FACULTY OF SCIENCE & AGRICULTURE

2011/2012 REGULATIONS & SYLLABUSES
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MESSAGE FROM THE DEAN OF THE FACULTY OF SCIENCE & AGRICULTURE

On behalf of the Faculty of Science & Agriculture (FSA), I want to urge you to favourably consider the University of the West Indies and in particular the FSA as the institution of choice to pursue your graduate education and training. The Faculty was established in 1996 from the merger of the former Faculties of Agriculture and Natural Sciences and has a long tradition of excellence in postgraduate education and training as well as in research, development and innovation which dates back to its forerunner, the former Imperial College of Tropical Agriculture which was established in 1922. The Faculty currently offers a wide range of relevant graduate programmes ranging from taught postgraduate diplomas and Master of Science (MSc) degrees to research programmes leading to the award of MPhil and PhD degrees on the successful completion of a research thesis.

With the current rapid advances in technology and globalization of trade, there is now more than ever an urgent need for all individuals to equip themselves with the appropriate skills and competencies, which enhance employment and career prospects and for countries to have an appropriately trained and adaptable work force. We in the FSA see STI and Food and Agriculture as critical to a diversified economy and ultimately to the socioeconomic transformation of the region. The seven departments of the FSA have a cadre of highly motivated professional working on various basic and applied research projects. We also have many vibrant interdisciplinary research clusters working on projects of national/regional strategic importance.

The Faculty has been able to attract significant research funding for its research programmes from University sources as well as from local, regional and international sources. This is a reflection of the quality and relevance of the research programmes being undertaken.

The Faculty has implemented a system of academic advising to closely monitor the progress of its graduate students to ensure timely throughput rates. We expect all research students to meet at scheduled intervals with their Supervisors and Advisory Committees. We also require graduate students to attend all seminars as well as to present seminars on their own research at regular intervals. We provide financial support (limited) for our graduate students to present their research findings at regional/international conferences. We also expect all graduate students to publish their work in referred international journals.

The Faculty provides many specialised laboratories in which students can pursue impact research in an enabling environment under expert supervision. In addition to the above, our attractive campus and easily accessible working agricultural field station are located in a country which is ecologically diverse and which has not only a very rich culture, but also a very rich fauna and flora, so that although postgraduate study and the pursuit of excellence can be personally challenging, I am sure that your stay in Trinidad & Tobago and in our Faculty will be a very rewarding experience. We look forward to having you with us, and to the returning students - welcome back.

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Clerical Assistant
GENERAL INFORMATION ON POSTGRADUATE STUDIES IN THE FACULTY

1. SCHOOL FOR GRADUATE STUDIES AND RESEARCH (SGS&R)

The School for Graduate Studies and Research has the overall responsibility for the development of graduate studies and research on all three campuses of The University of the West Indies. The School is chaired by its Pro Vice Chancellor (PVC, Graduate Studies) and is governed by the Board for Graduate Studies and Research. There is a committee of the SGS&R on each campus called the Campus Committee for Graduate Studies and Research. The SGS&R works closely through these three Campus Committees to manage and administer activities related to research and graduate studies. The School assists academic departments with the maintenance and development of coherent graduate studies programmes and, through the Board for Graduate Studies and Research, approves the establishment of new postgraduate programmes and the award of degrees.

2. TYPES OF GRADUATE PROGRAMMES OFFERED IN THE FACULTY OF SCIENCE AND AGRICULTURE

The Faculty offers a wide range of certificates, diplomas, taught Master's degrees as well as research degrees (MPhil and PhD).

(a) Taught Programmes

The programmes for the Master of Science (MSc) degrees and for Postgraduate Diplomas consist mainly of a set of lectures, seminars, coursework assignments and either a project or a research paper. The Faculty also offers Diplomas and Certificates by distance.

