3
FOST6003	Food Chemistry	3

EITHER 1 OF 2 RESEARCH PROJECTS

FAPT6304	Research Project	6
FAPT6305	Comprehensive Research Project	12

Electives

Course Code	Course Name	No. of Credits
FAPT6103	Edible Oils, Fats & Biofuels Processing	3
FAPT6104	Meat, Poultry and Seafood Processing	4
FAPT6105	Fruits, Vegetables, Root Crops and Tubers Processing	4
FAPT6106	Cereal and Grain Processing	2
FAPT6107	Herbs, Spices, Essential Oils, Nutraceuticals and Fine Chemicals	3
FAPT6108	Post Harvest Technologies	3
FOST6010	Dairy Chemistry and Dairy Products Technology	3

Course Title: AGRO-PROCESSING TECHNOLOGIES
Banner Code: FAPT6101

The effective application of agro-processing technologies is vital to the sustainable growth and development of the food and agricultural industries. This course will introduce students to the agro-processing industry, and provide details about the techniques involved in the processing and preservation of agricultural products. Thermal processing, refrigeration/freezing, irradiation, and dehydration are among the techniques that will be covered. The processing techniques applied to

specific food groups as well as the application of microorganism in agro-processing will be discussed in detail. The effects of processing on product quality and the environment are included. This course has a strong practical component designed to provide students with the hands on experience necessary to prepare different types of food products in a pilot plant setting. Field trips to selected agro-processing plants will also assist them in concretizing theoretical concepts.

This course (along with Food Chemistry, Food Microbiology and Biotechnology, Food Safety and Quality Standards) forms one of the central pillars around which all other courses in the programme are organized.

Course Title: PACKAGING: MATERIALS AND APPLICATIONS
Banner Code: FAPT6102

This course will review the manufacture of glass, plastic, metal and paper and the processes which prepare these materials for food packaging. The properties of various polymers, their advantages and disadvantages and the equipment used to convert them to containers will be covered. Laboratory sessions will allow the students to better understand closing methods, defects identification, quality testing and material characterization. Visits to factories that fabricate and use food packaging will also be utilized in the learning process. Selected topics for food packaging applications will include aseptic packaging, retorting, package/product interactions, active and smart packaging, shelf life studies, handling of packages, and modified atmosphere packaging.

This course demonstrates the dependence of packaging on the chemistry of the packaged product as well as the technologies used for processing and illustrates the inter-relationship with food safety and quality. It is thus critical to any modern programme in food and agro-processing.

Course Title: FOOD SAFETY AND QUALITY STANDARDS
Banner Code: FAPT6201

This course allows the students to become familiar with microbial and chemical risk factors that are associated with food safety. The microbial factors include bacteria, fungi, viruses and protozoa. The chemical factors include both organic and inorganic compounds that are from plant, animal, packaging, agricultural and industrial sources. Various techniques to minimize the risks to food safety are discussed, including temperature control (heating and cooling), irradiation, chemical, pH, pressure and dehydration. Processing methods that use these techniques to ensure food safety are presented in this course. The students will also be engaged with methods of identification of microbial and chemical contamination of foods. The role of governmental agencies and food laws aimed at minimizing food related illnesses will be considered. To assist the students in these aspects, visits will be organized to governmental

agencies responsible for food safety and to quality control testing facilities managed by private companies. Guest lecturers with experience in food processing may also be utilized.

Food safety and quality standards forms an integral part of adding value to agricultural products meant for consumption and as such this course represents one of the pillars supporting the programme.

Course Title: FOOD MICROBIOLOGY & BIOTECHNOLOGY
Banner Code: FAPT6202

Modern food processing technologies demand a thorough understanding of the challenges that micro-organisms present in the production of nutritious and safe foods. The preservation techniques employed are often directly related to the characteristics of the micro-organisms of public health significance, and the strategies adopted in food production are geared towards minimising the risks of food borne illnesses. With an increase in our knowledge and control of micro-organisms, and an ability to manipulate their metabolic processes (biochemistry), biotechnology will continue to have a tremendous impact on the production of foods, nutrients and food additives into the foreseeable future.

This course is therefore designed to provide the student with the knowledge and understanding of the attributes of micro-organisms and the application of modern techniques in the applied science of food microbiology and related biotechnology. Students will also develop an advanced understanding of the microbiology of foods, food-borne diseases, food spoilage and modern microbial analytical techniques. The course will also introduce students to diverse techniques in genetic engineering and biotechnology (for example: identifying plant and animal food genes, newly developed organism strains, transgenic crops and livestock, bioinformatics, food-omics, industrial microbiology, fermentation technology and bioreactors, food enzymes, etc.) and ethics in biotechnology.

Course Title: RESEARCH METHODS: PRINCIPLES AND PRACTICE IN THE FOOD AND AGRO-PROCESSING SECTORS
Banner Code: FAPT6301

The course is designed to prepare students for a meaningful research project in the food and agro-processing sectors. Students will be introduced to the philosophy and principles of scientific research methodology, including the planning, design and conduct of research projects. Students will be guided on how to develop their research question (from existing and/or perceived problems in the sector) and instructed on the conduct of extensive literature review through the use of abstracting and indexing resources. The importance of ethics in the conduct of research will be emphasized.

Students will develop their research project scope and objectives, which are to be clearly stated (specific, measurable, achievable, realistic and time-bound) and will consider the appropriate methodologies to be utilised. Students are expected to present an independently prepared research proposal (written and oral) at the end of the course.

Additional learning modules will include an introduction to the principles of strategic

market research (through market surveillance) which may be used to develop market intelligence and competitive advantage, and the use of statistical tools in decision making, through data collection, analysis and interpretation.

Course Title: PRODUCT DEVELOPMENT
Banner Code: FAPT 6302

The course will introduce students to the importance of Food Product development both to the individual product owner and to the market economy. The theoretical background provided should enrich student thinking about the major issues in development of new food products There will be a significant amount of time spent on acquiring an understanding of the planning, processes and operational strategies necessary for successful marketing of a food product The infusion of current practice into the course in the form of case studies, guest speakers and visits to factories is also a useful aid to enhance the understanding of future entrepreneurs.

Course Title: AGRO-PROCESSING PROBLEM SOLVING
Banner Code: FAPT6303

In this course, principles and practices of problem-solving in relation to food processing and food products will be modeled. Students will be exposed to simple and complex issues related to specific food processing and products and will engage in discussions, laboratory analysis and collaborative decision-making to solve these problems. They will have the opportunity to prepare scientific reports and to present these in order to share their findings.

Course Title: AGRI-BUSINESS MANAGEMENT
Banner Code: FAPT6401

The agri-food system has evolved from the production and sale of primarily homogeneous agricultural commodities to a focus on value-adding, differentiation and coordination with other firms in the food chain. In the modern world, the unique technical aspects of food and agricultural production, processing, distribution and markets need to be integrated with business management principles and strategy. A module on Food Commercialization will demonstrate

how these activities can be integrated to focus on successful delivery of products to market, and the coordination of the production & quality, marketing, finance and operation functions.

This course will provide an overview of the abilities required of business professionals working within the agro-food processing industry. Students will gain an understanding of the unique and changing structural, legal and regulatory aspects of food markets (chains), as well as basic business management theories and concepts necessary to fully understand and appreciate the skills needed to manage organizations effectively and efficiently within this agro-processing industry.

Course Title: FOOD CHEMISTRY
Banner Code: FOST6003

In order for practitioners in the field to effectively apply and exploit agro-processing techniques, it is essential that they possess sound knowledge and understanding of the chemical composition and structure of foods. This course exposes students to the chemistry of the major (water, proteins, lipids, carbohydrates and lipids) and minor (vitamins and minerals, enzymes, colourants) food components. Students will be exposed to the effects of processing and storage on the chemical, nutritional, functional properties and quality of the food product. Issues related to functionality, bioavailability, toxicity, and dietary recommendations of vitamins and minerals will also be presented. The students will be made aware of undesirable components of foods, and the means to reduce them. Analytical methods employed for the determination of different food components and food quality will be presented.

Course Title: EDIBLE OILS, FATS & BIOFUELS PROCESSING
Banner Code: FAPT6103

Oils and fats comprise one of the major food groups, and are therefore a very important component in the diet. A good understanding of their physiochemical and functional properties, and the different technologies employed for their processing and quality assurance is therefore essential. The relationship between fats and health is significant, and it is imperative that workers in the agro-processing industry are sufficiently knowledgeable about this topic. The production of bio-fuels from biomass including oils is becoming increasingly significant. This is in part due to the global trend of increasing energy consumption along with concerns about energy security in the face of dwindling crude oil reserves. The production of bio-fuels would provide better energy security and improve the local and regional economies, as well as the environmental benefits that come from using this renewable source of energy. Alternative energy production involving bio-fuels is an emerging world trend, and is a very relevant component of this course.

This course introduces the different classifications of lipids, their physical and chemical properties and common chemical reactions, which are related to the effects of processing on fats and oils. Students will be exposed to various methods used for processing fats into specified products. Issues relating to deterioration, preservation, product quality and analysis, by-product utilization, and health aspects will be included. Students will also be introduced to bio-fuels processing, with the production of biodiesel, natural gas and alcohol, as well as other emerging technologies, being explored. Environmental issues will be discussed.

Course Title: MEAT, POULTRY & SEAFOOD PROCESSING
Banner Code: FAPT6104

This course introduces the biochemical, chemical and nutritional aspects of different muscle foods (meat, poultry and seafood), as well as the methods of producing value-added food items from these sources. Students will be exposed to safety concerns surrounding the preservation and processing of these foods and measures for addressing these issues. Advanced and environmentally friendly processing technologies for muscle foods and new uses of by-products will also be examined.

Course Title: PROCESSING OF FRUITS, VEGETABLES, ROOT CROPS AND TUBERS
Banner Code: FAPT6105

Course Description:

There is enormous diversity in the number and types of crops that thrive in the Jamaican environment and the Caribbean region. Significant potential exists for the enhancement of our agro-processing industry via value-added production from fruits, vegetables, root crops and tubers (FVRT). This course will, among other things, equip students with the requisite knowledge to successfully produce high-quality products from these food sources. The content will encompass the processing of fruits, vegetables, root crops and tubers, from farm to fork. Students will be introduced to the composition and quality indices of these foods, in addition to the principles and applications of thermal processing, dehydration, refrigeration, freezing, minimal processing, and specialized techniques for fruits, vegetables, root crops and tubers. Effects of post-harvest handling and processing on product quality, product safety, quality assurance and international trade issues, the potential for product development and by-product utilization will also be covered.

Course Title: CEREAL AND GRAIN PROCESSING
Banner Code: FAPT6106

Cereals form a major part of the diet of persons in the developing world. They contain mainly carbohydrates, along with some fat and protein, in addition to vitamins and minerals. Cereals are often eaten as processed foods; unfortunately during processing the protein is usually lost along with other useful nutrients, leaving mainly carbohydrate. However, this is still an important food source, as it provides significant amounts of energy.

Students taking this course will become familiar with the main types of crops that are harvested for processing into commonly known cereal products. The course will cover the grading, quality attributed, common processing technologies and end use of most cereals consumed in the Caribbean, North America, and European regions. Hazards associated with the storage and consumption of certain cereals will also be taught during the course. These include fungal infestation and aflotoxins, lipid oxidation of seeds and grains, and allergenic reactions to cereals such as wheat, soy, peanut and certain tree nuts.

Course Title: HERBS, SPICES, ESSENTIAL OILS, NUTRACEUTICALS & FINE CHEMICALS
Banner Code: FAPT6107

Jamaica and the Caribbean region are sources of unique herbs and spices, many with unusual flavours and properties. These herbs are widely incorporated into a strong folklore medicinal practice. There is a long-standing history of their usage. Researchers have been gradually building a scientific database which serves to validate the utilisation of many of these botanicals in folk medicine. Internationally and locally there is an increasing market demand for products from herbs and spices with additional functionalities (beneficial health properties). This course is intended to provide a basis for understanding these developments and to reveal potential applications.

Methods of classification and standardization of herbs and spices are introduced in this course. Additionally, it will investigates the methods in which these materials may be used with minimal processing or processed extensively into value-added products, based on an appreciation of the folk-medicinal and science-based properties. The potential of the functional food, nutraceutical and fine chemical industries arising from the use of herbs and spices will be explored.

Course Title: POSTHARVEST TECHNOLOGIES
Banner Code: FAPT6108

With increasing concern about local food security, the losses associated with poor handling of agricultural produce and the resultant poor quality of fresh produce are matters of great concern to food processors and consumers alike.

This course will provide students with the basic knowledge and understanding of the ripening of crops and their senescence, as well as the different physiological and biochemical processes

affecting the quality attributes of fresh crops. Details on the strategies and techniques to be utilised in the proper handling of fresh crops will also be explored. This will include the application of appropriate technologies to extend the shelf-life of crops, ensuring that they are maintained as "fresh as fresh". Integrated and combined postharvest preservation technologies will also be considered and discussed.

Course Title: DAIRY CHEMISTRY & DAIRY PRODUCTS TECHNOLOGY
Banner Code: FOST6010

The local production of milk in 1992 was valued at almost J$40M, representing approximately 24% of the local consumption. Since April, 2010, there has been a decline in production of over 50% in the dairy sector. The main cause of this is the availability of cheaper imported milk products. The quantity and cost of this, however, have increased significantly over the last decade. Taking into consideration our nation's food security, it is imperative that production in this sector be increased. The Ministry of Agriculture is currently launching a five-year programme aimed at reviving this ailing sector.

This course will play a pivotal role in achieving this objective by exposing present and future agro-processing practitioners to the basic science of dairy, as well as the applied science of the technologies involved in dairy processing, shelf-life extension, product quality assurance and evaluation, safety, regulatory and energy conservation issues. Approaches to new product development and critical analysis leading to reduction in production cost, which are critical in this regard, will also be included in this course.

Students will learn about the composition of milk and its physical, chemical, and functional properties. Current and cutting edge technologies applied to the production of dairy products will be covered. The production of different types of dairy products as well as the effects of processing on various characteristics of the finished product and on the environment will also be discussed. Other topics that will be covered include: preservation, management systems for safety and quality, and labeling, regulatory and energy conservation issues. Students will be exposed to the practical aspects of dairy processing via field trips to processing plants.

Course Title: RESEARCH PROJECT
Banner Code: FAPT6304

The Research Project course is intended to provide students with some research experience through introduction to data collection and preliminary evaluation and assessment of the generated data. It is intended to further develop critical thinking skills to prepare graduates for making technical decisions based on the sound evaluation and analysis of objective data. Ideally the project should be the execution of the research proposal developed in the Research Methods

course [FAPT 6301] completed in Semester I. Research on the project may begin in Semester II, or shortly thereafter.

Students pursuing the Research Project course may undertake an original project which seeks to test their hypothesis regarding an identified research problem. Alternately, they may conduct research which seeks to assess the validity of data from a pre-existing research project, or collect data associated with the performance of a process, or consumer product in the market. The work must demonstrate critical thinking, thorough analysis and/or new interpretation of results.

Students are expected to communicate their results with the wider community in an examinable project report and poster presentation. The basis for the poster will be an abstract of their research project submitted for peer-review.

Course Title: COMPREHENSIVE RESEARCH PROJECT
Banner Code: FAPT6305

Most candidates opt to pursue an MSc for self-improvement and to position themselves for better employment opportunities. A select few plan to conduct research, within or outside of academia, and as such require a more in-depth exposure to research. Such candidates may utilize an MSc to satisfy entry requirements for a research degree programme provided the research course accounts for no less than 25% of the MSc programme credit weighting and the students maintain a high grade average throughout the programme. This course satisfies such requirements. It will develop the critical thinking skills necessary to conduct higher order research and will facilitate a better understanding of factors that influence an identified problem. It is designed to prepare students for rigorous scientific enquiry and requires the student to develop a research project after consultation with his/her academic supervisor. Research on the project should begin in Semester II.

Students pursuing the Comprehensive Research Project course are expected to undertake a more in-depth original project and are allowed more time in which to collect an appropriate body of data for analysis. Alternately, they may conduct research which seeks to assess the validity of data generated from a pre-existing research project, or collect and analyse data associated with the performance of a process, or consumer product in the market. The project should seek to test a hypothesis regarding an identified research problem and must demonstrate critical thinking, thorough analysis and/or new interpretation of results which provides credible insights towards solving a wider problem.

Students are expected to communicate their results with the wider community in an externally examined thesis and in the preparation of a research paper, in a scientifically acceptable format for submission to a peer-reviewed journal.

Course Title: **FOOD CHEMISTRY LABORATORY**
Banner Code: **FAPT3511**

This practical course is designed to strengthen the knowledge base and technical competency of students who do not have a strong background in the fundamental laboratory techniques employed in the analysis of basic food components. This course will equip students with the skills in in the techniques and methodologies commonly used for the analysis of macro and micro food components including fats, carbohydrates, proteins, water, vitamins, minerals and toxicants. The principles governing the various techniques will be emphasized.

Department Contact Information:

Address: 2 Plymouth Crescent,
UWI Mona Campus,
Kingston 7, JAMAICA.

Office Tel: (876) 927-1910;
Facsimile: (876) 977-1835;

Programme Coordinator: Mrs. Andrea Goldson-Barnaby

DEPARTMENT OF GEOGRAPHY AND GEOLOGY

Head: Professor Simon Mitchell, Bachelor of Science from Hull University, Doctor of Philosophy from Liverpool University

The Department of Geography and Geology offers MPhil and PhD degrees in Geography and in Geology.
Collaborative projects may be done with other departments or with other universities or institutions.

MPhil or PhD Geography or Geology

Specializations/Options: Urban geography; Urban planning; Agricultural geography; Rural sustainable livelihoods; Food security; Cultural geography; Tourism; Geomorphology; Climate change; Environmental resource management; Natural hazards; Disaster management; Sedimentology; Petroleum geology; Palaeontology; Igneous petrology; Metamorphic petrology; Marine geology; Hydrogeology; Industrial minerals.
Programme Objectives:

1. To provide a strong understanding of the foundation, principles, and application of the substantive applied areas of Geography or Geology.

2. To train students with modern scientific equipment, tools, techniques and methodologies used

in research and development in Geography or Geology.

3. To encourage the development of problem-solving skills in the students area of specialization in Geography or Geology.

Entry Requirements:

Bachelors degree from the University of the West Indies, or other recognized universities, with at least upper second class honours.

Students must demonstrate aptitude in independent research and have passed the core undergraduate Geography or Geology courses.

Seminars

1-2 seminars per academic year per student

Duration of programme

3-6 years part-time/2-4 years-full time for MPhil degree
4-8 years part-time/3-6 years full-time for PhD degree

Courses (Core)

Course Code	Course Name	No. of Credits
GEOL6001	Research Techniques in Earth Science	4

Additional Information/Notes:

Acceptance to the MPhil or PhD programmes also depends on the availability of a suitable supervisor.

Department Contact Information:

876-927-2728 or 876-927-2129 (Tel.) or 876-977-6029 (Fax). E-mail: geoggeol@uwimona.edu.jm

ENVIRONMENTAL MANAGEMENT UNIT

The Environmental Management programme was established in September 1998 at the UWI, based upon the James Seivright Moss-Solomon Snr. Chair of Environmental Management endowed by the Grace Kennedy Foundation. It was formed in response to the need for a greater promotion of environmental management through capacity building. The programme promotes effective management of environmental resources through research, graduate training and community outreach. It has responded to national and regional needs in the following ways:

The Environmental Management programme was established in September 1998 at the UWI, based upon the James Seivright Moss-Solomon Snr. Chair of Environmental Management endowed by the Grace Kennedy Foundation. It was formed in response to the need for a greater promotion of environmental management through capacity building. The programme promotes effective management of environmental resources through research, graduate training and community outreach. It has responded to national and regional needs in the following ways:

Research
The conducting of research and supervision of research projects in various parts of the region and in a range of environmental themes.

Postgraduate Training
The development and delivery of a taught Master of Science degree in Natural Resource Management, which has been completed by approximately One Hundred students in six cohorts since its inception. This programme was initially supported by funds from the European Union and the students have been drawn from across the Caribbean region. Two additional streams in Natural Resource Management Disaster Management and Sustainable Urbanization, as well as corresponding Diploma programmes, have been developed for delivery commencing in 2009. of research degree programmes - MPhil and PhD The development degrees in Environmental Management.

Dissemination of Information
The dissemination of information and the promotion of public education through the mounting of international, regional and national seminars on various environmental topics, and the publication of literature on current environmental issues in the Caribbean.