(b) Research Degrees

The Master of Philosophy (MPhil) and the Doctor of Philosophy (PhD) degrees are research degrees. Research degrees involve independent study, directed by one or more supervisors. All MPhil and PhD programmes of study culminate in the presentation of a thesis conveying the results of the independent study and research carried out by the graduate student. It is necessary that graduate students, supervisors, advisory committees and examiners ensure that the qualitative and quantitative distinction between the MPhil Degree and PhD Degree be understood and maintained.
(ii) The MPhil Thesis
The MPhil thesis reviews the state of knowledge in a particular field, creates and evaluates a new design or novel experiments in a particular aspect of an area of study or makes an appropriate critique or interpretation of the subject. The Master's Thesis should be evidence of the graduate student's ability to effectively review the relevant literature in the field, to undertake independent research and to present the results in a clear, systematic and scholarly form.

It is normally expected that a Master's Thesis will make some independent contribution to knowledge or understanding in the subject area in which the student is working.

(iii) The Doctoral Thesis
A Doctoral thesis must set forth a significant contribution to knowledge or understanding, adding to or critiquing through approved research methodologies the current theoretical underpinnings and empirical base in the student's field of study.

The thesis must be set forth in a scholarly manner demonstrating the original and independent investigations conducted and setting forth unambiguously its achievements, contributions and findings in a format appropriate to Doctoral Theses in the particular discipline.

The Doctoral Thesis must reflect not only mastery of the subject area under investigation and competence in research techniques, but also the ability to select an important problem for investigation and to deal with it in a mature, competent manner.

The Doctoral Degree is, by nature and tradition, the highest certificate of membership in the academic community. It is meant to indicate the presence of superior qualities of mind, intellectual interest and high attainment and knowledge in a chosen field. It is not conferred merely as a certificate for a prescribed course of study and research, no matter how faithfully pursued. Independent achievement at a high intellectual level is a prerequisite to its conferment. A Doctoral Thesis or parts thereof must be judged to be potentially publishable.

The award of a PhD also requires the candidate to defend his/her thesis at a public oral examination. Many research degrees now contain a taught element. The intention of these taught courses is to provide students with research techniques and skills that will not only help them complete their current research topic, but will also stand them in good stead for life after University.

With the exception of holders of MPhil degrees from recognised Universities, candidates interested in pursuing the PhD degree are normally required to register for the MPhil Degree in the first instance. If your Supervisors are happy with your progress, then provisions exist to upgrade your registration from the Master's to Doctoral level without first submitting a Master's dissertation.

If you decide to pursue a research degree, it is very important that the thesis topic you choose is of genuine and sustainable interest to you.

3. Registration
The academic year is divided into two semesters as follows:
Semester I - August to December
Semester II - January to May

Candidates for the MPhil or PhD degree may register during the first two weeks of either Semester but it is more usual for such candidates to begin their studies at the start of the academic year. A candidate wishing to pursue a taught Master's Degree or an Advanced Diploma programme MUST begin his/her studies at the start of the academic year unless otherwise specified.

Students from Trinidad & Tobago may be registered for full-time or part-time studies. You will not be registered for full-time studies if you spend an average of twelve or more hours a week in paid employment. For a student registering as part-time, proof of leave of absence from your job must be submitted at the time of registration. Overseas students will normally be required to register for full-time studies.

No allowances will be made with respect to attendance at lectures, laboratories, tutorials or examinations for students on the condition of their employment.

4. Time Limitation
The following table shows IN GENERAL the time limitation (in years) for postgraduate degrees:

<table>
<thead>
<tr>
<th>PROGRAMME</th>
<th>FULL TIME</th>
<th>PART TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minimum</td>
<td>Maximum</td>
</tr>
<tr>
<td>Diplomas</td>
<td>1</td>
<td>XXXX</td>
</tr>
<tr>
<td>MSc (taught)</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>MPhil</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>PhD</td>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>

5. Academic Supervisor
Each research student is assigned one or more supervisors who will guide the student through his/her studies. The appointment of a supervisor(s) is recommended by the relevant Head of Department after careful consideration of the Faculty member's expertise and experience. Also, a Committee of Advisors shall be appointed by the Board for Graduate Studies and Research for each MPhil and PhD student. This Committee shall comprise a minimum of three persons, including the supervisor(s) of your research programme.
6. Assessment
   a. Taught Programmes
      The methods of assessment may vary, but examinations
      are conducted mainly by written papers supplemented
      by in-course testing, practical examinations, a project
      report, a research paper, or a combination of these
      methods.