Consultancy Services:
Rapid (Urban and Rural) Environmental Assessments
Environmental Audits and Feasibility Studies
Resource Valuation (Coastal and Watershed)
Waste Management Assessments & Audits
Participatory Urban and Rural Planning
Environmental Curriculum Development at all levels
Environmental Impact Assessment
Environmental Management Systems Implementa- tion
Community Development/Community Based Management

Environmental Information Management
Disaster Risk Reduction
Hazard Vulnerability Assessment

MSc in Natural Resource Management

Specializations

There are 3 MSc streams:

1. Integrated Urban and Rural Environmental Management

2. Disaster Management

3. Marine and Terrestrial Ecosystems

Programme Objectives:

1. **Integrated Urban and Rural Environmental Management:**

The primary objective of this programme is to contribute to sustainable development in the Caribbean region by training a cadre of professionals in environmental and natural resource management. Training will focus on the development and implementation of appropriate policies, institutional mechanisms, strategies and techniques for sustainable use of natural resources in the region, and for the protection and management of the regional environment.

2. **Disaster Risk Management:**

The objective of this programme is the delivery of an applied programme that produces disaster managers who would become familiar with and able to take a comprehensive and holistic approach to disaster and risk management, including not only the scientific/technical aspects, but also social, economic, legal and cultural dimensions as well.

The goal of this programme will be the training of disaster risk management experts from different disciplines, who can be called upon to develop policy and address disaster risk management issues in the region. The target group will therefore be recent graduates in an appropriate scientific discipline and personnel who are already employed in public and private sectors that deal with disaster management-related problems.

3. Marine and Terrestrial Ecosystems:

The primary aim of this M.Sc. in Marine and Terrestrial Ecosystems (MaTE) programme is to provide a regionally integrated approach to marine and terrestrial ecosystems management. This will be accomplished through training and research, geared towards the empowerment of graduate students and professionals with knowledge of marine and terrestrial ecosystems and associated processes. This will also involve the collection and analysis of data required for the detailed study of these areas and the knowledge of biological and other interventions for conservation, monitoring and integrated management of marine and terrestrial ecosystem resources towards sustainable use.

At the end of this programme students will be able to:

i. identify the issues affecting terrestrial and marine communities and the processes which make these systems unique.
ii. appropriately use GIS, Geoinformatics, remote sensing as well as other environmental tools in the study of the environment.
iii. outline environmental management strategies that integrate biological, political, legal, social and ethical issues as well as design appropriate interventions to conserve threatened species and environments.
iv. execute sound research for monitoring and providing solutions for problems related to the environment.

Entry Requirements: Applicable to all M.Sc. Natural Resource Management Streams:

A good honours Degree in a related subject (or equivalent qualifications and work experience) is required for entry into the above M.Sc. Streams. The selection of candidates is made on a competitive basis, owing to the constraints on the number of places available.

Areas of Research

MPhil and PhD degrees are awarded by thesis. Candidates are required to have either a first or second class honours degree in a related subject for entry into the Master of Philosophy programme. A first or upper second class honours degree and an approved Masters degree in an appropriate field are required for a candidate to be eligible for admission into the PhD programme. The determination of acceptance into these programmes is also based upon the candidates research proposal and adequate facilities for the particular work. Candidates will be required to pass several postgraduate taught courses up to twelve credits.

Some areas of interest for research include:

Biodiversity in Farmed Areas
Land Management and Food Security
Disaster Management and Risk Mitigation
Urban Renewal
Parks and Protected Areas
Environmental Health
Community Resource Management

Watershed Management
Coastal Zone Management
Waste Management
Water Resource Management
Children and the Environment
Eco-tourism
Environmental Law and Policy

Seminars

At least one Seminar per year is required of each student in the MPhil and PhD programmes.

Duration of programme

Master of Philosophy (MPhil) Degree

The minimum period of registration for the M.Phil. is two years full time, and three years for part-time. It consists largely of work on a research topic which is examined by a thesis.

Doctor of Philosophy (PhD) Degree

A PhD candidate will pursue research over a minimum of three calendar years as a full-time student or four years as a part-time student. The PhD thesis should make a distinctive contribution to the content and advancement of knowledge in the field of environmental management and show evidence of originality.

Master of Science (M.Sc.) streams:

These postgraduate programmes will be available on a part-time basis:

- 2 years for part-time registration, subject to review.

Programme Structure

Integrated Urban and Rural Environmental Management (IUREM)

This MSc Stream Integrated Urban and Rural Environmental Management will be available on a part-time as follows:

Part-time: Duration of the degree by part-time students will be 24 months over 4 semesters and 2 summer terms. Semester 1 commences in September and the summer term is regarded as a semester.

Year 1:

- Semester 1 Three core courses (9 credits)

- Semester 2 Three core courses (9 credits)
- Summer Term One speciality course – Environmental Economics (3 credits) and preparatory work for the major Research Project in Year II

Year II:

- Semester 1 Three speciality courses (9 credits)
- Semester 2 Two speciality courses (6 credits)
- Summer Term Research Project (9 credits)

Programme Structure: Disaster Risk Management (DRM)

This Disaster Risk Management .Sc. stream will be available on a part-time basis, as follows:

Part-time: Duration of the degree by part-time students will be 24 months over 4 semesters and 2 summer terms. Semester 1 commences in September and the summer term is regarded as a semester.

Year 1:

- Semester 1 Three core courses (9 credits)
- Semester 2 Three core courses (9 credits)
- Summer Term Preparatory work for the major Research Project in Year II

Year II:

- Semester 1 Three speciality courses (10 credits)
- Semester 2 Two speciality courses (8 credits)
- Summer Term Research Project (9 credits)

Programme Structure: Marine and Terrestrial Ecosystems stream (Coordinated by the Department of Life Sciences)

This M.Sc. stream will be available on a part-time basis, as follows:

Part-time. Duration of the degree by part-time students will be 24 months over 4 semesters and 2 summer terms **OR** 32 months over 5 semesters and 2 summer terms, depending on the type of Research Project selected. Semester 1 commences in September and the summer term is regarded as a semester. Students in this stream have the option to select either the Research Project (9 credits over 12 weeks duration) or the Environmental Research Project (12 credits over 20 weeks duration). Access to the Environmental Research Project is contingent on student performance in the Semester 1 courses.

Year 1:

- Semester 1 Three core courses (9 credits)
- Semester 2 Three core courses (9 credits)
- Summer Term One speciality course – Environmental Economics (3 credits)* and preparatory work for the major Research Project or Environmental Research Project in Year II

Year II:

- Semester 1 Three speciality courses (9 credits)
- Semester 2 Two speciality courses (6 credits)
- Summer Term Research Project (9 credits) **OR** Summer Term and Semester 1 of the ensuing academic year if the Environmental Research project is selected.

*Students who have elected to do the Environmental Research Project are not required to do Environmental Economics

Courses (Core):

All M.Sc. Streams share the six core courses of three credits each:

Course Code	Course Title	Credits	Course Weighting
	NRM CORE		
ENVR6401	Environmental Law and Multilateral Environmental Agreements	3	Exam 50% Coursework 50%
ENVR6402	Research Methods and Project Management	3	Exam 50% Coursework 50%
ENVR6403	Environmental Impact Assessment	3	Exam 50% Coursework 50%
ENVR6404	Principles and Practice of Geoinformatics	3	Exam 50% Coursework 50%
ENVR6405	Management and Analysis of Environmental Data	3	Exam 50% Coursework 50%
ENVR6406	Socio-ecology and Natural Resource Management	3	Exam 50% Coursework 50%

Specialization courses:

1. Integrated Urban and Rural Environmental Management

ENVR6407	Environmental Economics	3	Exam 50% Coursework 50%
ENVR6400	Waste Management Systems	3	Exam 50% Coursework 50%
ENVR6410	Environmental Hazards and their Impacts	3	Exam 50% Coursework 50%
ENVR6420	Health and the Environment	3	Exam 50% Coursework 50%
ENVR6430	National Parks, Tourism and Recreational Amenities	3	Exam 50% Coursework 50%
ENVR 6440	Land and Water	3	Exam 50% Coursework 50%
ENVR6500	Research Project	9	

2. Disaster Risk Management

ENVR7130	Hazard Vulnerability and Risk Analysis	4	Exam 60% Coursework 40%
ENVR6410	Hazards and their Impacts	3	Exam 50% Coursework 50%
ENVR 7140	Techniques and Tools in Disaster Risk Management	4	Exam 60% Coursework 40%
ENVR 7170	Disaster Information and Communication	3	Exam 50% Coursework 50%
ENVR7100	Principles of Disaster Risk Management	4	Exam 60% Coursework 40%
ENVR6500	Research Project	9	

3. Marine and Terrestrial Ecosystems (Department of Life Sciences)

BIOL6411	Threats to Tropical Biodiversity	3
BIOL6412	Conservation & Management of Biodiversity	3
BIOL6413	Sustainable Use and Management of Natural Resources	3
BIOL6414	Integrated Coastal Zone Management	3
BIOL6415	Natural Resources and Project Management for Environmental Education	3

ENVR6407	Environmental Economics (**not required by students doing BIOL6550-Environmental Research Project**)	3
ENVR 6500	Environmental Project	9
	OR	
BIOL6550	Environmental Research project	12

M.Sc. Core Courses (all streams)

1. ENVR6401 Environmental Law and International Environmental Agreements

Credits: 3

Aims and Distinctive Features

This course will provide students with a working knowledge of the philosophical bases and key principles of environmental management, general foundations/sources of environmental law, and an introduction to the history, structure and function of current international environmental agreements (IEAs) specifically related to biodiversity conservation. It will describe specific sector regimes, enforcement of environmental laws and international and regional environmental law. The course will provide students with a clear understanding of the current regional legislative models for biodiversity conservation, and critical international agreements on biodiversity protection.

Course Description

This course will provide students with a background to the sources for existing environmental laws, and of the specific framework for regulation of the environment in the Caribbean region.

It will examine the ways in which human behaviour with respect to the environment is regulated at the international level, with specific reference to key biodiversity-related IEAs. This will involve a brief review of the legal and institutional framework within which international law making on the environment takes place. The course will provide students with a basic understanding of the existing legal environmental regimes of selected Caribbean countries.

The course will then articulate this regional framework within its international context. The course will introduce students to some of the factors that surround and influence the negotiation and implementation of international environmental law. Key IEAs, including the Convention on Biological Diversity, the Biosafety Protocol, the UN Convention on Climate Change, Cartagena Convention, RAMSAR, CITES and Principle on Forests will be used as examples to illustrate the key issues. Students will also be introduced to key regional environmental agreements, including the Cartagena Convention, SPAW Protocol. Additionally, students will be introduced to key issues specific to biodiversity conservation including bio-piracy, liability and

redress, access and benefits sharing, and existing legal models for management of cross-border resources including migratory species and cross-jurisdictional protected natural areas.

Learning Outcomes:

The student who successfully completes this course will be able to:

1. Describe the basic components of environmental law
2. Describe the application and enforcement of environmental law
3. Explain the existing regional legal frameworks for environmental protection
4. Describe the current suite of IEAs and discuss relevant issues related to their regional implementation
5. Summarise and present on a topic relevant to environmental law and IEAs
6. Demonstrate the possession of interpersonal and teamwork skills
7. Demonstrate the possession of skills in self-management

Mode of delivery: Lectures 24 hours; Tutorial/Seminar/Laboratory 24 hours

2. ENVR6402 Research Methods and Project Management

Credits: 3

Aims and Distinctive Features

The goal of this course is to provide students with a solid background in the philosophy of research, research design, in modern methods of data and information collection, as well as in data handling and analysis for environmental management. This will include an introduction to the conceptual and practical aspects of qualitative and quantitative research and the types of topics for which each approach is useful. Students will be introduced to various quantitative and qualitative analytical methods including media and public education, participant observation, participatory action research, media and textual analysis as well as software for data analysis. The modules will provide the student with a broad range of research skills which can be utilized both for the specific Masters project and as a basis for more long-term projects. The course also aims to develop student skills in making oral presentations as well as writing for scientific papers and technical reports.

Learning Outcomes:

On successful completion of the course, the student will be able to:

- outline the principles of scientific research.
- outline the scientific procedures and setting up research questions and hypotheses
- plan and conduct effective search strategies to retrieve, evaluate and identify useful sources

- devise methods appropriate to the questions or hypotheses of a research topic or course of study
- integrate and present information in a coherent and logical form with correctly cited references.
-

Course Description:

Module 1a. Scientific procedures and setting up research questions and hypotheses; project proposals and planning

This Module will examine the purpose of research, paradigms and approaches that shape research and research ethics. Fundamentals of research proposal writing – rationale for proposals, core elements, choosing a topic, the research problem, literature review will follow and finally students will be exposed to alternative knowledge claims, styles of social inquiry (qualitative, quantitative, mixed methodologies), quantitative research design, sampling research techniques and instruments of data collection.

Module 1b. Qualitative analysis; participatory research methods; data collection and management .

This module will examine qualitative and quantitative research by analyzing the strengths and weaknesses of the qualitative approach. An overview of qualitative methods will present: Ethnography, Projective techniques, Observation, Focus groups and Interviewing as well as some issues in qualitative research. Qualitative Analysis Content analysis**,** Visual analysis and practical applications of content analysis and visual methodologies will be covered by In-class exercises.Finally the module will introduce students to questionnaire construction including theoretical perspectives considerations in constructing a questionnaire, types of questions, Layout, Pre-testing and ethical considerations.

Module 2: Quantitative techniques and data presentation for scientific papers and technical report writing.

This module presents alternative knowledge claims including positivism and experimental, interpretive, critical theory (advocacy/participative) and pragmatism. Student will also be introduced to styles of social inquiry: quantitative, qualitative and mixed methodologies as modes of research as well as the modalities of integration in mixed methodologies.

Module 3. The Project Management module is designed to build the capacity among students to guide a project to its successful completion by using project management methods and skills. Projects related to resource management and developments (as it relates to the environment) are the principal focus of the course. This module will attempt to provide a mix of theory and practice with emphasis on practical application of certain project management tools. The objectives of the module are to enable students to internalize key concepts and issues in project management, develop skills in the preparation of detailed project implementation plans, project

scheduling, budgeting, monitoring and control using Microsoft Project, and the procurement of goods, works and services.

Mode of delivery: Lectures 24 hours; Tutorial/Seminar/Laboratory 24 hours

3. ENVR6403 Environmental Impact Assessment
Credits 3

Aims and Distinctive Features

This course provides an overview of the variety of environmental assessment tools available with the selection of the EIA for in depth treatment. It aims to help students understand what impact assessment is attempting to achieve and what constitutes a good EIA and EIS. The course will introduce participants to the fundamental principles and philosophy of EIA, including practical demonstrations for illustrative purposes. The course will expect students to reflect deeply on the limitations and key issues of EIA as it is currently practiced, and suggest creative solutions to advance the effectiveness of EIA as an environmental management tool.

Course Description

The course will begin with a general overview of the variety of environmental assessment tools currently available and an introduction to Environmental Impact Assessment (EIA) including definition, goals, objectives and purpose of EIA, definition of key terms, history of Environmental Impact Assessment and the legislative, policy and institutional framework for EIA.

It will describe the EIA process, with emphasis on biodiversity conservation and sustainable use; the development of the Terms of Reference (TOR) including screening, scoping and public participation; and the assessment of project impacts, including understanding the ecosystem, assessment of significant impacts of the project and impact management.

It will then consider reporting EIS and Environmental Management Plans, review of the EIS, linked to the TOR; and follow up monitoring, auditing, adaptive management and enforcement. Special consideration will be given to public participation, EIA standards, EIA for island, and Strategic Environmental Assessments

Learning Outcomes

The student who successfully completes this course will be able to:

1. Understand the variety of environmental assessment tools available and their key functions
2. Describe the role and intentions of EIA in environmental management for sustainable development

3. Explain processes, principles and supporting legislation
4. Define the objectives of EIA
5. Critically assess the quality of EIA processes and EIA documents, especially TORs and EIS
6. Explain the limitations of EIA in environmental management and issues that require further development to improve the contribution of EIA to sustainable development

Mode of delivery: Lectures 24 hours; Tutorial/Seminar/Laboratory 24 hours

4. ENVR6404 Principles and Practice of Geoinformatics

Credits: 3

Aims and Distinctive Features

The aim of this course is to provide an overview of the main concepts associated with the discipline of geoinformatics. This will include an overview of the various concepts and technologies and techniques available for spatial decision making. Students will benefit significantly from this because the information provides a foundation for spatial decision-making.

Course Content

This course will provide an overview of the principles of geoinformatics including an introduction to geographic information systems, Global Positioning Systems and field survey techniques. Following an introduction to geoinformatics and definitions, the course will cover spatial data acquisition using GPS and field survey techniques, GIS data structures and capabilities. It will describe GIS and network analysis and spatial data analysis, and GIS functionality. Finally it will consider hardware and software systems and the design and implementation of GIS.

Learning Outcomes

The student who successfully completes this course will be able to:

- Examine the nature of GIS and its information technology, cartographic and geographic basis
- Explain the basic principles underpinning GIS
- Critically examine the advantages and shortcomings of the major GIS approaches and their suitability for different applications
- Discuss the main issues surrounding data requirements, quality, analysis and management

Mode of delivery: Lectures 24 hours; Tutorial/Seminar/Laboratory 24 hours

5. ENVR6405 Management and Analysis of Environmental Data

Credits: 3

Aims and Distinctive Features

The aim of this course is to provide students with a fundamental understanding of the importance of storage, retrieval and analysis of environmental data. In particular, the course will provide practical training in statistical analysis of environmental data and demonstrate the storage and retrieval of biodiversity information using national and international databases. As such, this course will show students how data, through appropriate management and analysis, becomes information which then informs the decision making process. In addition, it will provide the student with fundamental skills which may underpin many elements of their future research project and career.

Course Description

This course will provide practical training in data management and in statistical analysis of environmental data. Students will initially review fundamental univariate numerical techniques, including basic parametric and non-parametric statistics. Students will then complete task sheets which, thereby, demonstrate an understanding of the application of appropriate tests to datasets. These sheets will be completed using either of the statistical package Statistix and/or Minitab. The course will then progress to explore the use of multivariate statistical techniques to analyse detailed environmental datasets. Students will also be introduced to the use of Bayesian statistics, and biodiversity specific data analysis software including DISTANCE and Vortex.

Learning Outcomes

The student who successfully completes this course will be able to:

1. Describe the process of good experimental design in ecological studies
2. Select appropriate statistical analyses with which to examine various datasets
3. Apply appropriate parametric or non-parametric statistical analyses to data
4. Analyse univariate data using Minitab/ Statistix and interpret the results of such analyses
5. Explain the uses and application of various multivariate statistical analyses to ecological data
6. Summarise and present on an application of data analysis
7. Demonstrate the possession of group and team-working skills

Mode of delivery: Lectures 24 hours; Tutorial/Seminar/Laboratory 24 hours

6. ENVR6406 Socio-ecology and Natural Resources Management

Credits 3

Aims and Distinctive Features

The Convention on Biological Diversity expressly recognizes the importance of rural, indigenous and traditional users of biodiversity. The primary purpose of this course is to provide students with an introduction to the cultural, socio-economic and traditional beliefs, values and attitudes that affect the way rural, tribal and other indigenous users of natural resources interface with these resources. It also introduces the students to the approaches available to natural resource managers to integrate these users in sustainable management of biodiversity. The course will serve as an introduction for those students who have had little exposure to the disciplines of economics, social psychology, demography, and social organization to the issues surrounding the use of natural resources by rural and indigenous peoples.

Course Description & Structure

Successful natural resources management requires the development of consensus of all stakeholders on the goals of such management and the activities to be undertaken to achieve such goals. The need for such a consensual approach is especially important in biodiversity management situations where indigenous, tribal and rural communities have traditionally used or hold rights to access and utilization of such resources. To enable the students to understand the context for these types of challenging resource management scenarios, the course begins by introducing current sociological thinking on the nature of, and relationships between, human values, beliefs, and attitudes to nature. It then reviews western scientific approaches to renewable resources management in the context of traditional economically driven resource production. The students will then review through case studies regional examples of natural resources use by rural, tribal indigenous peoples and compare and contrast the bases for these interactions with western, science-based natural resources management. Finally the students will be introduced to the basic tools currently used by natural resource managers to assess impacts on management interventions on rural and indigenous peoples, and tools for integrating these communities in resource management decision making.