      Candidates are required to pass all courses and all
      coursework, designated by the Department as forming
      part of the higher degree programme for which they
      are registered, with a mark of 50% or better.

   b. MPhil/PhD Thesis and Examination
      All research degrees are examined by theses. In
      addition, research students will be required to pass
      courses amounting to a MINIMUM of 6 credits for the
      MPhil and 9 credits for the PhD degree. For the MPhil
      degree the candidate may be required to defend
      his/her thesis by an examination. Every candidate
      for the PhD must defend his/her thesis by an oral
      examination.

      A candidate who is unsuccessful in the examination for
      the PhD may apply to the Board for Graduate Studies
      and Research for transfer of registration to the relevant
      MPhil and for permission to resubmit the relevant
      thesis or a revised version of it for examination for a
      Master’s degree. Where the application is approved, the
      registration for the PhD will lapse and the registration
      for the MPhil will be deemed to have started from the
      date of registration for the PhD.

7. Upgrading of Registration
   Postgraduate students who are registered for the MPhil
   degree and who wish to be considered for the upgrading of
   their registration to PhD must apply to do so in the second
   year of registration on the written recommendation of
   their supervisor(s). Applications for upgrading will not be
   considered after the third year of registration. Applicants
   for upgrade must have completed all departmental
   coursework requirements by this time and must defend
   their proposal for upgrading at a Faculty seminar.

   A supervisor must state why he/she considers the student
   to be outstanding and whether in his/her opinion the work
   can be developed to the level of the PhD

   All recommendations from Departments for PhD upgrade
   registrations are subject to the approval of the Board for
   Graduate Studies and Research.

8. Graduate Research Seminars
   All postgraduate research students are required to present
   at least two seminars on their work, both of which will be
   examined and a ‘pass’ or ‘fail’ mark given. Students are also
   required to attend a minimum of 75% of all Departmental/
   Faculty seminars. A Seminar attendance register will be
   kept by all Departments.

9. Postgraduate Course in “Scientific Presentation and
   Critique”
   Purpose of the Courses
   These courses are designed for MPhil and PhD students. Its
   purpose is to:
   • Immerse graduate students into a culture of reading
     and critical analysis of research in their field and
     related disciplines.
   • Expose students to a broad range of research topics in
     and related to their discipline.
   • Involve students in regular scientific discourse
     involving their own work and the work of others.
   • develop students’ analytical and critical thinking skills
     as well as their oral presentation and writing skills.

   NOTE: Current School of Graduate Studies state that MPhil
   students are required to present two assessed seminars and
   PhD students must present three. This course may be used as
   a forum for these presentations which will be assessed in the
   manner prescribed for such assessed seminars.

   MPhil
   GRSM 7004 - Scientific Presentation and Critique 1
   GRSM 7005 - Scientific Presentation and Critique 2
   GRSM 7006 - Scientific Presentation and Critique 3

   PhD
   GRSM 8004 - Scientific Presentation and Critique 1
   GRSM 8005 - Scientific Presentation and Critique 2
   GRSM 8006 - Scientific Presentation and Critique 3
GENERAL INFORMATION ON THE FACULTY OF SCIENCE & AGRICULTURE

The FSA comprises seven teaching and research departments which are organised into two Schools as follows:

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(C) TEACHING AND/OR RESEARCH UNITS:
The Faculty also includes the following teaching and/or research units.

(i) THE UNIVERSITY FIELD STATION (UFS):
This is located approximately 4 km from the main campus, has facilities for livestock and crop production work including a rabbitry, cattle, sheep and poultry facilities, a laboratory, a machine shop, plant propagation facilities, and temperature-controlled rooms for vegetable and fruit storage work. In addition there is an abattoir and a milk pasteurisation facility. The Faculty has recently acquired 200 acres of land in Orange Grove for the construction of a modern experimental agricultural field station. Work on this site is currently in progress.