Learning Outcomes

The student who successfully completes this course will be able to:

- Explain how beliefs, values and attitudes are currently understood to shape human behaviours towards natural resources.
- Describe the interrelationships between capitalism, science and western-style forestry, wildlife management and fisheries management;
- Explain and discuss, using named regional examples, the historical and current economic and cultural relationships between indigenous users and natural resources.

- Understand and describe the challenges faced by natural resource managers responsible for integrating rural and indigenous people in sustainable forestry, wildlife and fisheries management.
- Describe and understand the use of social impact assessment tools in management of natural resources utilized by rural, indigenous and traditional users of biodiversity.

Mode of delivery: Lectures 24 hours; Tutorial/Seminar/Laboratory 24 hours

SPECIALIZATION COURSES

1. M.Sc. Integrated Urban and Rural Environmental Management

1. ENVR 6400: Waste Management Systems

Credits: 3

Aim:

This course provides students with an understanding of the importance of the design of an integrated waste management system to achieve the objectives of sustainable development in developing countries, with specific emphasis on the Caribbean region.

Course Outline

The course will examine both technical and societal issues, laws and policies relating to waste management systems and pollution control in developing countries, especially the Caribbean states. It examines:

- the issues of governance and institutional arrangements in solid waste management with reference to the concept of public goods in environmental management
- the effects of the industrial and technological revolutions, as well as the current chemical revolution on solid waste composition and characteristics
- the implications of non-integrated solid waste management systems for environmental management and sustainable development
- issues of wastewater treatments in the Caribbean and the implications for integrated environmental management and sustainable development.
- the impacts of poor wastewater treatments on groundwater quality within the context of urban and rural environments and the implications for water quality, food production systems and public health.

Discussions on measures of water quality, monitoring of water quality, main sources of pollution including municipal, industrial and agricultural, the geochemical cycle of ground and surface water and pollution control measures are also included.

This will be delivered in three modules:

Module 1 Sustainable solid waste management

Module 2 Policies and social issues in the urban solid waste management system

Module 3 Pollution and wastewater treatment

Learning outcomes:

The student who successfully completes this course will be able to:

1. **Discuss the interactions between the different components of the integrated solid waste and wastewater management systems**
2. **Analyse the relationship between the ecosystem and waste generation**
3. **Review the history of waste management with reference to the creation of cities, and the industrial and technological revolutions**
4. **Discuss the interactions between the goals and principles of sustainable development and integrated solid waste and wastewater management systems in rich and poor countries**
5. **Compare and contrast different case studies and specific projects addressing issues of solid waste and wastewater management in the Caribbean Region.**

Mode of delivery: Lectures 24 hours; Seminars/Group Discussions/Fieldwork 24 hours

2. ENVR6407 Environmental Economics

Credits : 3

Aims and Distinctive Features

The primary purpose of this course is to provide students with an introduction to environmental and natural resource economics. The secondary purpose is to give students insight into how economists think about the environment and how they approach environmental problems. It will provide an introduction to economic value of environmental assets and costs of environmental problems. It will provide students with the basic theory in environmental and natural resource economics and how this underpins environmental management policy and decision making.

Course Structure

The course will begin by introducing basic economic principles and exploring the limits of human nature in dealing with environmental degradation. It will then consider environmental economics from several perspectives, examine various economic tools and discuss their

limitations. Using examples, it will then apply these tools to everyday scenarios that illustrate the possibilities and limitations of economics in resolving environmental and natural resource issues.

Learning Outcomes

The student who successfully completes this course will be able to:

1. Define and describe key concepts in environmental economics.
2. Empirically solve problems of natural resource distribution.
3. Evaluate the feasibility of policies and their theoretical expected outcomes for solving environmental problems, in a Caribbean context.
4. Differentiate and defend the choice of policies to solve specific environmental problems
5. Demonstrate the critical analysis of academic information and literature

Mode of delivery: Lectures 24 hours; Tutorial/Seminar/Laboratory 24 hours

3. ENVR 6410: Hazards and their Impacts

Credits: 3

Aim

This course provides a review of major hazards and their impacts, particularly those to which the Caribbean region is vulnerable. The focus is on the characteristics of these hazards including the physical as well as social contexts in which they are generated. Their impacts on the social as well as on the physical environment are also addressed. In this context the course examines hydro-meteorological hazards, geo-hazards, human induced hazards and the emergent issues related to climate change.

Objectives

During this course participants will investigate:

- the characteristics and impacts of hydro-meteorological hazards
- the characteristics and impacts of geo-hazards
- the characteristics and impacts of human-induced hazards
- the projected influence of climate change on hazards

Learning Outcomes

On completing this course participants will:

- understand the characteristics and impacts of main categories of hazards
- appreciate the strategies employed for mitigation of the impact of different hazards
- understand the intersect among hazards, environment and development
- understand the importance of mitigation in reducing the impact of hazards

- understand the projected impact of climate change on hazards
- understand the role of recovery and reconstruction in reducing vulnerability

Course Outline

- Hydro-meteorological hazards – cyclones, floods, drought
- Geo-hazards – earthquakes, tsunamis, landslides/debris flows, volcanoes
- Human-induced hazards - hazardous material spills, industrial accidents
- Climate change and hazards
- Health related – epidemics, environmental/public health hazards
- Mitigation and risk reduction for hazards
- Recovery and Reconstruction

Mode of delivery: Lectures 24 hours; Tutorial/Seminar/Laboratory 24 hours

4. ENVR 6420: Health and the Environment

Credits: 3

Aim

This course reviews concepts of health within an environmental context, and is designed to develop an understanding of what constitutes the health of a society.

Course Outline

- Identification and examination of the role of the natural environment in providing resources and services on which human beings depend.
- An ecosystem approach is adopted to underscore the relationship between the health of the living and the non living players on this planet.
- An emphasis the ecological perspective that is necessary to ensure a more effective management of ecosystems and a more sustainable future beyond traditional definitions of and concerns about human health.
- An examination of environmental impacts on health especially in island settings.
- Student analysis/critique of demographic, environmental, health data and policy issues.
- The importance of health and medical management issues involved in disaster management and an introduction to a range of medical and health issues that are inherent in emergency management and discusses methods for integrating medical, public health and psychological processes in emergency management.
- Creation a forum in which students broaden their understanding of the way in which human alterations of the environment create threats to which large numbers of people are exposed and stimulate discussions of possible solutions.

The course will be delivered in three modules:

Module 1 Determinants and comparative perspectives on island health

Module 2 Health and medical issues in disaster management

Module 3 Public health and psychological processes in emergency management

Learning Outcomes

The student who successfully completes this course will be able to:

- Describe the relationship between the health of ecosystems and human health
- Discuss the changes in the drivers that directly and indirectly affect ecosystems
- Understand health and medical issues in disaster management
- Explain various methods by which health, medical and psychological processes can be integrated into emergency management.
- Explain the manner in which changes in the drivers impact on services provided by ecosystems.
- Understand the implications of these changes to human health

Mode of delivery: Lectures 24 hours; Tutorial/Seminar/Laboratory 24 hours

5. **ENVR 6430: National Parks, Tourism and Recreational Amenities**

Credits: 3

Aim

This course will examine the tourism and leisure industry with particular emphasis on its impacts, the sustainable management of tourism and recreation amenities, in particular, the mitigation of negative impacts, the management of National Parks and other protected areas with particular respect to recreational use. It will also examine environmental education and communication and the interrelationship with and application to tourism and the management of national parks and recreational amenities.

Course Outline

- Concepts such as sustainable tourism, greening of tourism, nature tourism, ecotourism and community-based tourism.
- Ecosystem and human health to provide a sound basis for practical work in policy development, planning and management of natural resources.
- National Parks internationally are considered natural areas protected usually by national legislation, and managed mainly for ecosystem protection and recreation. As different countries may use the term ‘national park’ to mean different things, the World Conservation Union has established a categorization system with a series of Roman

numerals I through VI being used to designate protected areas according to the same criteria regardless of the name assigned nationally. Under this system, National Parks in the USA are Category II whilst National Parks in the UK are Category V, however despite differing conservation purposes, both types of sites are managed for recreational use by both domestic and international tourists.

- Perspectives on the concept of Ecotourism
- A consideration of sustainable development being 'de rigueur' in any country of the world, use of natural and cultural sites (whether they are national parks or not) for recreation whether by day trippers, domestic or international tourists, issues of sustainability.
- Responsible Environmental Behaviour (predictors; categories)
- Environmental Literacy
- Ecological Identity
- Antecedents of Environmental Education
- Implementation Tools for Environmental Education & Communication

Learning Outcomes

The student who successfully completes this course will be able to:

1. Understand the relationship between tourism, recreation and natural resource management
2. Explain core concepts in tourism and understand their relevance in the wider contexts of sustainable development
3. Summarize and present on topics such as sustainable tourism, ecotourism and community-based tourism
4. Compare and contrast different case studies and specific projects addressing issues relating to tourism and recreation policy development, planning and management of natural resources.

Mode of delivery: Lectures 24 hours; Tutorial/Seminar/Laboratory/Field Trips 24 hours

6. ENVR 6440: Land and Water

Credits: 3

Aim

This integrated Land and Water course examines land use and management issues and integrated management of fresh water resources.

Course Description

- An examination of issues relating to sustainable land use and management, with respect to the global food problem and Caribbean food security.
- A review of the knowledge-based procedures that help integrate land, water, biodiversity, and environmental management to meet rising food and fibre demands while sustaining ecosystem services and livelihoods.
- An examination of issues and strategies relating to sustainable land use and management, with emphasis on land degradation, and water management.
- The use of country case studies by students to assess the current situation of food security among selected Small Island Developing States (SIDS), particularly those in the Caribbean.
- An introduction to fundamental considerations in the integrated management of fresh water resources to include exploitation and delivery phases. These fresh water resources are vital for meeting basic needs and inadequate protection and management of these resources can set significant limits to sustainable development, especially in small island developing states.
- Identification of sound long term management strategies for water catchment and storage areas as well as the treatment and distribution of water resources are of critical environmental and economic importance.
- An examination of water as a resource, issues in water management, a framework for water management strategies, water resource systems, water use, conveying and distributing water, water quality, wastewater treatment, an integrated approach to mitigating the impacts of natural hazards on water systems, and financial considerations in water supply, sanitation and sustainability.

The course will be delivered in three modules:

Module 1 Water resource systems; Water and Society

Module 2 Integrated Water and Land resource management

Module 3 Food Security issues in SIDS

Learning Outcomes

The student who successfully completes this course will be able to:

1. Describe the processes that help to integrate land, water, biodiversity, and environmental management within the context of sustainable development and livelihood strategies
2. Understand the vital importance of water resource management in meeting the objectives of sustainable development, with emphasis on small island developing states
3. Compare and contrast different case studies and specific projects addressing issues relating to food security and the treatment and distribution of water resources among selected small island developing states.

Mode of delivery: Lectures 24 hours; Tutorial/Seminar/Laboratory/Field Trips 24 hours

2. Disaster Risk Management

1. ENVR 7100: Principles of Disaster Risk Management

Credits 4

Aim

The primary aim of this course is to introduce the basic principles and key concepts in Disaster Risk Management. This course also reviews the exposure of the Caribbean region to hazards and explores planning for hazards and their impacts. (highlights the legislative and policy-response framework that have evolved for disaster loss-reduction in the region - moved to evolution of disaster management)

Objectives

During this course participants will:

- explore the philosophy behind the definition of and approaches to disaster management
- examine key concepts in disaster risk management
- evaluate disaster management vs. disaster risk management approaches( )
- examine the physical, social and economic vulnerability of the Caribbean region to hazards
- examine the economic impacts of disasters on countries of the Caribbean
- examine the rationale for Disaster Management within the context of sustainable development
- examine the characteristics of the Disaster Cycle and other disaster management models
- explore current disaster management planning approaches in the Caribbean
- examine methods of emergency management applied in the Caribbean

Learning Outcomes

On completion of this course participants will:

understand the effects of disasters on development

- understand the fundamental concepts of disaster risk management
- demonstrate clear understanding of the specific vulnerability of the Caribbean region to different types of hazards
- show critical awareness of the legislations, policies and initiatives that have evolved for disaster risk-reduction (move to Evolution of Disaster Management)

- effectively communicate related facts and arguments
- understand key issues related to planning for the impact of hazards
- understand basic principles of planning for emergencies

Syllabus Outline

- Concepts and issues in disaster risk management
- Socio-cultural context of disaster risk management
- Ideological context and approaches to disaster risk management
- The Disaster Management Cycle and other models
- Environmental and socio-economic impacts of disasters in the Caribbean and their underlying causes
- Emergency Operations Centre management
- Development of national disaster management plans
- Community-based Disaster Risk Management Planning

Schedule

- Lectures: 36 hours
- Seminars and Group Discussions: 24 hours

2. ENVR 7130 Hazard Vulnerability and Risk Analysis

Credits 4

Aim

The ability to assess the impacts and potential impacts of hazards on vulnerable systems is a critical component of disaster management. In that regard this course focuses on methodologies utilized in vulnerability analysis. The concept of analysis provides the background for regional as well as social vulnerability analysis. Regional vulnerability focuses on the geographical as well as geological factors that influence the vulnerability of a site. Social vulnerability focuses on the socio-economic conditions that aggravate the susceptibility of society to the impacts of hazards. Risk represents the intersection of hazards, exposure and vulnerability, and will be examined qualitatively and quantitatively.

Objectives

During this course participants will:

- examine the concept of hazard / vulnerability analysis
- review methodologies used in Regional Vulnerability Analysis
- review methodologies in Social Vulnerability Analysis
- Examine risk as a social construct

- Examine risk as a quantitative concept
- Review methodologies used in risk analysis
- Examine the application of hazard and risk maps to development planning
- Examine instruments for risk transfer

Learning Outcomes

On completing this course participants will:

- demonstrate clear understanding of the concept of hazard, vulnerability and risk analysis
- be critically aware of the methodologies of and be able to conduct regional vulnerability analysis
- understand the methodologies of and be able to conduct social vulnerability analysis be critically aware of methodologies used in risk analysis

- understand the importance of hazard, vulnerability and risk analysis to planning
- understand the importance of hazard/risk maps to development planning

Syllabus Outline

- Concept of Analysis
- Techniques of Analysis
- Physical Vulnerability Analysis in Caribbean context
- Social Vulnerability Analysis in Caribbean context
- Methods of Risk analysis
- Use of hazard/risk maps in development planning
- Risk analysis and risk transfer – the role of insurance
- The price of poor planning

Schedule

- Lectures: 36 hours
- Seminars and Group Discussions: 24 hours

3. ENVR 6410: Hazards and their Impacts

Credits: 3

Aim

This course provides a review of major hazards and their impacts, particularly those to which the Caribbean region is vulnerable. The focus is on the characteristics of these hazards including the physical as well as social contexts in which they are generated. Their impacts on the social as well as on the physical environment are also addressed. In this context the course examines

hydro-meteorological hazards, geo-hazards, human induced hazards and the emergent issues related to climate change.

Objectives

During this course participants will investigate:

- the characteristics and impacts of hydro-meteorological hazards
- the characteristics and impacts of geo-hazards
- the characteristics and impacts of human-induced hazards
- the projected influence of climate change on hazards

Learning Outcomes

On completing this course participants will:

- understand the characteristics and impacts of main categories of hazards
- appreciate the strategies employed for mitigation of the impact of different hazards
- understand the intersect among hazards, environment and development
- understand the importance of mitigation in reducing the impact of hazards
- understand the projected impact of climate change on hazards
- understand the role of recovery and reconstruction in reducing vulnerability

Course Outline

- Hydro-meteorological hazards – cyclones, floods, drought
- Geo-hazards – earthquakes, tsunamis, landslides/debris flows, volcanoes
- Human-induced hazards - hazardous material spills, industrial accidents
- Climate change and hazards
  - Health related – epidemics, environmental/public health hazards
  - Mitigation and risk reduction for hazards
  - Recovery and Reconstruction

Mode of delivery: Lectures 24 hours; Tutorial/Seminar/Laboratory 24 hours

4. ENVR 7140 : **Techniques and Tools in Disaster Management**

Credits 4

Aim

This course introduces some of the primary techniques and tools employed in the management of disasters. Geographical Information Systems (GIS) has emerged as a primary and powerful tool for vulnerability assessment and analysis. This technique is essential to hazard mapping and various disaster prediction techniques including the building of disaster scenarios. The Disaster Imagination Game (DIG) is a recent technique that has emerged in the Japanese disaster management environment and has the potential for transfer and application in most regions of the world. The technique is cost effective and simple and is therefore particularly relevant to developing countries such as those in the Caribbean region.

Objectives

During this course participants will:

- examine selected techniques commonly employed in disaster risk management
- examine key tools that can be used for the effective management of disasters
- examine modeling techniques used in hazard management e.g. flood hazard modeling
- examine the use of remote sensing and GIS techniques in disaster risk management
- examine the use of information technology in the management of hazards and disasters

Learning Outcomes

On completing this course participants will:

- demonstrate clear understanding of key techniques used in disaster risk management and be able to apply them
- demonstrate clear understanding of the application of Geographic Information Systems to disaster risk management
- demonstrate clear understanding of the use of remote sensing methods in disaster risk management
- Demonstrate clear understanding of the application of information technology to disaster risk management

Syllabus Outline

- GIS in disaster risk management
- Hazard Mapping
- Forecasting and modeling techniques including climate change
- Disaster Imagination Game (DIG)
- Remote sensing techniques
- Information technology-based emergency management techniques

Schedule

- Lectures: 24 hours (36 hrs)
- Seminars and Group Discussions: 24 hours

5. ENVR 7170 : **Disaster Information and Communication**

Credits 3

Aim

The generation and effective dissemination of information is probably the most critical component of disaster management. This course highlights the strategies and principles of effective dissemination of disaster related information, focusing on the role of hazard maps, of media as well as international and inter-organizational channels for information sharing. The effectiveness of disaster information is also influenced by underlying issues relating to human perceptions and behavioural patterns throughout the disaster cycle.

Objectives

During this course participants will:

- evaluate the role of information in crisis and response management
- evaluate and determine disaster and crisis information requirements
- examine information technology applied to crisis, disaster and emergency management
- examine cause and effects of information breakdown during crisis and disasters
- examine the role of public awareness and information outside of crises and disasters
- examine the role of the media in increasing public awareness on hazards and disasters
- examine how human beings perceive and personalize risk

Learning Outcomes

On completing this course participants will:

- demonstrate understanding of the role of information in disaster management
- demonstrate understanding of disaster information requirements
- have practical knowledge of information technologies applicable to disaster and crisis management
- have clear understanding of the cause and effect of information breakdown during disasters
- understand how human beings perceive and personalise risk

Syllabus Outline

- Role of information and communication in disaster management
- Determination of disaster and crisis information and communication requirements

- Communication techniques
- Information technology in disaster risk management
- Common causes and effect of information breakdown
- Public awareness and education in disaster risk management
- Crisis communication
- Communicating with various target audiences
- Risk perception

Schedule

• Lectures: 24 hours
• Seminars and Group Discussions: 24 hours

3. Marine and Terrestrial Ecosystems

1. BIOL6411: Threats to Tropical Biodiversity

Credits: 3

Aim

This course will provide student with a detailed appreciation of the main threats facing global biodiversity and particularly tropical biodiversity. It will describe the critical processes impacting a variety of tropical systems and explore the underlying pressures on these ecosystems while providing the fundamental framework and concerns which underpin and drive current environmental management practices.

Course Description

This course will examine the major threats to tropical biodiversity and ecosystems. It will highlight the major threats, as described in the CBD: habitat loss and degradation, over-exploitation, climate change, pollution and introduction of alien species. It will also examine the history of human intervention in tropical environments.

In relation to loss of genetic diversity issues including threats to genetic diversity, loss of populations, reductions in heterozygosity and their consequences, inbreeding depression and genetic bottlenecks will be considered.

Using examples, and case studies, major threats will be considered in relation to the impacts being seen on selected ecosystems. It will include a description of human altered terrestrial and coastal environments.

Consideration will also be given to the issues of environmental stress including impacts of pollution and climate change on terrestrial and marine systems. Evidence for global warming, impacts on species and ecosystems and methods for the detection of climate change will be described.

Learning Outcomes

The student who successfully completes this course will be able to:

1 Discuss the principle threats confronting global biodiversity and tropical diversity

2 Explain the impact and consequence of these threats to a variety of tropical ecosystems

3 Describe the major underlying pressures which drive the main threats to tropical biodiversity

4 Compare and contrast the major threat to particular tropical ecosystems

5 Summarise and present on topics relevant to the threats to tropical biodiversity

6 Demonstrate the critical analysis of scientific information and literature

Mode of delivery: Lectures 24 hours; Tutorial/Seminar/Laboratory 24 hours

2. BIOL6412: Conservation & Management of Biodiversity

Credits: 3

Aim

This course will provide an advanced and detailed review of the theoretical basis for conservation practice and review issues relevant to tropical biodiversity conservation. It is structured to provide the critical biological underpinning for other courses in the M.Sc. programme.

Course Description

This course will provide students with a detailed review of the key elements of ecology and biology that are relevant to understanding the context, threats and current approaches to conservation of biological diversity. It takes an approach that ranges in scale from the molecular to ecosystem, and includes elements of demography and population dynamics (particularly of small populations), landscape ecology, measurement of biological diversity, and ecosystem patterns and processes. It also includes a brief introduction to the historical and socio-economic factors leading to the current anthropogenic

biodiversity crisis, and outlines the range of approaches currently taken by conservation biologists to address these threats. This will be placed in the context of international treaties including the Convention on Biological Diversity.

The molecular genetic component of the course will cover such topics as: concepts of molecular genetics, intra-specific variation, inter and intra-specific genetic diversity, processes of evolution, allopatric and sympatric speciation. Overviews will be given of modern molecular methods for detection of genetic species/ heterozygosity. The importance of intra-specific heterozygosity will be highlighted in relation to current understanding of evolution and adaptation, with specific reference to the Caribbean.

It will define species diversity, explore the cline in diversity between the tropics and the poles, and define concepts such as endemicity and keystone species. The exploration of these concepts will be used as a segue to identification of the unique elements of continental and insular Caribbean biodiversity, and to introduce students to the processes that maintain diversity of different ecosystems in the region.

The course will describe the important tropical ecosystems including forest, savannah, riverine, lake, wetland, mangrove and coastal systems including coral reefs of the region. In each case the systems will be considered holistically in relation to their diversity, ecology, ecosystem function, goods and services.

Learning Outcomes

The student who successfully completes this course will be able to:

1. Describe and demonstrate an understanding of the underlying population biology and key genetic and molecular biology issues of importance to conservation science;
2. Explain the energetic, nutrients and ecosystem level patterns and processes found in Neotropical ecosystems;
3. Describe and discuss the methods used to select, design and manage protected natural areas, and the discuss their importance as tools for biodiversity conservation;
4. Discuss the role of human communities in protected areas management and sustainable natural resource use;
5. Demonstrate an understanding of the approaches used in coastal, marine and freshwater protected areas management
6. Demonstrate an understanding of the tools and techniques used in exsitu conservation and ecological restoration

Mode of delivery**:** Lectures 24 hours; Tutorial/Seminar/Laboratory 24 hours

3. BIOL6413 : Sustainable Use and Management of Natural Resources

Credits: 3

Aim

The aim of this course is to familiarize students with contemporary issues regarding sustainable use of tropical resources and sustainable development. The mainstreaming of biodiversity within development is a priority for the Conference of the Parties of the Convention on Biological Diversity (CBD) and this course will explore some of the key issues and problems associated with this process. It will introduce students to renewable ecosystem-based industries and the environmental issues historically associated with their operation and consider what is required of these sectors as they move toward sustainability.

Course Description

This course will address important tropical ecosystem based industries including forestry, agriculture, fisheries, energy, the pharmaceutical industry and tourism. In order to be sustainable, these industries will have to adopt environmental activities as core to their business, rather than consider them as an overhead. Topics covered in this course will include an analysis and determination of land capability and optimal land use. Social aspects of land use and land degradation, together with the need for participatory approaches in sustainable development, will be discussed. The need for the integration of soil and water conservation into farming systems, integrating water needs in agriculture with industrial and potable supply requirements.

Agro-ecological systems will be considered in relation to sustainable mono-cropping, multiple cropping and agro-forestry systems for tropical environments. Sustainable forestry and timber production will also be examined. The need for development and exploitation of alternative energy sources including solar energy, hydroelectric, wind power, turbines and farms, wave power, deep water wave devices will also be considered in response to anticipated climate change issues.

Finally, current issues of fishery management will be examined as countries try to achieve sustainability in tropical capture fisheries, including management of freshwater environments for fisheries production, the integration of aquaculture production systems into agricultural and water conservation practices.

Learning Outcomes

The student who successfully completes this course will be able to:

1. Explain the underlying concepts for sustainable use of natural resources;
2. Describe the properties of Neotropical soils and how these properties affect sustainable land-use, water conservation and land capability;
3. Explain the characteristics of Neotropical agro-ecological and agro-forestry systems and discuss the properties of sustainable models for such systems
4. Demonstrate an appreciation of the techniques and principles associated with sustainable timber, NTFP, wildlife, and capture fisheries management, and the role of these management strategies in carbon sequestration (soil based & REDD+).
5. Describe the current status of development and exploitation of biodiversity-based sources of renewable energy in the wider Caribbean, including biofuels;

6. Discuss the role of aquaculture in sustainability of marine and freshwater fisheries;
7. Explain the role of ecotourism and other non-consumptive uses of biodiversity in achieving sustainable use of

Mode of delivery**:** Lectures 24 hours; Tutorial/Seminar/Laboratory 24 hours

4. BIOL6414: Integrated Coastal Zone Management.

Credits: 3

Aims

- To promote best practices in the field of integrated coastal management in order to address environmental issues and conflicts associated with exploitation of coastal resources.
- To facilitate the application of social analysis, economic evaluation, EIA, GIS and alternative dispute resolution techniques to resolve coastal issues.
- To analyse the composition of stakeholders involved in any issue and evaluate the coastal resources management in the region towards the formulation of a regional strategy for ICM.

Learning Outcomes: On successful completion of the course, students will be able to:

- Articulate basic concepts in ICM
- Discuss international agreements and global issues related to ICM
- Describe institutional arrangements in ICM
- Describe the Caribbean coastal environment and the tools and processes applied in ICM
- Articulate the major coastal problems in the Caribbean
- Describe regional management regime and policies in operation in the Caribbean.

Course Description:

- Integrated coastal management concepts and practices
- Instructional arrangements in integrated coastal management
- Economic valuation
- Environmental Impact Assessment and Strategic Environmental Assessments
- Social Analysis
- The Caribbean Coastal Environment
- Major coastal problems in the Caribbean
- Integrated Coastal Management in the Caribbean Region
- Integrated Coastal Management Studies in the Caribbean

Practical exercises will be conducted on the above mentioned topics

Mode of delivery: Lectures 24 hours; Tutorial/Seminar/Laboratory 24 hours

5. BIOL6415: Natural Resources and Project Management for Environmental Education

Credits: 3

Aim

Biodiversity represents a fundamental resource for education and recreation. The biologist serves as a mediator interpreting the biological features of students and visitors. The course aims at introducing effective means of communication and interpretation.

Learning Outcomes

Upon successful completion of this course the student will be able to:

- Evaluate methods of public relations in natural resources management.
- Develop information material using multiple media to interpret natural resources.
- Design and implement interpretative facilities.

Course Description

- Natural Resources Public Relations:
  - methods of disseminating public information;
  - planning outreach programmes;
  - public involvement methods.
- Interpretive Media Development: written and graphic media
  - Including brochures, posters and signs; slide shows and videos;
  - interactive media using electronic technologies.
- Interpretive Facilities Planning:
  - exhibitions; visitor centres; nature trails.

Mode of delivery: Lectures 24 hours; Tutorial/Seminar/Laboratory 24 hours

6. ENVR6407: Environmental Economics

Credits 3

Aim

The primary purpose of this course is to provide students with an introduction to environmental and natural resource economics. The secondary purpose is to give students insight into how economists think about the environment and how they approach environmental problems. It will provide an introduction to economic value of environmental assets and costs of environmental problems. It will

provide students with the basic theory in environmental and natural resource economics and how this underpins environmental management policy and decision making.

Course Structure

The course will begin by introducing basic economic principles and exploring the limits of human nature in dealing with environmental degradation. It will then consider environmental economics from several perspectives, examine various economic tools and discuss their limitations. Using examples, it will then apply these tools to everyday scenarios that illustrate the possibilities and limitations of economics in resolving environmental and natural resource issues.

Learning Outcomes

The student who successfully completes this course will be able to:

1. Define and describe key concepts in environmental economics.
2. Empirically solve problems of natural resource distribution.
3. Evaluate the feasibility of policies and their theoretical expected outcomes for solving environmental problems, in a Caribbean context.
4. Differentiate and defend the choice of policies to solve specific environmental problems
5. Demonstrate the critical analysis of academic information and literature

Mode of delivery: Lectures 24 hours; Tutorial/Seminar/Laboratory 24 hours

Additional Information/Notes:

Before applying to the M.Phil/Ph.D Programmes, candidates should contact the Head, Centre for Environmental Management to discuss their proposed topic before submitting an application. Contact information: email**: environmental.management@uwimona.edu.jm**

Department Contact Information:

Prof. Dale Webber, Head, Centre for Environmental Management: Tel. 702-4152

Programme Coordinator**:** Dr. Vivienne Vassall, Tel. 702-4152

DEPARTMENT OF LIFE SCIENCES

Head: Dr. Dwight Robinson

The Department of Life Sciences seeks to realize the University's mission by making available, through excellence in teaching, research and outreach, high quality education and training for students of biology such that they are prepared to function as biologists in the regional and global arena. In addition to the BSc Level courses the Department offers research programmes leading to the award of the MPhil and PhD degrees in Botany, Zoology, Experimental Biology, Environmental Biology or Oceanography. Registration for the research degrees may be on a part-time or full-time basis. The Department also offers the taught MSc Courses in Plant

Production and Protection and from September 2010 will offer in collaboration with the

Department of Management Studies the MSc in Agricultural Entrepreneurship.
An MSc degree will normally take between 18 and 24 months and is done on evenings and weekends. The MPhil degree normally takes two to three years of intensive research on a full-time basis, while a PhD degree usually takes three to four years. For the award of the degree, the student submits a thesis and defends this in an oral (viva) examination. Normally research leading to a Ph.D would demonstrate a level of originality beyond that of an M.Phil and the research would incorporate an experimental component.

Departmental Courses
Students are also expected to read prescribed courses viz BL60C Research Methodology, Project Management and Technical Report Writing (4 credits) and BL60D Literature Review (4 credits). The intention of these courses is to provide students with research techniques and skills that will not only help them to complete their current research topic, but strengthen their practical application skills for life after university.

The Department of Life Sciences offers the following Graduate programmes:

MSc Plant Production and Protection
MSc Marine and Terrestrial Ecosystems: Assessment, Conservation and Management
MSc Agricultural Entrepreneurship
MPhil/PhD (by research)
Botany
Environmental Biology
Marine Biology
Oceanography & Zoology

MSc Plant Production and Protection

Programme Objectives:
On successful completion of the programme, students will be knowledgeable about the following:

1. production systems, productivity and propagation techniques;

2. the influence of soil and climate on plant growth, production systems, and pest and disease development;

3. the significance of weeds, diseases and pests in plant production systems;

4. management of weeds, diseases and pests;

5. techniques for evaluating the significance of various factors affecting plant production and productivity;

6. factors to be considered for harvesting, storage and transport of produce.

Entry Requirements:
Bachelor of Science (Honours) degree in the biological or agricultural sciences

Duration of programme:
Two years part-time

Programme Structure:

Year 1
BL60EResearch Methods in Biology
BL62APlant Production and Propagation Systems (4 credits)
BL62BPlants and Soils (4 credits)
BL62CPlants and Climate (4 credits)

Summer of year 1
BL62DHarvesting and Post-Harvest Management (4 credits)

Year 2
BL62EPrinciples of Plant Pathology (4 credits)
BL62FPlant Diseases and their Control (4 credits)
BL62GThe Biology and Ecology of Insect Pests ofPlants (4 credits)
BL62HThe Management of Insect Pests of Plants (4 credits)

Summer of year 2
BL61FResearch Project (12 credits)

Courses(Core):

Course Code	**Course Name**	**No. of Credits**
BL 60E	Research Methods in Biology	4
BL 62A	Plant Production and Propagation Systems	4
BL 62B	Plants and Soils	4
BL 62C	Plants and Climate	4
BL 62D	Harvesting and Post-Harvest Management	4
BL 62E	Principles of Plant Pathology	4
BL 62F	Plant Diseases and their Control	4
BL 62G	The Biology and Ecology of	4

	Insect Pests of Plants	
BL 62H	The Management of Insect Pests of Plants	4
BL 61F	Research Project	12

Department Contact Information:

Department of Life Sciences
4 Anguilla Close
UWI MonaTel: 927-1202Fax: 977-1075
Programme Coordinator:
Professor Phyllis Coates-Beckford

Diploma in Plant Production

There are persons working in specialized areas of the plant sciences, some with a higher degree, who may desire or need to increase their knowledge in related areas in the plant sciences. A programme leading to a Diploma in Plant Production would offer such an opportunity.

The required courses for this Diploma are courses already approved for the MSc programme in Plant Production and Protection.
Students registered for the MSc in Plant Production and Protection, but who fail to satisfy all the requirements for the MSc degree, would have the opportunity of obtaining the Diploma in Plant Production once they have satisfied the requirements.

Programme Objectives:

On successful completion of the programme, students should be able to:

1. show understanding of production systems, productivity and propagation techniques;

2. evaluate the influence of soil and climate on plant growth and production systems;

3. evaluate the significance of weeds and identify management strategies for their control in production systems;

4. evaluate the significance of various factors affecting plant production and productivity by utilizing various techniques;

5. identify factors to be considered for harvesting, storage and transport of produce.

Entry Requirements: Bachelor of Science degree in the biological or agricultural sciences

Duration of programme:
Time equivalent to three semesters - Part Time

Programme Structure:
A pass is required in four 4-credit core course and two of four 4-credit elective courses.

Courses (Core):

Course Code	Course Name	No. of Credits
BL 62A	Plant Production and Propagation Systems	4
BL 62B	Plants and Soils	4
BL 62C	Plants and Climate	4
BL 62D	Harvesting and Post-Harvest Management	4

Electives

Course Code	Course Name	No. of Credits
BL 62E	Principles of Plant Pathology	4
BL 62F	Plant Diseases and their Control	4
BL 62G	The Biology and Ecology of Insect Pests of Plants	4
BL 62H	The Management of Insect Pest of Plants	4

BL62A / Plant Production and Propagation Systems

On successful completion of this course, students should be able to:

1. recognise the biological features of agroecosystems and their varying levels of productivity and sustainability;
2. describe the range and importance of cultivated plants;
3. differentiate between the various types of plant production systems;
4. evaluate techniques of plant propagation;
5. outline means of improving cultivated plants and their roles in increasing productivity.

BL62B / Plants and Soils

Course Description:

Objectives: On successful completion of this course, students should be able to:

1. describe the basic characteristics of cultivated soil and their measurement;
2. explain the influence of soil type on the availability of water and nutrients to plants;

3. explain the concept of soil fertility, how it is assessed and how it can be improved by fertilization and other management practices;
4. identify soil factors that are constraints to plant production;
5. describe types of soil erosion and means of soil conservation in plant production systems;
6. describe types of weeds, their significance in plant production systems and methods of control in weed management programmes.

BL62C / Plants and Climate
Course Description:

Objectives: On successful completion of this course, students should be able to:

1. explain how the energy balance in plants in different situations determines productivity;
2.describe the various means by which light, temperature and rainfall determine plant growth and development, and how production systems can be managed to make best use of climate and microclimate conditions;
3. describe the effects on plant production by extremes of climatic conditions and the means to mitigate them.

BL62D / Harvesting and Post-Harvest Management
Course Description:

Objectives: On successful completion of this course, students should be able to:

1. determine readiness for harvesting and describe harvesting practices for a range of plant produce;
2. explain changes occurring after harvesting for the main types of plant produce;
3. evaluate methods of storage and transport for these types of plant produce.

BL62E / Principles of Plant Pathology

Course Description:

Objectives: On successful completion of this course, students should be able to:

1.explain how plant diseases are initiated;
2. explain how plant, pathogen and environmental factors determine the extent of disease development,
3.explain the principles governing plant disease management.

(Course Code/Name) BL62F / Plant Disease and Their Control
Course Description:

Objectives: On successful completion of this course, students should be able to:

1. identify the symptoms of various plant diseases;
2. manipulate the causal agents;
3. select appropriate disease management strategies.

BL62G / The Biology and Ecology of Insect Pests of Plants

Course Description:

Objectives: On successful completion of this course, students should display knowledge of:

1. the evolution and development of insect pests of plants;
2. the taxonomy, biology and identification of insect pests of plants;
3. the factors that regulate the population of insect pests.

BL62H / The Management of Insect Pests of Plants

Course Description:

Objectives: On successful completion of this course, students should be able to:

1.identify insect pests and related plant damage;
2. assess damage and determine the economic status of insect pests affecting plants;
3. select and integrate appropriate insect control strategies;
4. develop an integrated pest management programme for various cultivated plants.

Additional Information/Notes:
Students will receive some instruction in Biostatistics in the course BL62C (Plants and Climate) but will be making use of experimental designs in other courses

Department Contact Information:

Department of Life Sciences, UWI, Mona Campus, Kingston 7, Jamaica Telephone: (876) 927-2752; (876) 927-1202)Fax: (876) 977-1075E-Mail: Website:

Programme Coordinators:
2008-2009 Professor Phyllis L. Coates-Beckford2009-2010 Dr. Jane E. Cohen

Diploma in Plant Protection

There are persons working in specialized areas of the plant sciences, some with a higher degree, who may desire or need to increase their knowledge in related areas in the plant sciences. A programme leading to a Diploma in Plant Production would offer such an opportunity.
The required courses for this Diploma are courses already approved for the MSc programme in Plant Production and Protection.
Students registered for the M.Sc. in Plant Production and Protection, but who fail to satisfy all the requirements for the MSc degree, would have the opportunity of obtaining the Diploma in Plant Production once they have satisfied the requirements.

Programme Objectives:
Objectives: On successful completion of the programme, students should be able to:

1.demonstrate knowledge of factors influencing the development of diseases and pest problems before and after harvest;
2.evaluate the significance of diseases and pests in plant production systems;
3.identify management strategies for diseases and pests;
identify techniques for evaluating the significance of various factors affecting plant production and productivity

Entry Requirements:

Bachelor of Science degree in the biological or agricultural sciences

Duration of programme:
Time equivalent to three semesters - Part-Time

Programme Structure:

A pass is required in four 4-credit core course and two of four 4-credit elective courses

Courses (Core):

Course Code	Course Name	No. of Credits	Course Weighting
BL62E	Principles of Plant	4	One-sixth
BL62F	Plant Diseases and	4	One-sixth
BL62G	The Biology & Ecology of Insect Pests of Plants	4	One-sixth
BL62H	The Management of Insect Pests of Plants	4	One-sixth

Electives

Course	Course Name	No. of	Course

Code		Credits	Weighting
BL62A	Plant Production & Propagation Systems	4	One-sixth
BL62B	Plants and Soils	4	One-sixth
BL62C	Plants and Climate	4	One-sixth
BL62D	Harvesting and Post-Harvest Management	4	One-sixth

BL62A/ Plant Production and Propagation Systems

Course Description:

Objectives: On successful completion of this course, students should be able to:

1.recognise the biological features of agroecosystems and their varying levels of productivity and sustainability;
2. describe the range and importance of cultivated plants;
3. differentiate between the various types of plant production systems;
4. evaluate techniques of plant propagation;
5. outline means of improving cultivated plants and their roles in increasing productivity.

BL62B / Plants and Soils

Course Description:

Objectives: On successful completion of this course, students should be able to:

1. describe the basic characteristics of cultivated soil and their measurement;
2. explain the influence of soil type on the availability of water and nutrients to plants;
3. explain the concept of soil fertility, how it is assessed and how it can be improved by fertilization and other management practices;
4. identify soil factors that are constraints to plant production;
5. describe types of soil erosion and means of soil conservation in plant production systems;
6. describe types of weeds, their significance in plant production systems and methods of control in weed management programmes.

BL62C / Plants and Climate

Course Description:

Objectives: On successful completion of this course, students should be able to:

1. explain how the energy balance in plants in different situations determines productivity;
2. describe the various means by which light, temperature and rainfall determine plant growth and development, and how production systems can be managed to make best use of climate and

microclimate conditions;
3. describe the effects on plant production by extremes of climatic conditions and the means to mitigate them.