(ii) THE COCOA RESEARCH UNIT (CRU):
This unit, which is the custodian of the International Cocoa Genebank, Trinidad, has a collection of some 2,300 accessions. The CRU is involved in a number of multi-disciplinary research programmes, which include collection and conservation of germplasm, morphological and molecular characterisation, germplasm enhancement, evaluation for resistance to major diseases and flavour assessment. In addition, the CRU plays a role in the improvement of cocoa by providing useful and diverse germplasm to cocoa producing countries. The Unit is involved in several international research projects, collaborates with other research institutions, and continues to attract local and external funding to support its research activities.

(iii) THE NATIONAL HERBARIUM OF TRINIDAD AND TOBAGO (NHTT):
This facility which gained national status in 1972, predates the UWI. It was established in 1887, and was then transferred to the Imperial College of Tropical Agriculture, (currently the Faculty of Science and Agriculture) in 1947. The NHTT maintains the permanent museum collection of the flora of Trinidad and Tobago, is a resource centre for botanical information, and provides facilities for local, regional and international researchers, as well as a plant identification service.

(iv) ELECTRON MICROSCOPE UNIT:
The Faculty operates a Scanning electron Microscope (SEM) and Transmission Electron Microscope (TEM) at the Eric Williams Medical Sciences Complex. This Unit facilitates both teaching and research activities at the Campus.
Entry Requirements
Candidates seeking entry to the Diploma, or MSc, or MPhil programmes in the Faculty must satisfy the minimum requirements of the School for Graduate Studies and Research (Lower Second Class Honours for MSc and Upper Second Class Honours or equivalent for MPhil) AND must hold a BSc degree at the prescribed level in Agriculture or Natural Sciences (or an equivalent qualification) from an approved university. In exceptional cases, students may be admitted with a pass degree and considerable work experience in a related area.

For direct entry into the PhD programme, a student must satisfy minimum entry requirements of the School of Graduate Studies & Research AND have obtained a MPhil degree (or an equivalent qualification) in an appropriate field of study in science or agriculture from an approved tertiary level institution.

SCHOOL OF AGRICULTURE
(a) The School of Agriculture which comprises the departments of Agricultural Economics and Extension and Food Production, has a long history of excellence in teaching, research and outreach dating back to 1924 in the Imperial College of Agriculture (ICTA). The School is staffed by well-qualified and experienced academic and technical staff.

Research in the School is focused on the problems of low productivity of the agricultural sector in the Caribbean, as well as competitiveness and sustainability in the new global environment; agricultural biotechnology; soil and water conservation; crop and livestock production and post-harvest technology. Research is done in close collaboration with the Departments of Life Sciences and chemistry, the Faculty of Engineering and the School of Veterinary Science.

Research work is financed from University funds, augmented by grants from the private sector, international agencies and the Government of the Republic of Trinidad & Tobago.

(b) GRADUATE PROGRAMMES:
The School of Agriculture offers postgraduate degrees in the following areas:
(i) Postgraduate Diploma in:
   - Agricultural and Rural Development (By Distance);
   - Agri Food Safety and Quality
   - Agricultural Extension
(ii) Master of Science (MSc) Degrees in :
   - Agricultural and Rural Development (by Distance)
   - Agricultural Economics;
   - Agrifood Food Safety and Quality
   - Crop Protection;
   - Marketing and Agribusiness;
   - Tropical Animal Science and Production;
   - Tropical Commodity Utilisation;
Mounting of these courses in any given year is subject to obtaining a suitable number of students.
(iii) Master of Philosophy (MPhil) and Doctor of Philosophy (PhD) Degrees in:
   - Agricultural Economics;
   - Agricultural Extension;
   - Crop Science;
   - Earth and Environmental Science;
   - Food Safety and Quality;
   - Geography;
   - Livestock Science;
   - Soil Science
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E-mail: govind.seepersad@sta.uwi.edu

B. (i) PROGRAMME OFFERINGS

The Department offers:

- MSc in Agricultural Economics which has courses in three core areas of specialisation:
  - Trade Policy and Competitiveness
  - Marketing and Agribusiness Management
  - Environmental and Natural Resource Economics
  - MSc in Marketing and Agribusiness
  - MPhil and PhD degrees in Agricultural Extension and Agricultural Economics.