BL62D / Harvesting and Post-Harvest Management

Course Description:

Objectives: On successful completion of this course, students should be able to:
1. determine readiness for harvesting and describe harvesting practices for a range of plant produce;
2. explain changes occurring after harvesting for the main types of plant produce;
3. evaluate methods of storage and transport for these types of plant produce.

BL62E / Principles of Plant Pathology

Course Description:

Objectives: On successful completion of this course, students should be able to:

1. explain how plant diseases are initiated;
2. explain how plant, pathogen and environmental factors determine the extent of disease development,
3. explain the principles governing plant disease management.

BL62F / Plant Disease and Their Control

Course Description:

Objectives: On successful completion of this course, students should be able to:

1. identify the symptoms of various plant diseases;
2. manipulate the causal agents;
3. select appropriate disease management strategies.

BL62G / The Biology and Ecology of Insect Pests of Plants

Course Description:

Objectives: On successful completion of this course, students should display knowledge of:

1.the evolution and development of insect pests of plants;

2.the taxonomy, biology and identification of insect pests of plants;

3. the factors that regulate the population of insect pests.

BL62H / The Management of Insect Pests of Plants

Course Description:

Objectives: On successful completion of this course, students should be able to:

1. identify insect pests and related plant damage;

2. assess damage and determine the economic status of insect pests affecting plants;
3. select and integrate appropriate insect control strategies;
4. develop an integrated pest management programme for various cultivated plants.

Additional Information/Notes:

Students will receive some instruction in Biostatistics in the course BL62C (Plants and Climate) but will be making use of experimental designs in other courses.

Department Contact Information:

Department of Life Sciences
UWI, Mona Campus
Kingston 7, Jamaica
Telephone: (876) 927-2752; (876) 927-1202)Fax: (876) 977-1075
E-Mail: Website:

Programme Coordinators: Dr. Dwight Robinson and Professor N. Benkeblia

MSc Marine and Terrestrial Ecosystems: Assessment, Conservation and Management.

Programme Objectives:

At the end of this programme students will be able to:

1. identify Caribbean terrestrial and aquatic communities and the processes which makes these systems unique.

2. appropriately use GIS, remote sensing, modelling as well as other environmental tools in the study of the environment.

3. outline environmental management strategies that integrate biological, political, legal, social and ethical issues as well as design appropriate interventions to conserve threatened species and environments.

4. execute sound research for monitoring and providing solutions for problems related to the

environment.

Entry Requirements:
Bachelor of Science (Honours) degree in the biological sciences

Duration of programme:
Two years part-time

Programme Structure:
Year 1 courses, 4 credits each = 16 credits

BL60E	Research methods in Biology
BL63G	GIS and modelling for aquatic scientists
BL61A	Ecosystem assessment and monitoring
BL60F	Statistics for graduate biology

Year 1 Summer course: 4 credits

BL63F	Aquatic biodiversity and biogeography

Year 2 courses, 4 credits each = 16 credits

BL60A	Concepts and issues in the functioning andmanagement of tropical environments
BL63H	Integrated coastal zone management
BL61D	Biological interventions to conserve speciesand habitats
BL61E	Biological resources for education andecotourism

Year 2- Summer project: 8 credits

BL61F	Research project

Course Code	**Course Name**	**No. of Credits**
BL 60E	Research Methods in Biology	4
BL 63G	GIS and modelling for aquatic scientists	4
BL 61A	Ecosystem Assessment and monitoring	4
BL 60F	Statistics for graduate biology	4
BL 63F	Aquatic biodiversity and biogeography	4
BL 60A	Concepts and issues in the functioning and managementof tropical environments	4

BL 63H	Integrated coastal zone management	4
BL 61D	Biological interventions to conserve species and habitats	4
BL61E	Biological resources for education and ecotourism	4
BL 61F	Research Project	8

Department Contact Information:

Department of Life Sciences
4 Anguilla Close
UWI Mona
Tel: 927-1202Fax: 977-1075

MSc Agricultural Entrepreneurship

Entry Requirements

Entrants to this course are normally required to have obtained an honours degree (minimum GPA 2.25) or its equivalent in agriculture, forestry, botany, biological, agronomy, chemical, environmental, or social sciences; in rural development, development planning and management or a related subject. Applicants with other qualifications and who have at least 2 years professional experience in a relevant field of agriculture and development are also eligible to apply for admission to this course. Applicants who do not possess the requisite qualification and experience will be required to do pre-qualification courses in agriculture/sciences and the social sciences. References will also be taken into account.

Duration of programme: Eighteen Months

Programme Structure

Credit Structure MSc Agricultural Entrepreneurship:
Level 1/Pre-Semester (0 Credits Pass Requirement)
Science Graduates:
4 x 3 Credit Business Management Courses)
Or
Social Sciences Graduates:
4 x 3 Credits Agricultural Science, Knowledge, Skills and Competencies Courses
Level 2 (27 Credits) Core
5 x 3 credit courses and 3 x 4 credit courses
Level 3 (9 Credits) Core
3 x 3 credit courses
Level 4 (6 Credits) Core
1 x 6 credit course Business Project

Course (Core)

Course Code	Course Name	No. of Credits
	Qualifying courses for business major students	
AGBU1002	Introduction to agro-environmental management	4
AGRI1101	Introduction to agriculture, crop, and livestock production	4
AGCP3007	Post harvest technology	4
	Qualifying courses for science major students	
ACCT2017	Management accounting	3
MS62S	Marketing	3
MS62Q	Decision models for managers	3
MS61T	Finance	3

Course (Electives)

Course Code	Course Name	No. of Credits
	Core courses for all students	
AGLS6003	Tropical livestock development	4
MGMT6161	The agriculture value chain	3
MGMT6162	International entrepreneurship in agricultural enterprises	3
BIOL6102	Standard and risk management in agriculture production systems	3
BIOL61o1	Advanced crop production technologies	3

CHEM6501	Agro-processing technologies	3
MGMT6163	Market assessment and analysis	3
MGMT6164	New venture creation	3
BL60E	Research methods in science	4
BIOL6103	Agricultural Seminar	1
ECON6045	The economics of farm and farming systems	3
MGMT6165	Agricultural marketing strategies	3
MGMT6166	Final Project	6

Course Description:

Pre-Semester (Level 1): Specially Admitted: Basic Courses for Business major students

Course Code: AGBU1002/AM17B
Course Title: Introduction to Agro-environmental Management

Number of Credits: 4

Course Description:

The role and importance of the environment for social development and as a life support system. The nexus between agriculture and the environment. Agro-ecosystems structure and dynamics. Economic of environmental resources: market failure and environmental degradation, externalities and public goods; optimal resource use/extraction and approaches for management of renewable resources. Concept of watershed as a management unit, hydrology, soils, natural forest, biodiversity and land use. The impact of agricultural practices on the environment viewed from an ecosystem perspective; deforestation, soil erosion/degradation, flooding, irrigation, loss of biodiversity and climate change. Case studies of impacts related to various agricultural systems: crops and livestock, subsistence and plantation farming, hillside and erodible soils, pesticide and chemical application, irrigated agriculture. Integration of the concepts and issues discussed in designing sustainable agro- environmental systems for the tropics; focus on small island states. Mode of delivery: Lectures 24 hours; Field Trip12 hours; Tutorials 12hours. Evaluation: Course work 40%; Field report 20%; Term Paper 20%; Final Examination 60%; One three hour examination.

Course Code: AGRI1010/AG18A:
Course title: Introduction to Agriculture, Crop and Livestock Production

Course Description:

This course defines agriculture, traces its historical development and describes its importance to the economy, with special emphasis on the tropics and the Caribbean. The relationship between agriculture and food supply is considered. Special attention is paid to the physical and technical aspects of agriculture and the relationships between the crop, livestock, agro-processing, marketing and distribution sub-sectors. Introduction to fundamental concepts of crop and livestock production. Provides an overview of crop and livestock production and deals with major species of livestock in the CARICOM region, along with the factors that affect their productivity and profitability. Mode of delivery: Lectures 24 hours; Field Trip12 hours; Tutorials 12hours. Assessment: Coursework 40%-Oral presentation 10%, Field trip report 20%; One in-course test 10%; Final Examination 60%; One three hour examination.

Course Code:AGCP3007/AC33A:
Course Title: Post Harvest Technology

Course description:
The post harvest physiology and biochemistry of selected tropical fruits, vegetables, root crops and grains. The post harvest environment including pathological agents, with particular reference to these crops. Physiological disorders. Post harvest handling systems. Introduction to basic equipment used in evaluation refrigeration and storage systems and general post harvest produce management. Mode of delivery: Lectures 24 hours; Field Trip12 hours; Tutorials 12hours. Assessment: Course work 40%, Field trip report 20%, Group report 10%, In course test 10%, Final Examination 60%, One three hour examination.

Course Code:ACCT2017;
Course title: Management Accounting

Course Description:
This course examines the formulation of management accounting concepts and techniques with major attention paid to how accounting information is used by managers for planning, control and evaluation. This course also provides managers with the basic tools for efficiently using the financial resources of an organization and understanding the objective of financial management. It focuses on the factors which govern the financial structure, cost of capital, market valuation, sourcing of short and long term funds and dividend, working capital policies of the firm and methods of capital budgeting. Mode of delivery: Lectures 24 hours; Tutorials 12hours. Assessment: Coursework 40%; In course Test 10%,Term Paper 10%,Group Work 20%, Final Examination 60%. One three hour examination.

Course Code:MS61S
Course Title: Marketing

Course Description:
This course introduces the basic concepts in social psychology relevant to the study and understanding of individual and group behaviour in an organizational setting. It shows the managers how interpersonal and structural variables influence job and task performance, individual and group productivity and their impact on the achievement of consistent quality in organizational outputs. This course also provides managers with an understanding of marketing

concepts, methods and techniques and how these are used to achieve organizational goals. It examines the marketing mix and its application in planning and decision making in private and public enterprises. An emphasis is placed on improving the efficiency and effectiveness of sales, distribution and marketing programmes. Mode of delivery: Lectures 24 hours; Tutorials 12hours. Assessment: Coursework40%; Project 20%; Case studies 10%; In course test 10%; Final Examination 60%; One three hour examination.

Course Code:MS62Q;
Course Title: Decision Models for Managers

Course Description:
This course examines how formal analytic tools and quantitative techniques are used or managerial decision making. It examines the application of statistical concepts and models to decision making under uncertainty and under conditions of relative uncertainty. This course introduces managerial concepts and techniques that can be used to achieve flexibility, reliability, efficiency and total quality in operations. Specific attention is paid to the role of forecasting, systems design production planning and scheduling and materials management. The use of information systems in planning, design and control of manufacturing and service organizations is introduced. Mode of delivery: Lectures 24 hours; Tutorials 12hours; Assessment: Coursework 40%; Final Examination 60%; One three hour examination.

Course Code: AGLS 6003;
Course Title: Tropical Livestock Development

Course Description:
What is livestock development? Livestock classes including aquaculture and poultry, Sustainable livestock development, Choice of livestock production technology breeding (AI, embryo transfer); feeds/feeding system; feed/nutrition, health, housing, Livestock production systems, Integrated systems, Factors influencing livestock development, Livestock products /Harvesting practices Demand for livestock products, Marketing of livestock products. Role of Government and Private sector in the livestock industry. Mode of delivery: Lectures 24 hours; Field Trip12 hours; Tutorials 12hours; Assessment: Coursework 40%; Field trip report 20%; Group report 20%; Oral presentation 10%; Final Examination 60%; One three hour examination.

Course Code:BL60E;
Course Title: Research Methods in Science

Course description:
Concepts and philosophy of research; logical foundation of research; scientific method, ethical concepts, Logical thought; Locating information for research. How to plan and conduct effective research, using the on-line public access catalogue, abstracting and indexing services, library-based electronic resources, documenting sources-Chicago manual of styles etc., The thesis guide; Project planning and management; logical framework, research proposal and budget, securing resources; Research process, data collection, data analysis and interpretation; Thesis structure, literature review; Technical report writing and presentation; writing styles; Presentations: posters, audio-visual skills, power point. Tutorials. Mode of delivery: Lectures 24

hours; Student seminar presentations 24 hours. Assessment: One type written dissertation/research proposal & literature review 50%; Seminar (Oral presentation of research proposal & review20%; Coursework Consisting of 30%; End of course test 15%; Written assignments 15%.

Course Code: MGMT 3231;
Course Title: International Entrepreneurship

Course Description:
Introduction: Entrepreneurship, Traits of an Entrepreneur, Opportunity Seeking and Recognition; The entrepreneurial ventures business environment; Assessing business opportunities in the international market; Strategies which entrepreneurial firms can use to go international; Getting mature entrepreneurial firms to go international; Acquiring existing businesses in international markets; The strategic management of the entrepreneurial firm; Managing in a growing international firm; Cross cultural issues in managing an international firm; Networks and the internationalization of the entrepreneurial firm; Assembling resources for international operation; Raising financing for international business transaction; Course review and examination preparation. Mode of delivery: Lectures 24 hours; Tutorial 12 hours. Assessment: Coursework 50%, Project 35%; Essay 15%; Final Examination 50%; One three hour examination

Course Code: MGMT6161
Course Title: The Agricultural Value Chain

Concept of the value chain.
Structures and peculiarities of the agricultural value chain such as input supply, production, handling, harvesting, processing, value addition, and distribution and marketing.
Value chain analysis and evaluation: students to identify and create successful strategies and solutions for their respective business environments.
Limitations of value chain advantages
Advantages of the agricultural value chain
Identifying and developing agricultural value chains for selected agricultural commodities
Identification and establishment of partnerships and collaborations
Identification of constraints
Supply chain category management
Market intelligence Information gathering and designing
Case studies/case analyses
Group and individual presentation Mode of delivery: Lectures 24hr; Tutorial/Case studies12hr; Assessment: Coursework:50% (Case studies 20%; In Course test 20%; Oral Presentation 10%; Final Examination: 50%;One three hour examination.

Course Code:BIOL6102
Course Title: Standards and Risk Management inAgriculture Production Systems
Ration Course Description:

Measurements-soil, water, other parameters using, chemical, instrumental and biological

techniques, PCR/ELISA, GIS, GPS and supporting ICT. Disease identification techniques. Production standards: GAP, Global gap, Fair Trade, Organic, Good manufacturing practices (GMP), HAACP/ ISO9000/14000; Traceability, Exploration and evaluation of the organization and operation of complex diversified farming systems using tools and perspectives drawn primarily from ecology, agronomy, sociology and economics. Determinants of readiness for harvest, harvesting practices, post harvest changes and loss of value, ripening and senescence of fruits, preparation for storage, storage and transport. The course contains a significant component of fieldwork focused on farms, as well as supply and distribution networks. Mode of delivery: Lectures 24h; Laboratories 36h; Assessment: Coursework 50%; Laboratory report 20%; Course assignment 10%; Field trip report 20%; Final Examination-50%; One three hour examination.

Course Code:BIOL6101
Course Title:Advanced Crop ProductionTechnologies

Course Description:
Production systems of crops/plants including vegetables, roots and tubers, tree crops, agroforestry, ornamentals, fibre crops and bio-fuels, forages, pastures and turf, beverage crops, herbs, spices and medicinal plants. Soil and nutrient management practices for crop production. On-farm water management/irrigation and drainage management. Protected agriculture-greenhouse, biotechnology and plant breeding and propagation techniques. Agricultural mechanization and use of ICT and GIS. Mode of delivery: Lectures 24 hours;Laboratories/Field trips 36 hours: Assessment: Coursework 50%; One in-course test10%; Field trip/laboratory report 20%; In-course assignment 20%; Final Examination 50%; One three hour examination.

Course code: CHEM6501
Course title: Agro-processing Technologies for Entrepreneurs

Course Content:
Overview of unit operations. Raw material handling & storage for the prevention of deterioration. Introduction to material and energy balances; energy utilization. Good manufacturing practices. Value-added agricultural products (with specific reference to products of local and regional significance: food, feed, fuel, fibres, essential oils) and processing technologies (for example high and low temperature processes, distillation, dehydration, concentration, use of preservatives, fermentation, filtration, irradiation, etcetera) used in their production. Modern packaging technology. Quality Control concerns. Records and traceability. Waste Management. Mode of delivery: 30 hours lectures, 9 hours tutorials; Assessment: Coursework 40%; 3 written assignments30%; 1 oral presentation 10%; Final Examination:60%; One three hour examination.

Course Code: MGMT6164;
Course Title: New Venture Creation

Course Description:
This course allows the student hands-on opportunity to use in a holistic manner the various

techniques learned (agribusiness management and entrepreneurial techniques) to design and implement a business along the agricultural value chain. The new venture creation process provides an opportunity to refine these skills and integrate them into a cohesive plan for a new venture. Additionally, communications of a new business ventures strategy, business model, and competitive advantage, no matter how straight forward, can be a daunting task.
This class is designed to provide hands-on experience of developing all of these skills while producing a viable plan for a new venture. Frameworks and guidelines that can be used to formulate strategies relevant in the contemporary agri-business environment. Emphasis will be placed on real world application in agribusiness theory through the building of an effective business plan, case study analysis and interaction with the agribusiness sector. Additionally, outside practitioners will participate, providing front line insight to the real life issues, challenges and skills needed to fund and launch a successful venture. Students in teams take a multi-disciplinary approach to the preparation and presentation of a professional business plan. The teams will present their plans to a group of venture investors, entrepreneurs, attorneys, and operating executives. Tutorial/Case studies 12hr; Assessment: Coursework: 50%; Case studies 20%; In Course test 20%; Oral Presentation 10%; Final Examination: 50%; one three hour examination

Course code:MGMT6163;
Course title:Market assessment and analysis

Course Description:
Introduction to market assessment and analysis; Monopoly: Pricing, Rent Seeking, etc. Price Discrimination;Choice of Product Quality, Advertising, Efficiency;Oligopoly Model; Bertrand, Cournot, Stackelberg; Capacity Utilization; Conjectural Variation; Concentration, collusion. Vertical Relations - Intra- and Interbrand Competition; Vertical Restraints; Bargaining; Buyer Power; Applications; Vertical Control; Market Power; Entry and Exit Contestable Markets; Sunk costs;Strategic Investment;Research and Development: Adoption; Patent Races; Patent Protection; Adoption and Diffusion; Licensing. Mode of delivery: 24 hours of lectures; Tutorials 12 hours; Assessment: Coursework: 50%; Case study analyses 20%; Two written assignments 20%; Oral presentation 10%; Final Examination: 50%; One three hour examination.

Course Code:BIOL6103;
Course Title: Agricultural Seminars

Course Description:
Students in the MSc Agricultural Entrepreneurship must present a seminar. The topic will be based on a topic of the students choice and will be based on some aspect of the agriculture value chain. The topic has to be agreed on well in advance by the course coordinator/lecturer. The seminar must be presented to faculty and students and must reflect a comprehensive understanding of the subject. Students will be evaluated for content and oral delivery. Audio visual aides are to be used in the presentation. Students are expected to give constructive responses to queries raised during the presentation.Attendance is compulsory for group seminars.Assessment: Written Report: 40%; Seminar critique report 10%; Oral Presentation: 50%.

Course Code:ECON6045:
Course title:The Economics of farming and Farming systems.

Course outline:

1. Methodology in economics and the role of agricultural economics

What is economics? The method of knowledge creation (deductive versus inductive methods). The problem of value judgments.What economists do and should do?The task of a public economist.

2. Specifics of agricultural markets and the agricultural sector.

Classification of markets and implications for exchange and its relevance for agriculture.
Transaction costs as a main determinant of productive interactions.
Specifics on the demand side and the relevance for neoclassical approach to economics.
Specifics on the demand side and the relevance of neoclassical economics.
Specifics of price formation for agricultural products and factors.
Macroeconomic development and agriculture.

3. Price formation on the land market.

Price formation on factor markets: The neoclassical theory and its limitations. The relationship between product and land prices in a neoclassical world. The relevance of transaction costs. The relevance of expectation and uncertainty.
The impact of selected policy instruments on land markets.

4. The impact of technological change on factor and product prices and the adjustment of the agricultural sector.

Types of technical change.

5. Specifics of agricultural trad.

Definition of technological progress. The importance of technology from a macroeconomic view. The importance of technology from a sectorial point of view. Alternative Classifications of technological progress. Sectorial effects of technological progress. In a close economy of a relatively small sector and relatively small country; In an open economy of a relative small sector and relatively small country.6. Evaluation of agricultural policies:The limits of cost-benefit analysis based on traditional welfare economics; The importance of market failure; The importance of governance; A framework for policy assessment. Mode of delivery: Lectures 18 hours; Case study analyses 6 hours, Field visits 12 hours; Assessment: Coursework 50%; Case study analyses 20%; Group Assignment 10%; Field trip report 20%; Final Examination 50%; One three hour examination.

Course Code:MGMT6165.
Course Title:Agriculture marketing strategies

Course Outline

1. Analyzing Consumer Behavior/Market Demand

A. Factors Affecting Consumer Behavior/Demand:

1. Economic Factors; 2. Non-Economic Factors; a. External Influences of Lifestyles; Culture

Values; Demographics; Social status; Reference groups; b. Internal Influences of Lifestyles

Perception; Learning and memory; Motives, personality, and emotions; 3. Formation of Tastes and Preferences;B. Neo-classical Theory of Demand; C. Extensions to Neo-classical Model; Consumer Demand with Variable Preferences; Household Production Theory Unitary and Non-Unitary Models; Consumer Goods Characteristics Model; D. Data Sources and Issue; 2. Sample Studies of Consumer Food Demand: A. Foods for Health;B. Nutrition and Health: The Case of Nutritional Labelling; C. Food Safety: The Case of Food Irradiation; 3. Presentations of Report I; 4. Value Theory and Product Valuation; A. Willingness to Pay; B. Willingness to Accept; C. Divergence Issue: 5. Introduction to Economic Experiments: Applications to Marketing: A. The Experimental Method: B. Laboratory versus Field Experiments: C. Designing Experiments; D. Elicitation Methods; E. Contingent Valuation; F. Experimental Auctions; G. Choice Experiments; 6. Presentations of Report II Mode of Assessment: Coursework 50%; Case study analyses 20%; Group Assignment 10%; Term paper20%; Final Examination 50%; One three hour examination.

Course Code: MGMT6166;
Course title:Final Project

Special Topics: This creative component is in lieu of thesis and mandates all participants in the programme to undertake a final project which entails the development and implementation of an agricultural enterprise which has a real potential for real world applicability. It will involve making a business plan for the promotion of an agricultural enterprise with emphasis on some aspect of the agriculture value chain. This proposal will be presented to a panel of judges who will determine whether or not the idea is feasible. The project outline should include the following, title, preliminary questions or issues, context, literature review and methods. Permission from instructor/coordinator is required prior to the development of the programme. Assessment: The final project will be assessed by two examiners. The candidate must have obtained an average mark of 70% or more to obtain a distinction.

Department Contact Information:

Department of Life Sciences;
Faculty of Pure and Applied Sciences,
The University of the West Indies, Mona, Kingston 7, Jamaica
Tel: 1 (876) 927-1202 0r 927-2753Fax: 1 (876) 977-1075
Email:lifesci@uwimona.edu.jmURLhttp://www.uwi.mona.uwi.edu/lifescience/contact.htm

Programme Coordinator: Professor N. Benkeblia

MPhil and PhD Programmes

Specializations/Options:

Botany
Environmental Biology
Marine Biology
Oceanography & Zoology

Programme Objectives:

students will possess advanced knowledge and training in one or more areas of biology with more specific subject-related skills in one of these.
the subject-related skills developed will be in an area of applied biology.
students will develop significant information gathering and analytical skills.
students will be able to take a critical approach to any biological/environmental problems which they may encounter.

Entry Requirements:

Entry level to the MPhil degree program is a first or upper second class BSc (Honours) degree in the Life Sciences. Candidates having a Lower Second class Honours BSc may be considered for acceptance into an MPhil. program following special recommendation by the Department. Applications for transfer to a PhD program from MPhil are encouraged where students display exceptional promise.

Areas of Research

Biodiversity and conservation, Biotechnology, Coastal Zone Management, Coral reef ecology, Entomology, Pest Management, Fish Biology, Freshwater Ecology Fisheries and Aquaculture, Forest Ecology, Horticulture, Marine Ecology, Molecular Biology, Parasitology, Animal Physiology, Plant Breeding, Plant Pathology, Plant Physiology, Terrestrial and Aquatic Ecology, Tissue culture and Virology.

Seminars
Two/ Three (One per year)

Duration of programme:
Two/three years full-time

Programme Structure:

Year 1 Semester 1
BL60EResearch Methods in Biology

Year 1 Semester 2
BL60FStatistics for Graduate Biology

Each student receives guidance from an Advisory Committee that consists of a Supervisor, who is an expert in the area of research to be undertaken, and at least two other persons with related expertise.

Courses (Core):

Course Code	Course Name	No. of Credits
BL60E	Research Methods in Biology	4
BL60F	Statistics for Graduate Biology	4

Department Contact Information:

Department of Life Sciences
4 Anguilla Close UWI Mona
Tel: 927-1202 / Fax: 977-1075

Programme Coordinator: Dr. Mona Webber

DEPARTMENT OF MATHEMATICS

Head: Dr. Nagarani Ponakala

The Department of Mathematics offers the following Graduate programmes:

MSc Mathematics
MPhil/PhD Mathematics (by research)

MSc Mathematics

Programme Objectives:

The objectives of the programme are to:

Provide graduates with a comprehensive advanced knowledge of important areas of mathematics.

Produce graduates with high level analytic and numerical skills required in a 21st century economy.

Enable graduates to function effectively as teachers, at both the school and university levels.

Furnish graduates with the necessary background for further study in Mathematics, and enhance their research capability.

Entry Requirements:

To be admitted to the programme a candidate should normally have a Bachelors, BSc (Mathematics), degree from a recognized university with at least Lower Second Class Honours. Candidates with lower qualifications may be considered but will be required to pass qualifying courses, as prescribed by the department.

Students must demonstrate aptitude in research/computer skills and must have passed the following courses (or their equivalent): MATH 2125 Introduction to Mathematical Analyses, MATH 2160 Analysis and Mathematical Methods, MATH 2110 Linear Algebra

Areas of Research

Stochastic Differential and Difference Equations and Applications, including stochastic modeling and numerical analysis.
Modelling Physiological Fluid Flows
Differential Equations and Applications

Mathematical Physics: General Relativity, Quantum Field Theory in curved Spacetimes, Differential Geometry, Noncommutative geometry inspired solutions of Einstein field equations.
Numerical Methods
Statistics

Seminars
MSc Programme: 1 one-hour seminar during the programme.
MPhil and PhD programmes: 1 seminar per semester.

Duration of programme:

Part time: 24 months

Programme Structure:

The MSc Mathematics is currently offered as a part-time programme over two (2) years.

The list of all core and elective courses available to the department for the MSc Mathematics programme is given below. To fulfill the requirements for the MSc, students must take a minimum of 26 credits from the list of core courses, which must include the Research Project, and sufficient further credits from the list of elective courses to achieve a minimum credit total of 44.

Courses (Core)

Course Code	Course Name	No. of Credits	Course Weighting
MATH6110	Functional Analysis	6	70% Exam 30% In-Course test
MATH6120	Theory of Integration	6	80% Exam 20% In-Course test
MATH6310	Complex Variables	6	85% Exam 15% In-Course testing
Development	Differential Equations	4	TBD
MATH6621	General Topology	6	60% Exam 20% in-Course test 20% group project
MATH6800	Research Project	8	
MATH6624	Topics in Mathematical Analysis	4	60% exam 40% in-course test
MATH6625	Measure and Integration	4	60% exam 40% in-course test
MATH6626	Elements of Functional Analysis	4	60% exam 40% in-course test

Courses (Electives)

Course Code	Course Name	No. of Credits	Course Weighting
MATH6193	Numerical Methods for Partial Differential Equations	4	60% exam 40% coursework
STAT6220	Multivariate Statistics	6	80% exam 20% In-Course test
MATH6620	Topology	6	70% exam 30% in-course test
STAT6510	Stochastic Processes	6	70% exam 30% Two In-Course tests
STAT6520	Time series and Forecasting	6	70% exam 30% Two In-Course tests
MATH6010	Group Theory	6	70% exam 30% Two In-Course tests
MATH6220	Mechanics	6	70% exam 30% In-Course test
MATH6410	Algebraic Number Theory	6	70% exam 30% Two In-Course tests
MATH6420	Analytic Number Theory	6	80% exam 20% Two In-Course tests
MATH6720	History of Mathematics	6	50% exam 25% One In-Course test 25% One written paper
MATH6610	Geometry	6	70% exam 30% Two In-Course tests
MATH6623	Numerical methods for differential equations	4	50% exam 50% (written assignments, in-course test, laboratory test)
STAT6632	Multivariate Statistical	4	50% exam 20% in-course test

	Analysis		20% lab assignment 10% assignment
STAT6630	Introduction to Stochastic Processes	4	60% exam 40% in-course test
STAT6631	The Analysis of Time Series	4	60% exam 20% in-course test 20% lab assignment
MATH6627	Group Theory with Applications	4	60% exam 20% in-course test 20% group project
MATH6629	Mechanics of Interacting Particles	4	60% exam 20% in-course test 20% group project
MATH6633	A Course in Algebraic Number Theory	4	60% exam 30% in-course test 10% assignment
MATH6634	A Course in the History of Mathematics	4	40% exam 60% assignments
MATH6628	Differential Geometry	4	60% exam 20% in-course test 20% group project
MATH6622	Differential Equations: Theory and Applications	4	70% exam 30% in-course test
MATH6635	Complex Analysis and Applications	4	60% exam 20% in-course test 20% assignment

Course Description:

MATH6110: Functional Analysis

Functional analysis is mainly concerned with the study of vector spaces and operators acting upon them. It provides powerful tools in handling several problems in applied mathematics and theoretical physics. It is also basic for the understanding and development of very many other mathematical theories like the Theory of Partial Differential Equations and the Theory of Operators. The first part of the course is devoted to a short introduction in the theory of metric spaces and to a detailed study of normed and Banach spaces and in particular to the analysis of linear operators acting upon them. The second part of the course deals with Hilbert spaces and linear operators upon them, since they play a fundamental role in applied mathematics. Finally, we look at some fundamental theorems for normed and Banach spaces such as the Hahn-Banach theorem for complex vector spaces and normed spaces and its application to bounded linear functionals; the uniform boundedness theorem, and the closed Graph theorem

MATH6120: Theory of Integration

This course considers the limitations of the Riemann integral, and shows that it it necessary to develop a precise mathematical notion of 'length' and 'area' in order to overcome them. Thus we develop the concept of measure, and use it to construct the more powerful Lebesgue integral, and explore its properties. Finally we look at applications of measure and Lebesgue integration in modern probability theory.

MATH6310: Complex variables

The course develops the properties of the complex number system, treated as a generalisation of the real number system. We explore the parallel analysis that results, with a particular emphasis on differentiability, analyticity, contour integrals, Cauchy's theorem, Laurent series representation, and residue calculus.

MATH6620: Topology

This course examines metric and topological spaces, continuity, completeness, and compactness, providing a theoretical foundation for further work in differential equations, probability theory, stochastic processes, differential geometry and mathematical physics.

MATH6621: General Topology

Topology is the study of spaces and sets and can be thought of as an extension of geometry. It is an investigation of both the local and the global structure of a space or set. The foundation of General Topology (or Point-Set Topology) is set theory. The motivation behind topology is that some geometric problems do not depend on the exact shape of an object but on the way the object is put together. The course gives an up-to-date and modern overview of the main concepts in General Topology. Topological properties and several examples of topological spaces arising in several branches of mathematics are studied to show how topology is a unifying theme in different mathematical fields.

MATH6800: Research Project in Mathematics

Each student will work on a mathematical project under the supervision of a faculty member. The project will culminate in an oral presentation to the Department of Mathematics. The topic of the project will agreed upon by the student and supervisor.

MATH 6193: Numerical Methods for Partial Differential Equations

Preliminaries: classification of partial differential equations; Well-posedness; Spatial differences: central differences; Fourier analysis; Higher order difference approximations; Onesided differencing; Temporal errors: Concepts of stability and
accuracy; analysis of dispersive and dissipative error; Mostly explicit difference schemes: Forward Euler in time, Central difference in space; Lax-Friedrichs; Leap-frog (2-2) and (2-4); Concept of artificial dissipation; Lax-Wendroff; MacCormack's scheme; Runge-Kutta time stepping; Systems of equations: Decoupling; disparate speeds; Implicit schemes: Backward Euler; Crank-Nicholson; compact 4-th order approximation for spatial derivatives; implicit schemes for systems; Semi-implicit schemes: Adams-Bashforth multi-step method; Parabolic equations and methods for their numerical solution; Numerical approximation of boundary conditions (for parabolic and hyperbolic equations): Extrapolating boundary conditions; one sided differences; linear systems; Two-dimensional problems: Operator splitting; Alternating directions implicit method; Anisotropic errors, 2-D boundary conditions.

STAT6220: Multivariate Statistics

This course aims at introducing students to methods of analyzing multivariate data. It introduces students to the notion of principal components factor analysis, various multivariate distributions, analysis of variance, multivariate analysis of variance (MANOVA), multivariate regression and multidimensional scaling and cluster analysis. At the end of the course students would have also considerably improved their knowledge of applied linear algebra and matrix theory and to be somewhat competent with at least one statistical software package.

STAT6510: Stochastic Processes

This course develops the ideas underlying modern, measure-theoretic probability theory, and introduces the various classes of stochastic process, including Markov chains, the random walk, jump processes, the Poisson process, diffusions, and Brownian motion. Their properties and applications are investigated.

STAT6520: Time series and Forecasting

This course aims to introduce students to the fundamental concepts requiring for the description, modeling and forecasting of the time series data.

STAT6010: Group Theory

Poetically, "Group theory is the branch of mathematics that answers the question "What is symmetry?" (N. C. Carter). Various physical systems, such as crystals and the hydrogen atom, can be modeled by symmetry groups. Group theory and the closely related representation theory have many applications in physics and chemistry. We first start by consider some main classes of groups such as permutation groups, matrix groups, transformation groups, topological and algebraic groups. We will study representation of groups and symmetry and the last part of the course is devoted to some applications of group theory such as Lie groups and the study of differential equations, and the Heisenberg, Lorentz, and Poincare groups, which play a fundamental role in modern theoretical physics.

MATH6220: Mechanics

This course aims to introduce students to classical and quantum mechanics by means of a mathematically rigorous approach. In the first part of the course we shortly introduce Newtonian mechanics and develop Lagrangian and Hamiltonian mechanics on manifolds with a particular emphasis on the underlying

variational principles. The second part introduces Quantum Mechanics in an axiomatic way and is focused on the study of the spectral properties of the Schrödinger Hamiltonian for different classes of potentials.

MATH6410: Algebraic Number Theory

This course aims to present a historical development of the subject area, leading to a significant partial proof of Fermat's Last Theorem.

MATH6420: Analytic Number Theory

This course focuses on the analytic proof of the prime number theory and the elementary theory of the Riemann zeta function and Dirichlet's L-functions.

MATH6720: History of Mathematics

This course will provide teachers and students of mathematics with the historical background of their discipline. It will also enable them to further studies in this area independently.

MATH6610: Geometry

Geometry is a branch of mathematics concerned with questions of size, shape, relative position of figures, and the properties of space. This course aims to introduce students to the study of the above questions in curved manifolds. To this purpose, basic concepts of differential geometry with a particular emphasis to Riemannian and pseudo-Riemannian manifolds will be introduced and applied to geometric objects such as black holes and the Robertson-Walker universe, which find their roots in the theory of general relativity, i.e. the geometric theory of gravitation.

MATH6624/Topics in Mathematical Analysis

Even though the students are familiar with the notion of limit from high school, they still need to understand deeper the limit concept, countability and non-countability, consider paradoxes and counter examples, extend their understanding of convergence of sequences and series of functions, derivative, integral. The aim of the course is to teach students the tools of modern analysis as it related to further study in mathematics, especially numerical analysis, differential equations, functional analysis, topology, stochastic processes. This course is intended to develop the ability of the students to work with abstract ideas.

MATH6625/ Measure and Integration

The construction of the Riemann integral is known to every undergraduate mathematics student. However, this integral has certain inherent limitations that prevent its use in a wide range of mathematical applications, including modern developments in the fields of probability theory, stochastic processes and dynamical systems. This issue is dealt with by extracting the fundamental ideas behind the construction of such integrals, and providing a mathematically rigorous, though abstract, foundation upon which to define more powerful notions of integration. We consider the limitations of the Riemann integral, and show that it is necessary to develop a precise mathematical notion of `length' and `area' in order to overcome them. Thus we develop the more abstract concept of

measure, and use it to construct the Lebesgue integral, and to investigate its properties. Finally we look at the role played by measure and Lebesgue integration in modern probability theory. This course is intended to develop the ability of students to work with abstract ideas.

MATH6626/Elements of Mathematical Analysis

Functional analysis is a branch of mathematical analysis dealing with the study of normed, Banach, and Hilbert spaces endowed with some kind of limit-related structure such as for instance an inner product, norm, topology, etc. and the linear operators acting upon these spaces and respecting these structures in a suitable sense. The historical roots of functional analysis lie in the study of spaces of functions and the formulation of properties of transformations of functions such as the Fourier transform as transformations defining continuous, unitary, etc. operators between function spaces. This point of view turned out to be particularly useful for the study of differential and integral equations. The course gives an up-to-date and modern overview of the main concepts in Functional Analysis. Functional analytic properties and several examples of Banach and Hilbert spaces arising in several branches of mathematics are studied to show how functional analysis is a unifying theme in different mathematical fields.

MATH6623/Numerical methods for differential equations

Differential equations are abundant in the theoretical modelling of problems in science and engineering as well as economics, social science, biology, business, health care, etc. Though there are many well developed analytical solution techniques available since hundreds of years yet often the systems described by differential equations are so complex, or the systems that they describe are so large that a purely analytical solution is not tractable. It is in these complex systems numerical methods are powerful to obtain an approximate solution of the differential equation. With the advent of high speed computers and advancement in Numerical analysis and efficient computer programmes, one can take up challenging problems in the above fields. This course is intended to introduce and give an understanding of numerical methods for the solution of ordinary and partial differential equations. The methods will be derived and the convergence and stability of the methods will be analyzed. The applications of these methods in solving real world problems will be emphasized. Students will be exposed to modern mathematical software for the practical use of the problems and for better visualization of the convergence and stability of these methods.

STAT6632/Multivariate Statistical Analysis

Multivariate techniques are applied to a wide array of disciplines, such as business, health sciences and economics. In many cases, a multivariate method is used as one component to better understand multidimensional data such as data reduction and how variables are correlated. The aim of the course is to introduce a variety of standard statistical methods used to analyze multivariate data. Emphasis will be placed on developing the theory of these methods as well as the various interpretations of results derived from applying these methods. The (free) R statistical computing package will be used for data analyses.

STAT6630/Introduction to Stochastic Processes

Even though the students are familiar with the main notions of Probability Theory, they still need deeper and wider knowledge of many concepts of it. The Theory of Stochastic Processes will bring the

students to a higher level of understanding of randomness, discussing how the random variables change over time, learning the exciting properties of Poisson process, Markov chain, Random walk, Brownian motion. This course will teach students to work successfully with stochastic modelling in different areas, including Finance, Queue Theory, Population Dynamics. This course aims to give students a broad overview of the main concepts in the theory of probability and stochastic processes. It will provide students with solid grounding in modern probabilistic and statistical methods.

STAT6631/The Analysis of Time Series

Classical statistical analysis is ineffective when applied to sets of observations that are correlated in time: for example share prices. Time series analysis is a specialised branch of statistical science which deals with such data sets, providing an essential toolset for statisticians, scientists, engineers and financial analysts. The course covers the fundamental concepts required for the description, modeling and forecasting of time series data, both in the time- and frequency-domains. Attention to the theoretical underpinnings of the subject is complemented by the analysis of real-world data sets, and a practical laboratory component introduces students to the software package R.

MATH6627/Group Theory with Applications

Group theory studies the algebraic structures known as groups. The concept of a group is central to abstract algebra and recurs throughout mathematics. Moreover, the methods of group theory have strongly influenced many parts of algebra. Lie groups theory is a branch of group theory that has experienced tremendous advances and it cannot be skipped in any course in group theory. Group theory and the closely related representation theory have many applications in physics and chemistry since various physical systems, such as crystals and the hydrogen atom, can be modeled by symmetry groups. The course gives an up-to-date and modern overview of the main concepts in Group Theory. Group theoretical properties and several examples of groups arising in many branches of mathematics, physics, and chemistry are studied to show how group theory emerges in different mathematical fields and in applied sciences.