The Agricultural Economics degrees qualify graduates for potential employment as Agricultural Economists, Agricultural Planners, Development Bankers, Marketing Specialists, Rural Development Specialists, Environmental Specialists, Consultants or University Lecturers while the Agricultural Extension degrees qualify graduates for potential employment as Extension Programme Planners, Communication Specialists, Rural Sociologists, Rural Development Specialists, University Lecturers, Consultants, Nutrition Extension Specialists and Youth Counsellors.

(ii) RESEARCH AGENDA

Research in the Department addresses current issues in the agricultural sector of Caribbean countries with the objective of making a contribution towards the development and transformation of the agrifood sector.

The research programme in Agricultural Economics and Human Ecology focuses on contemporary policy areas for the regional agricultural sector. These include:

- Human Nutrition;
- Rural Development;
- Trade and Agricultural Policy;
- Marketing and Agribusiness Management;
- Environmental and Natural Resource Management.

The research programme in Agricultural Extension includes:

- Rural development using a multidisciplinary framework
- The organisation and management of Extension especially current trends such as decentralisation and privatisation
- Planning, delivery (including the use of ICTs) and evaluation of Extension programmes dealing with trade liberalisation, competitiveness, food and nutrition, environmental issues.
- Emerging models such as Farmer Field Schools, Fisheries Extension and Forestry Extension.

C. DETAILS OF DEGREE PROGRAMMES

(i) MSC MARKETING AND AGRIBUSINESS

(a) Entry Requirements

The general pre-requisite for entry into the MSc Marketing and Agribusiness is at least a Lower Second Class Honours BSc Degree in Agribusiness, Agribusiness Management, Management Studies, Economics or Agriculture or in a related subject (or equivalent qualifications and working experience).

(b) Duration of Course

The MSc in Marketing and Agribusiness will normally extend over 2 years of full-time or 4 years of part-time study.

(c) Award of the Degree

To qualify for the award of the degree, candidates must pass all six Core courses, two Electives and the Research Project. The degree shall be awarded in two categories - Distinction and Pass. For the award of the degree with Distinction, the candidate must have obtained an average mark of 70% or more, across all core courses and electives as well as 70% or more in the Research Project.

(d) Programme Structure

A candidate electing to do the MSc in Marketing and Agribusiness will be required to take SIX Core Courses, TWO Elective Courses and a Research Project- a total of 44 credits.
(e) Core Courses (COMPULSORY)

- AGBU 6102: Statistics and Mathematics for Agribusiness (4 credits)
- AGBU 6301: Research Methodology (4 credits)
- AGBU 6202: Agribusiness Management (4 credits)
- AGBU 6201: Agricultural Marketing (4 credits)
- AGBU 6002: International Trade and Marketing (4 credits)
- AGBU 6602: Quantitative Methods II (Econometrics) (4 credits)
- AGBU 6999: Research Project (12 credits)

(f) Elective Courses (Any Two)

- AGBU 6303: Investment Analysis and Financing for Agribusiness (4 credits)
- AGBU 6302: Quantitative Methods I (Operations Research) (4 credits)
- AGBU 6103: Sustainable Rural Development (4 credits)
- AGBU 6903: Advanced Agricultural Marketing I (4 credits)
- AGBU 6691: Advanced Agribusiness Management (4 credits)

(g) Course of Study

YEAR 1

Semester 1

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>AGBU 6301</td>
<td>Research Methodology</td>
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<tr>
<td>AGBU 6201</td>
<td>Agricultural Marketing</td>
<td>4</td>
</tr>
<tr>
<td>AGBU 6102</td>
<td>Statistics and Mathematics for Agribusiness</td>
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Semester 2