MATH6629/Mechanics of Interacting Particles

In a broad sense Mechanics is the branch of science concerned with the behavior of physical bodies when forces act upon them. This discipline separates into analytical mechanics and quantum mechanics. Historically, classical mechanics came first, while quantum mechanics is a comparatively recent invention. There is also the "theory of fields" which is closely interwoven with the mechanics of classical and quantum fields. Thus, for instance, forces that act on particles are frequently derived from fields (electromagnetic and gravitational), and particles generate fields by acting as sources. In fact, in quantum mechanics, particles themselves are fields, as described theoretically by the wave function. The course gives an up-to-date and modern overview of the main concepts in the Mechanics of interacting particles. Starting with an introduction to Newtonian mechanics and the Lagrangian/Hamiltonian formalism the course continues with an axiomatic approach to Quantum Mechanics. Path integrals and path integral quantization of Bosonic and Fermionic particles are also treated. A short introduction to Gauge Theories and the Higgs field is given at the end of the course.

MATH6633/A Course in Algebraic Number Theory

Even though the students are familiar with basic concepts of algebra, they still need to understand the new ideas and techniques, consider potential applications in coding theory and cryptography, various examples, extend their understanding of archimedean, non-archimedean metrics, norms, completions, integrality, number fields, quadratic forms, groups, rings, discriminants and bases. The aim of the course is to teach students the tools of modern algebra and number theory as it is related to further study in mathematics. This course is intended to develop the ability of the students to work with abstract ideas and their applications.

MATH6634/A Course in the History of Mathematics

The history of mathematics illuminates modern mathematics in many ways. It includes: the birth of the axiomatic method around 500 BCE; impressive development of geometry, trigonometry and a certain form of algebra up to around 350 AD; the birth of alternative methods of invention in the 1600's; the development of calculus in the late 1600's. All of these developments have become part of modern mathematics and all can become useful underpinnings of modern pedagogy. In this course, students will study the origins and development of topics of great modern importance. The course is designed primarily for graduate students interested in teaching and mathematics pedagogy. However, it is suitable for all mathematics students also. The course will focus primarily on the axiomatic development of mathematics, the creative processes leading to new methods, and, the development of the calculus.

MATH6628/Differential Geometry

Differential geometry is a field in mathematics using several techniques of differential and integral calculus, as well as linear algebra, to study problems in geometry. The theory of plane and space curves and of surfaces in the three-dimensional Euclidean space formed the basis for the development of differential geometry during the past two centuries. Since the late 19th century, differential geometry has grown into a field concerned more generally with the geometric structures on differentiable manifolds. This course is about the analysis of manifolds such as curves, surfaces and hypersurfaces in higher dimensional space using the tools of calculus and linear algebra. There will be many examples discussed, including some which arise in the theory of general relativity. Emphasis will be placed on developing intuitions and learning to use calculations to verify and prove theorems. Students need a good background in linear algebra. Some exposure to differential equations is helpful but not absolutely necessary.

MATH6622/Differential Equations:Theory and Applications

Differential Equations are the language in which the laws of nature are expressed. This subject is the natural goal of elementary calculus and the most important part of mathematics for understanding the physical sciences. Also, in the deeper questions it generates, it is the source of most of the ideas and theories which constitute higher analysis. The course presents various classes of differential equations, and shows how each may be used to construct models in various branches of science and engineering, demonstrates existence and uniqueness of solution, and shows where possible how each may be solved. Students will be exposed to modern mathematical software specifically designed for the solution of differential equations, and will be taught to use this software to explore the properties of the equations encountered on the course.

MATH6635/Complex Analysis and Applications

Complex Analysis has tremendous applications in many branches of Mathematics, Physics and engineering. It is well known that two dimensional Laplace Equation can be related to Complex Analytic functions and many mathematical techniques based on the results of Complex Analysis can be used for studying problems in two dimensional Potential theory. Functions of complex variables arise in many branches of mathematics both as part of a theoretical framework and in applied areas like Electronics, Fluid Mechanics and Physics. Providing graduate students with a background in this field is an essential part of developing mathematical maturity, and prepares them for advanced work in many other areas. This course develops Complex Analysis as an extension of Real Analysis. Apart from concentrating on the theoretical developments, emphasis will be on unifying aspects in theory and applications. Examples will be taken from different applied subjects to showcase the elegance and utility of introducing methods based on complex analysis.

Department Contact Information:

Department of Mathematics,
University of the West Indies,
Mona, Kingston 7,
Jamaica, W.I.

Programme Coordinator: Davide Batic

DEPARTMENT OF COMPUTING

Head: Dr. Gunjan Mansingh

The Department of Computing at the Mona campus of the University of the West Indies offers three (3) taught, postgraduate degrees,

- Postgraduate Diploma (DIPG) in Information Technology
- Master of Science (MSC) in Computer Science
- Master of Science (MSC) in Computer-Based Management Information Systems

Postgraduate Diploma (DIPG) in Information Technology

The postgraduate diploma in information technology is designed to provide students with no prior academic experience or exposure to any Computing discipline with training that is both relevant to the professional environment and that will equip him/her with the basic requirements to pursue a higher degree in the field of Computing. Students could therefore either transition to an entry level professional position in the IT industry or pursue one of the Department of Computing's master's degree programmes.

Entry Requirements:
Applicants will be expected to have a first degree in any discipline except Computing with a degree gpa of 2.50 or greater.

Duration of Programme:
The programme is offered in an accelerated format over one academic year i.e. 3 consecutive semesters.

Programme Structure:
The programme covers subject areas including programming in at least two (2) widely used languages, mathematics for the field of IT, networking and databases. Courses are offered in pairs, over a period of eight (8) weeks. The eight week period is broken down as follows,

- Contact hours- two, 3 hour sessions per week over a six (6) week period
- examinations for the two courses at the end of a short break
- 1 week interval between the examinations and the start of the next 2 courses

Master of Science (MSC) in Computer Science

The MSc. programme in Computer Science has been offered at Mona for several years. The aims and objectives of this revised (2017) programme are to:

- expose candidates to cutting edge developments in computing technology and contemporary computing research
- meet industry research and development needs, as well as the needs of candidates seeking to pursue further academic research
- continue to provide a programme that meets local and regional needs, while meeting or surpassing the standards of top international programmes
- include an online mode of delivery to enable the programme to be offered across the region thereby increasing the accessibility of the programme
- introduce clusters of areas of interest and courses that address current and future needs of the industry that will continue to attract and increase interest in the programme, and that are aligned with DoC research groups
- maintain the established framework and programme structure that flexibly facilitates evolution of the programme without compromising any of the programme's objectives
- align existing courses with newly created clusters

Entry Requirements:

Applicants will be expected to have a first degree in an established Computing discipline with a degree gpa of 2.50 or greater. Further, applicants must have successfully completed undergraduate courses on object-oriented programming, discrete mathematics and algorithms.

Duration of Programme:

Typically, students are expected to complete the programme over the course of eighteen (18) months.

Programme Structure:

Credit requirements remain unchanged at a total of 40. These must be composed of,

- a core of 12 credits comprised of 3 mandatory, 4-credit courses
- 5, 4-credit courses which can be any combination of courses from any cluster
- a research project worth 8 credits which must include a report of publishable/professional quality

Entry Requirements:

First degree with a major in computer science from a recognised university

Duration of programme: 2 years

Programme Structure:

The degree consists of 40 credits as follows:

1. A core of three courses (one general course in research methods and two computer science courses) – 12 credits
2. Five computer science courses (at least 2 in one specialization area) – 20 credits
3. A research project (industry-related or academic), including a report of publishable/professional quality - 8 credits

Enrollment Option: Part Time

Courses (Core):

Course Code	Course Name	No. of Credits	Course Weighting
COMP6105	Object-Oriented Design	4	40% 3-hour written final, 60% projects/reports/presentations
COMP6430	Topics in Advanced Algorithms	4	60% 3-hour written final, 40 % coursework
COMP6001	Research Methods & Technical Writing	4	50% research project, 25% technical reports, 25% presentations
COMP6810	Research Project	8	100% written report

Courses (Electives):

Course Code	Course Name	No. of Credits	Course Weighting
COMP6110	Advanced Software Engineering	4	40% 3-hour written final, 60% projects/reports/presentations
COMP6410	Formal Methods of Software Design	4	40% 3-hour written final, 60% projects/reports/presentations
COMP6710	Advanced Operating Systems	4	60% 3-hour written final, 40 % coursework
COMP6770	Advanced Computer Networks	4	60% 3-hour written final, 40 % coursework
COMP6730	Cryptography and Digital Security	4	60% 3-hour written final, 40 % coursework
COMP6720	Advanced Database System	4	60% 3-hour written final, 40 % coursework
COMP6420	Parallel Computing	4	60% 3-hour written final, 40 % coursework
COMP6771	Wireless Networks	4	60% 3-hour written final, 40 % coursework
COMP6510	Topics in Advanced UI Design	4	40% 3-hour written final, 5 % in-course test, 5% individual project/report/presentation, 50% group project/report/presentation
COMP6520	E-Learning Design	4	40% 2-hour written final, 60% projects/reports/presentations
COMP6550	Web Design and Programming	4	40% 3-hour written final, 60%

			group projects/reports/presentations
COMP6540	Interactive Media Design	4	40% 3-hour written final, 60% projects/reports/presentations
COMP6210	Advanced Artificial Intelligence	4	60% 3-hour written final, 40 % coursework
COMP6220	Expert Systems	4	60% 3-hour written final, 40 % coursework

TOTAL NUMBER OF CREDITS FOR DEGREE **40**

COMP6105: Object-Oriented Design

This course covers advanced object-oriented analysis, design and programming. It looks at the principles behind current frameworks, and requires students to apply them in software design.

COMP6430: Topics in Advanced Algorithms

This course covers advanced data structures and algorithm analysis techniques that are not normally covered in an undergraduate course. It presumes that students have already been exposed to basic data structures, such as lists, trees, stacks, queues, binary heaps, and graphs, and aims to expose students to:
applications in which combinations of these basic structures are useful
other data structures that have good performance, but often require a reasoning capacity to analyse them beyond what is normally expected at the undergraduate level
algorithm analysis techniques that are often covered only briefly, or not at all at the undergraduate level

COMP6001: Research Methods and Technical Writing

This course covers the skills and techniques used in research and technical writing. The emphasis will be on practical skills that enable students to produce professional and publishable reports and technical presentations

COMP6510: Topics in Advanced User Interface Design

This course will introduce students to advanced issues in the design, development, and evaluation of user interfaces for computer systems. Concepts in human factors, usability, and interface design will be covered, and the effects of human capabilities and limitations on interaction with computer systems will be studied. Students will apply the concepts to the design and implementation of graphical user interfaces.

COMP6520: E-Learning Design

This course is designed to introduce students to the design and evaluation of educational technology. It covers the established learning paradigms of educational technology and the philosophical ideas behind them, developments in the field, and design and evaluation methods.

COMP6550: Web Design and Programming

This course covers the technologies that enable the creation of interactive websites that process and modify server-based data. This includes networking technologies, data representation for the web, web UI design and site design, client-server architecture and client-side and server-side programming. It covers relevant topics in e-commerce, network security, ethical and social issues, and relevant software engineering concepts such as the three-tier architecture and frameworks for the web. It also surveys mobile web issues and web multimedia.

COMP6540: Interactive Media Design

This course covers the technologies that enable the creation of interactive media. This includes the principles and design of the various forms of interactive media, including multimedia, visualizations, and animations.

COMP6770 : Advanced Computer Networks

This course covers the advanced features in wired networks starting from Frame Relay, Fast Ethernet, Gigabit Ethernet, and ATM. Then it goes into traffic management and congestion control techniques in both TCP and ATM. Finally, it introduces the student to various quality of service (QoS) tools such as Intserv, Diffserv and MPLS.

COMP 6771: Wireless Networks

This course covers wireless networking technologies and their protocols. It starts with the evolution of wireless networking, transmission media, antennas and signal propagation. The course then covers the Mac protocols, wireless network routing protocols, mobile IP, mobile TCP and ends with Next Generation networking.

COMP6720 (CS61Q): Advanced Database Systems
Here we explore some of the areas of current research in Database Management Systems and apply techniques that have been recently developed for storage, retrieval and analysis of large quantities of data

COMP6730 (CS61R): Cryptography

This course is intended to explore modern cryptographic algorithms, and the cryptographic techniques that may be used to protect stored data or data in communication systems.

COMP6110 (CS62Z): Advanced Software Engineering

This course covers modern topics in Software Engineering. The topics selected will vary from year to year and will depend on the interests of the lecturer. The topics covered in the past have included modelling with UML, software architectures, design and architectural patterns, software reusability, and software testing.

COMP6210 (CS63S): Advanced Artificial Intelligence

This course looks at advanced AI techniques that can be applied to the solution of various kinds of f problems.

COMP6220 (CS62S): Expert Systems

Here we apply AI techniques to the problem of acquisition and representation of expert knowledge for problem solving in the experts domain.

COMP6410 (CS63Z): Formal Methods of Software Design

This course applies mathematical models to the specification of safety critical systems (i.e. systems that cannot be allowed to fail).

COMP6810 (CS68O): Research Project

Here students typically spend a semester (full-time) developing their main project of the course.

Programme Co-ordinator: Ezra K. Mugisa (ezra.mugisa@uwimona.edu.jm)

Department Contact Information:

The Department of Computing
Faculty of Pure and Applied Science
The University of the West Indies Mona Jamaica, West Indies

MONA INSTITUTE OF APPLIED SCIENCES

Executive Director: Howard Reid, BSc, EMBA, PhD UWI

The Mona Institute of Applied Sciences offers the following Graduates programmes:

MSc Computer Science
Post-Graduate Diploma in Information Technology

MSc Computer Science (Relevant to students currently enrolled through the Mona Institute of Applied Sciences)

Programme Objectives:

To produce graduates with core knowledge and skills for computing, advanced knowledge of some selected topics in the science of computing, and research experience in computer science.

Entry Requirements:

An honours first degree in Computer Science or Information Technology from a recognised University. Students may be required to do selected Preparatory Courses as determined by an Academic Advisor or Head of Department.

Duration of programme:
Two years part time

Programme Structure:

The Master of Science in Computer Science provides graduates with core knowledge and skills for computing, advanced knowledge of some selected topics in the science of computing, and research experience in computer science. The courses are divided into four groups:
Preparatory courses develop prerequisite knowledge necessary and assumed for students to progress into any of the Master programs. These courses have zero credit value.
Principles courses examine core topics in computing, providing advanced knowledge.
Science courses examine selected topics in computer science research and development.
Project Course provide various opportunities to apply the knowledge obtained in other courses.
Students are required to complete:

Three courses of principles
Three courses of science
One course of principles or science
Research thesis

The MSc Computer Science will be offered two years part-time, with the preparatory courses being taught in the first Semester of the first year, the principle and science courses being taught from Semester II of the first year to Semester II of the second year, and finally, the Research Project in the final Semester.

Year 1 Semester 1

1. Computer Architecture

2. Discrete Mathematics

3. Algorithms, Implementation and Analysis

Year 1 Semester 2 Year 2 Semester 2

Principle and Science Courses

Year 2 Semester 3

Research Paper

Courses(Preparatory):

Course Code	Course Name	No. of Credits	Course Weighting
MIAS4117	Computer Architecture	0	60% Exam 40% Coursework
MIAS4213	Discrete Mathematics	0	60% Exam 40% Coursework
MIAS4501	Algorithms, Implementation and Analysis	0	60% Exam 40% Coursework

Principle:

Course Code	Course Name	No. of Credits	Course Weighting
MIAS6121	Operating Systems	4	60% Exam 40% Coursework
MIAS6317	Computer Networks	4	60% Exam 40% Coursework
MIAS6117	Database Systems	4	60% Exam 40% Coursework
MIAS6226	Software Engineering	4	60% Exam 40% Coursework
MIAS6218	Theory of Computing	4	60% Exam 40% Coursework
MIAS6319	Artificial Intelligence	4	60% Exam 40% Coursework
MIAS6815	Research Thesis	8	100% Coursework

Science:

Course Code	Course Name	No. of Credits	Course Weighting
MIAS6219	Expert Systems	4	60% Exam 40% Coursework
MIAS419	Topics in Artificial Intelligence	4	60% Exam 40% Coursework
MIAS6326	Formal Methods in Software Design	4	60% Exam 40% Coursework
MIAS6122	Parallel Computing	4	60% Exam

			40% Coursework
MIAS6118	Cryptography and Digital Security	4	60% Exam 40% Coursework

MIAS6121: Operating Systems

A comprehensive course covering the design and execution of operating systems manage system resources for application processes.

MIAS4317: Computer Networks

This course introduces the structure, implementation, and theoretical underpinnings of computer networking and the applications that have been enabled by that technology. It concentrates on the presentation and analysis of fundamental algorithms and design principles which underlie communications protocols and their performance characteristics.

MIAS6117: Database Systems

This course introduces the concepts and techniques of database system.

MIAS6226: Software Engineering

A study of the processes, structures, and management techniques required for the engineering of large software projects. Technical and organizational methodologies are examined, as well as specific tools that support software engineering.

MIAS6218: Theory of Computing

An examination of abstract models of computation, including finite automata, regular expressions, context-free grammars, pushdown automata, and Turing machines. Decidability and indecidability of computational problems.

MIAS6319: Artificial Intelligence

There are five cornerstones to the construction of artificially intelligent agents: powerful input processing, problem representation, search strategies, contextual knowledge, and powerful output processing. This course studies aspects of two core components: problem representation and search strategies. Various techniques and algorithms are introduced, and some implemented in a commonly used AI programming language.

MIAS6219: Expert Systems

The course gives a wide introduction to expert systems: how they can be used and how they are constructed, the main approaches to implement them, how to evaluate and compare systems and select the best one for the given problem.

MIAS6519: Topics in Artificial Intelligence

An in-depth study of a chosen topic in Artificial Intelligence.

MIAS6326: Formal Methods in Software Design

Formal Methods is a generic term for system design, analysis, and implementation methods that are described and used with mathematical rigour. The purpose is to construct, with high confidence, systems that behave according to their specification

MIAS6122: Parallel Computing

Parallel Computing is the study of the hardware and software issues in parallel computing. Topics include an introduction to the basic concepts, parallel architectures and network topologies, parallel algorithms, parallel metrics, parallel languages, granularity, applications, parallel programming design and debugging. Students will become familiar with various types of parallel architectures and programming environments.

MIAS6118: Cryptography & Digital Security

The course introduces the principles and practice of network security and cryptographic algorithms. Topics covered include the necessary mathematical background, cryptographic algorithms, and cryptographic protocols.

Department Contact Information:

Mona Institute of Applied Sciences
4 Belmopan Close
The University of the West Indies, Mona Jamaica, West Indies
Telephone: (876) 970-2021 / 970-2042 / 512-3069Fax: (876) 970-0289
Email: Website:

Programme Coordinator: Mr. Julian Francis

Post Graduate Diploma in Information Technology

Programme Objectives:

To bring university graduates with degrees in disciplines other than Information Technology and Computer Science to a level between a good honours degree and an MSc in Information Technology.

To enable graduates to acquire hands-on applied skills in information technology which are

under- girded by the theoretical foundation necessary to master key concepts in information technology.

Entry Requirements:

Applicants must have a Bachelors degree from a recognized university. Students must have an interest in information technology as well as programming.

Duration of Programme:
One year part time

Programme Structure:

The Postgraduate Diploma in Information Technology provides graduates with skills required to commence a career in the Information Technology industry, or to proceed to graduate study in a Master program. The courses are divided into two groups:

Core courses
Elective courses

The Post Graduate Diploma in Information Technology will be offered one year part-time, with the core courses being taught in the first and second Semester, and the elective courses being taught in the third Semester.

Students are required to complete:

All five Core Courses
Two Elective Courses

Semester 1

Core Courses

1. Computer Architecture
2. Discrete Mathematics
3. Introduction to Computer Programming

Semester 2

Core Courses

4. Data Structures
5. Operating Systems & Networks

Semester 3

Electives

1. Algorithms and Analysis
2. Graphics and Multimedia or Introduction to Database Principles
3. C Programming & Unix
4. Internet Computing

Courses Core

Course Code	Course Name	No. of Credits	Course Weighting
MIAS4117	Computer Architecture	4	60% Exam 40% Coursework
MIAS4213	Discrete Mathematics	4	60% Exam 40% Coursework
MIAS4101	Introduction to Computer Programming	4	60% Exam 40% Coursework
MIAS4201	Data Structures	4	60% Exam 40% Coursework
MIAS4317	Operating Systems &	4	60% Exam Networks 40% Coursework

Course Electives

Course Code	Course Name	No. of Credits	Course Weighting
MIAS4217	Introduction to Database Principles	4	60% Exam 40% Coursework
MIAS4301	Algorithms and Analysis	4	60% Exam 40% Coursework
MIAS4619	Graphics & Multimedia	4	60% Exam 40% Coursework
MIAS4401	C Programming & Unix	4	60% Exam 40% Coursework
MIAS4417	Internet Computing	4	60% Exam 40% Coursework

MIAS4117: Computer Architecture

A study of the hardware components of modern microcomputers and their organization. Evaluation and comparison of the various microcomputer systems.

MIAS4213: Discrete Mathematics

The discrete mathematical skills fundamental to the computing and information sciences.

MIAS4101: Introduction to Computer Programming

A first course in computer programming, examining the syntax and semantics of a chosen programming language, including object oriented programming techniques.

MIAS4201: Data Structures

Data Structures used in computer programming to represent domain objects and activities. Algorithms for manipulating the data structures. Advanced object oriented programming techniques to implement the algorithms.

MIAS4317: Operating Systems & Networks

Introduction to fundamental concepts of operating systems and their implementation in UNIX, Windows. Principles of computer network design, operation and management.

MIAS4217 - Introduction to Database Principles

This course provides students with an understanding of the importance of database technology in todays society and how they can use this technology to manage their own data requirements. The course will include a detailed discussion of database design and the relational database model.

MIAS4619: Graphics and Multimedia

A first course in algorithms and techniques for image generation. Geometric transformations, algorithms for hidden surfaces and ray tracing. Programming with standard a graphics interface. The planning and creation of interactive multimedia presentations, developing a conceptual and practical understanding of the components of media and their production.

MIAS4301: Algorithms and Analysis

Design of efficient data structures and algorithms. Analysis of algorithms and asymptotic time complexity. Graph, string and geometric algorithms.

MIAS4401: C Programming & UNIX

Programming in the C language in a UNIX environment. The syntax and semantics of the C language, with emphasis on features that make C effective for applications. Study of some code libraries available to C programming. The user environment of UNIX, its file system and tools. Programming for Unix through the system call interface, including internet programming.

MIAS4417: Internet Computing

Principles and practices used in creating interactive internet sites, using dynamic HTML, JavaScript, and the Common Gateway Interface. Effective use of search tools. Java Database Connectivity, swing, applets, and servlets. Principles and practices used in connecting web sites to back-end databases with Active Server Pages, PHP: Hypertext Preprocessor, JavaScript, Java servlets, and Java Server Pages. Internet programming with Python or Perl.

Additional Information/Notes:

Students exempted from any course due to previous study are required to take replacement elective courses.
Students proceeding to the MSc are required to take the Algorithms and Analysis elective.

Department Contact Information:

Mona Institute of Applied Sciences
4 Belmopan Close
The University of the West Indies,
Mona Jamaica, West Indies
Telephone: (876) 970-2021 / 970-2042 / 512-3069Fax: (876) 970-0289Email: Website:
Programme Coordinator: Mr. Julian Francis

DEPARTMENT OF PHYSICS

Head: Dr. Tannecia Stephenson

MPhil Physics/Electronics

Programme Objectives

The objectives of the MPhil program in Physics/Electronics are:

to provide advanced knowledge in Physics/ Electronics beyond that obtained in undergraduate programs

to develop competence in the conduct of research, within the framework of Physics/Electronics

to provide opportunities for the design of discipline-based research projects that meet the needs and interests of individuals

to provide an alternative to the honours program for students who have previously completed a

BSc and wish to proceed to a research degree.
to provide an opportunity to undertake (or transferring into) a PhD program.

Entry Requirements
The minimum requirement for admission to M.Phil. programmes shall be an Upper Second Class Honours degree or its equivalent, unless the Campus Committee in any particular case otherwise decides.

Areas of Research

Research is conducted in the following areas:
Physics
Climate Studies
Alternative Energy
Materials Science
Medical Physics
Electronics
Circuits and Instrumentation
Global Positioning Systems
Students undertake supervised research leading to the production of the thesis.

Seminars

Students enrolled for an M.Phil. degree must satisfactorily complete at least two research seminars, one in each year, to be convened by the relevant Head of Department, prior to the submission of the M.Phil. thesis. Assessment of the students seminars must be included in their Progress Reports.
Minimum two seminars
Students must given one seminar in the field of their research each year. In addition, full time students must participate in all seminars given in the department, and part time students must attend, during their studies.

Duration of programme

The MPhil degree is by thesis and must not normally take more than 3 years (a departmental regulation).

Department Contact Information:

Department of Physics
The University of the West IndiesMona,
JamaicaTel: (876) 927-2480 | Fax: (876) 977-1595 Email:

Programme Coordinator: Dr. Mitko Voutchkov

PhD Physics

Programme Objectives:

The doctoral programs of the department are oriented towards fundamental and applied research and reflect the specialties of the faculty. The objectives of the programs are to give students advanced training for further research in universities or the private sector.

Entry Requirements

The following are eligible to apply for admission to PhD programmes:

a) Persons holding approved graduate degrees awarded primarily for research;

b) Persons holding a taught Masters degree from the UWI or another approved University, provided that the Masters programme included a research component of at least 25% of the total credit rating and the applicant achieved at least a B+ average or its equivalent

c) Persons registered in M.Phil. degree programmes of the UWI who have met the requirements for upgrading of their registration, as stipulated by the Board for Graduate Studies & Research;

d) Persons possessing such other qualifications and experience as the Board for Graduate Studies & Research may approve.

Admissions of applicants to PhD programmes without prior registration for the MPhil must be approved by the Board for Graduate Studies and Research.

Applicants for direct admission to the PhD programme, are required to submit in writing to the

Department, a detailed proposal of the research they wish to undertake, within six weeks of notification by the Registrar. Applicants who write satisfactory proposals may be admitted as candidates for the PhD.

Applicants for admission to the PhD who do not hold a Masters Degree are normally required to register for the MPhil in the first instance. Applicants may have their registration transferred to the PhD after one year on providing evidence to the Board of their ability to undertake independent research.

Students holding degrees from foreign universities will be required to submit details of their undergraduate and/or graduate studies and research. In the case of students holding MSc by course work, proof of research ability will be a normal requirement for direct admission to the

PhD programme.

Areas of Research

Research is conducted in the following areas:

Physics
Climate Studies
Alternative Energy
Circuits and Instrumentation
Global Positioning Systems
Materials Science
Medical Physics
Electronics
Circuits and Instrumentation
Global Positioning Systems

Students undertake supervised research leading to the production of the thesis

Seminars

Students enrolled for a Ph.D. must satisfactorily complete three such seminars. Assessment of the students seminars must be included in their Progress Reports. In addition, full time students must participate in all seminars given in the department, and part time students must attend, during their studies.

Duration of programme:

The PhD degree is by thesis and must not normally take more than 5 years.

Department Contact Information:

Department of Physics
The University of the West IndiesMona,
JamaicaTel: (876) 927-2480 | Fax: (876) 977-1595 Email:

Programme Coordinator: Dr. Mitko Voutchkov

MSc Digital Technology

Programme Objectives:

The objectives of the programme are:

Analyze performance requirements and specify the technical characteristics and features of components and systems necessary to meet given performance objectives.
Evaluate technical proposal for systems employing digital technology and recommend appropriate choices and actions.
Manage the acquisition and implantation of integrated systems which use digital technology.

Entry Requirements:

The programme will admit applicants who are holders of a first degree from the University of the West Indies (UWI) in any of the following: Applied Physics, Electrical, Mechanical, Chemical Engineering or Computer Science. Applicants from other Universities will be considered on a case by case basis.

Duration of programme:

Two years part-time

Programme Structure:

The Digital Technology Masters will be offered as a two-year part-time programme. Where courses will be conducted on one night during the week and all day class and labs on Saturdays. There will also be two full time sessions during summer of each of the two year.

Year 1 Semester 1
0. Introduction to Digital Technology.

1. Solid State Electronic Devices and Applications.

Year 2 Semester 1
1. Micro Controllers (Architecture and Programming).

2. Computer control of Machinery, Industrial Systems and Processes.

Year 1 Semester 2
2. Digital Control Systems and Signal processing (Theories, Design and Analysis).

Year 2 Semester 2
3. Digital Communication (Theories Design and Analysis).

Year 1 Summer
3. Communication Links (Design and Implementation)

4. Project Management Fundamentals.

Year 2 Summer
4. Computer Networks.

Core Courses

Course Code	Course Name	No. of Credits
ELET 6400	Introduction to Digital Technology	0
ELET 6420	Digital Control Systems and	8

	Digital Signal Processing – Design and Analysis	
ELET 6430	Digital Communications - Design and Analysis	8
ELET 6450	Micro Controllers	8
ELET 6440	Computer Networks, Design and Implementation	8
ELET 6470	Digital Communication Links - Design and Implementation	4
ELET 6410	Solid State Electronic Devices	3
ELET 6480	Project Management Fundamentals	4

Course Electives

Course Code	Course Name	No. of Credits
ELET 6460	Computer Control of Industrial Machinery, System and Processes	4
ELET 6490	Software Method for Electronics	4
ELET 6455	Microprocessors - Architecture and Applications.	8

ELET 6400: Introduction to Digital Technology

Course Description:

To provide general knowledge in electronics, communication and electronics, component, principle of Microprocessor and controllers. This course was developed to enhance entry level knowledge and is compulsory for all students.
It is 3 credit undereducated course, credits are not counted towards MSc programme.

ELET 6420: Digital Control Systems and Digital Signal Processing Design and Analysis.

Course Description:

To provide a general foundation in the principles applicable to discrete data systems, digital control systems and digital signal processing. This module will enable students to adopta rigorous approach to practical applications in the field and will equip the students, academically, to undertake more advanced studies in more specialized aspects of the subjects.

ELET 6430: Digital Communications - Design and Analysis

Course Description:

To provide a general foundation in the principles applicable to digital communications. This module will enable students to adopt a rigorous approach to practical applications in the field and will equip the students, academically, to undertake more advanced studies in more specialized aspects of the subject.

ELET 6455: Microprocessors -Architecture and Applications.

Course Description:
To give students the knowledge and experience in the use of microprocessors in circuits designed to achieve digital control, communication or signal processing functionality.

ELET 6450: Microcontrollers.

Course Description:

To expose students to new advanced technology in microelectronics
To provide an understanding of microcontroller hardware and software.
To enable students to carry out design and troubleshooting of the intelligent microcontroller systems.

ELET 6450: Computer Networks,Design and Implementation.

Course Description:
To provide students with the knowledge and skills needed to assess user requirements and to design and implement computer networks of any size or configuration likely to be required by a Jamaican organization.

ELET 6470: Digital Communication Links -Design and Implementation.

Course Description:

To provide students with the skills and knowledge needed to enable them to design and implement digital communication links of any type needed in the current and future Jamaican commercial contexts.

ELET6460: Computer Control Of Industrial Machinery, Systems And Processes.

Course Description:

To provide students with the skills and knowledge required to enable them to design and / or direct the acquisition and integration of systems which would facilitate the computer control of industrial machinery, systems and processes.

ELET 6410: Solid State Electronics Devices.

Course Description:

The goal of this course is to introduce the physical principles of semiconductor devices and their practical implementation to beginning post graduate students. The aim is to initially introduce elementary semiconductor physics and fabrication technology, including concept of the energy band diagram, carrier concentration and mobility. The basic fabrication processes- impurity diffusion, oxidation, epitaxy, photomasking and ion implantation will be explained. The Static and dynamic properties of two-terminal and three terminal devices will be introduced.

ELET 6490: Project Management Fundamentals.

Course Description:

To provide students with the knowledge necessary to enable them to efficiently manage a technical project.

ELET 6490: Software Methods for Electronics.

Course Description:

To introduce students to a variety of software tools, which are use in the design, implementation and testing of electronics.

Department Contact Information:

The Department of Physics
Faculty of Pure and Applied Sciences
The University of the West Indies, Mona Jamaica West Indies Telephone No. 927-2480
URL:www.uwimona.edu.jm/physics OR

Programme Coordinator: Dr. Michael Taylor

MSc and Diploma in Medical Physics

Programme Objectives:

The objectives of the programme are:

- To provide education and training in the fields of the Medical and Health Physics.
- To produce Qualified Medical and Health Physicists who are competent to practice independently in the fields of the clinical Medical Physics (X-ray diagnostics, Nuclear Medicine, radiotherapy, MRI, US) or Radiation Health Physics (environmental radiation protection and management, radiation safety inspections of nuclear or radiation-based facilities, enforcement of government regulations, etc).

Entry Requirements:

Applicants must possess a Bachelor of Science, Engineering or Medicine degree from a recognised university with a minimum Lower Second Class Honours degree. All applications must be completed on-line using the website http://sas.uwimona.edu.jm:9010.

Duration of programme: One year full-time / Two years part time

Programme Structure:

The Medical Physics Masters will be offered as one-year full-time (three semesters) and two-year part-time programme.

The postgraduate programme in Medical Physics offers two study options:

1. MSc in Medical Physics: an approved combination of taught modules, followed by a Research Project and Graduate Seminar carrying 10 credits. A total of 48 credits are required with an overall average mark of 50% and at least 50% in the Research Project.
2. Postgraduate Diploma (PgDip): an approved combination of taught modules that can be completed in 9 months full-time study. A total of 24 credits are needed with an overall average mark of 50%.

The MSc/PGDip curriculum has a modular structure developed in three levels. Level I (core) courses (16 credits total), Level II (professional) courses (20 credits total) and Level III - speciality & practical courses (12 credits).

Course Code	Course Name	No. of Credits	Course Weighting
	LEVEL I (core)		
MDPH6110	Anatomy and physiology for medical physicists	3	60% Exam 40% Course work
MDPH6120	Physics of the human body	2	60% Exam 40% Course work
MDPH6130	Fundamentals of radiation physics and dosimetry	4	50% Exam 50% Course work
MDPH6140	Basic Medical Electronics and Instrumentation	3	50% Exam 50% Course work
MDPH6150	Biomedical statistics and informatics	2	60% Exam 40% Course work
MDPH6160	Radiation biology and protection	2	50% Exam 50% Course work
	LEVEL II (professional)		
MDPH6210	Diagnostic radiology: physics and equipment	4	50% Exam 50% Course work
MDPH6220	Radiation therapy: physics and equipment	6	50% Exam 50% Course work
MDPH6230	Nuclear medicine: physics, equipment	3	50% Exam

	and applications		50% Course work
MDPH6240	Non-ionization radiation: physics, equipment and applications	3	70% Exam 30% Course work
MDPH6250	Environmental and industrial health physics	4	50% Exam 50% Course work
	LEVEL III (electives)		
MDPH6301	Digital Signal and Image Processing	2	50% Exam 50% Course work
MDPH6302	Modelling in Health Physics	2	50% Exam 50% Course work
MDPH6303	Reactor Health Physics	2	50% Exam 50% Course work
MDPH6304	Special Topics in Medical Physics	2	50% Exam 50% Course work
	LEVEL III (practical)		
MDPH6320	Medical Physics Research Project	8	100% Course work
MDPH6330	Graduate Seminar	2	100% Course work

TOTAL NUMBER OF CREDITS FOR DEGREE / DIPLOMA

48 credits for MSc / 24 credits for PG Diploma

Level 1

MDPH6110: ANATOMY AND PHYSIOLOGY FOR MEDICAL PHYSICISTS

The aim of this course is to present the theoretical knowledge on the structure of the human body and the basic mechanisms of its function.

MDPH6120: PHYSICS OF THE HUMAN BODY

The purpose of this course is to show how physics is applied in human health sciences.

MDPH6130: FUNDAMENTALS OF RADIATION PHYSICS AND DOSIMETRY

The course aims to present the theoretical and practical foundations for a new medical physics recruit to the basis of radiation physics, radiation measurements and dosimetry.

MDPH6140: MEDICAL ELECTRONICS AND INSTRUMENTATION

To introduce/to explore the impact of electronic technology on today's modern digital instrumentation, control and communication systems applied to medical physics.

MDPH6150: BIOMEDICAL STATISTICS AND INFORMATICS

To provide the student with the useful applications of statistics in medical diagnostics, therapy, and health facilities. To provide an introduction to some of the basic component of the hospital information system.

MDPH6160: RADIATION BIOLOGY AND PROTECTION

The aim is to understand the effects of ionizing radiation on biological material and to include the application of radiation biology in radiation protection and safety.

Level II

MDPH6210: DIAGNOSTIC RADIOLOGY: PHYSICS AND EQUIPMENT

The aim of this module is to present to the students the basic physical principals of: (a) Conventional planar X-Ray Imaging; (b) Digital X-Ray Imaging and Computed Tomography.

MDPH6220: NUCLEAR MEDICINE: PHYSICS, EQUIPMENT AND APPLICATIONS

The aim of the course is to discuss basic physics in radionuclide imaging and the principle of tracers in nuclear medicine.

MDPH6240: NON-IONIZATION RADIATION: PHYSICS, EQUIPMENT AND APPLICATIONS

The aim of the module is to present to the students the theoretical and practical basis of non-ionisation radiation: principles, instrumentations and their medical applications for diagnostic and therapy.

MDPH6250: ENVIRONMENTAL AND INDUSTRIAL HEALTH PHYSICS

The main objectives of this course are to provide a high-quality graduate education experience for students in the areas of environmental and industrial health physics and to produce professionals capable of critical thinking and problem solving.

Additional Information/Notes:

The masers programme in Medical Physics was developed based on the guidelines for "*Academic Program Recommendations for Graduate Degrees in Medical Physics*" of the American Association of Physicists in Medicine (AAPM, Report No. 197, 2009), which provide a framework for the accreditation of Medical Physicists. The programme is directed toward providing a one year full time education and clinical training of graduates to become Qualified Medical and Health Physicists.

Department Contact Information: The University of the West Indies
Department of Physics
Telephone: (876) 475-3312 or (876) 927-2480

E-mail: physics@uwimona.edu.jm
Website: http://myspot.mona.uwi.edu/physics/
Programme Coordinator: Prof. Mitko Voutchkov

THE BIOTECHNOLOGY CENTRE

Director: Professor Helen Asemota, B.Sc. University of Benin, M.Sc. Ahmadu Bello University, **Ph.D. in Biochemistry, University of Benin / Frankfurt University.**

The Biotechnology Centre offers MPhil and PhD degrees in biotechnology.

Collaborative projects may be done with other departments or with other universities or institutions

MPhil/PhD Biotechnology

Programme Objectives:

1. To provide a strong understanding of the foundation, principles, and application of the substantive areas of biotechnology, with emphasis on plant biotechnology, biochemistry and molecular biology.

2. To train students with modern scientific equipment, tools, techniques and methodologies used

in biotechnology research and development.

3. To encourage the development of problem solving skills in the students area of specialization in biotechnology for agriculture, medicine and industrial usages.

Entry Requirements:

Bachelors degree from the University of the West Indies, or other recognized universities, with at least an upper second class honours.

Students must demonstrate aptitude in independent research and have passed the core undergraduate biotechnology and biochemistry courses, including molecular biology courses at the UWI. Students with an agricultural first degree will also be considered but may need to take qualifying courses.

Areas of Research

1. Plant Biotechnology

2. Molecular Genetics

3. Plant Molecular Biology

4. Plant Tissue Culture (micropropagation, somatic embryogenesis, cryopreservation, biofarming)

5. Molecular Plant Virology

6. Bioengineering of tuber crops

7. Management of Diabetes through the use of Glycemic Indices of Indigenous Caribbean Food

8. Nutraceutical products for selected diseases

9. Medicinal Plant Biotechnology

Seminars

1- 2 seminars per academic year per student

Duration of programme:

3-6 years part-time / 2-4 years full-time for MPhil Degrees
4-8 years part-time / 3-6 years full-time for PhD Degrees

Enrollment Option

Full-Time or Part-Time

Additional Information/Notes:

Acceptance to the MPhil also depends on the availability of bench space at the Centre and a suitable supervisor.

Department Contact Information:

876-977-1828 (Tel). 876-977-3331 (Fax)

Postgraduate Coordinator: Dr Sylvia Mitchell, sylvia.mitchell@uwimona.edu.jm