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<td>AGBU 6002</td>
<td>International Trade and Marketing</td>
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<tr>
<td>AGBU 6602</td>
<td>Quantitative Methods II (Econometrics)</td>
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YEAR 2

Semester 1

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<tr>
<td>AGBU 6999</td>
<td>Research Project*</td>
<td>12</td>
</tr>
<tr>
<td>AGBU 6903</td>
<td>Advanced Agricultural Marketing I</td>
<td>4</td>
</tr>
<tr>
<td>AGBU 6303</td>
<td>Investment Analysis and Financing for Agribusiness</td>
<td>4</td>
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YEAR 2

Semester 2

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<tr>
<td>AGBU 6999</td>
<td>Research Project*</td>
<td>12</td>
</tr>
<tr>
<td>AGBU 6103</td>
<td>Sustainable Rural Development</td>
<td>4</td>
</tr>
<tr>
<td>AGBU 6302</td>
<td>Quantitative Methods I (Operations Research)</td>
<td>4</td>
</tr>
<tr>
<td>AGBU 6691</td>
<td>Advanced Agribusiness Management</td>
<td>4</td>
</tr>
</tbody>
</table>

*This is extended across two semesters

(ii) MSC AGRICULTURAL ECONOMICS

(a) This degree is offered with specialisation in the following areas:
- Trade Policy and Competitiveness
- Marketing and Agribusiness Management
- Environmental and Natural Resource Economics

(b) Areas of Specialisation will be offered subject to student demand and the availability of staff.

(c) Entry Requirements
At least a Lower Second Honours BSc degree (minimum GPA of 2.0 or equivalent) in Agribusiness, Agribusiness Management, Agriculture, Agricultural Economics, Economics, Management or related areas.

(d) Qualifying Year
Candidates not considered suitable for minimum entry requirements may be admitted to a qualifying year as determined by the Department. Such candidates will be required to read courses to improve their competency in Economic Theory, Agricultural Economics, Mathematics or Statistics which may be read on any of the three campuses of the University of the West Indies.

The qualifying year may include:
- ECON 2002: Intermediate Macroeconomics I (3 credits)
- ECON 2003: Intermediate Macroeconomics II (3 credits)
- ECON 2000: Intermediate Microeconomics I (3 credits)
- ECON 2001: Intermediate Microeconomics II (3 credits)
- ECON 2015: Mathematical Methods in Economics I (3 credits)
- ECON 2006: Economic Statistics (3 credits)

The qualifying year will be designed to suit the needs of the individual student.

(e) Course of Study
- Candidates, on admission may be required to improve their competency in Economic Theory, Agricultural Economics, Mathematics or Statistics by reading one or more of the courses listed above under the qualifying year.
CORE COURSES (COMPULSORY)
The following core courses are required for ALL areas of specialisation:

- AGBU 6102: Statistics and Mathematics for Agribusiness (4 credits)
- AGBU 6602: Quantitative Methods II (Econometrics) (4 credits)
- AGBU 6301: Research Methodology (4 credits)
- AGBU 6103: Sustainable Rural Development (4 credits)
- AGBU 6501: Microeconomics (4 credits)
- AGBU 6302: Quantitative Methods I (Operations Research) (4 credits)
- AGBU 6999: Research Project (12 credits)

Other core and elective courses required for EACH AREA OF SPECIALISATION are:

1. Trade Policy and Competitiveness
   CORE COURSES
   - AGBU 6901: Agricultural Policy and Analysis (4 credits)
   - INRL 5007: International Trade and Economic Development (3 credits)
   PLUS
   One (1) Elective Course (equivalent to 4 credits), which may include:
   - AGBU 6002: International Trade and Marketing (4 credits)
   OR
   Any other relevant course approved by the Head of Department

2. Environmental and Natural Resource Economics
   CORE COURSES
   - ENVI 6001: Introduction to Environmental Planning and Management (4 credits)
   - AGBU 6902: Environmental Economics II (4 credits)
   PLUS
   One (1) Elective Course (equivalent to 4 credits) which may include:
   - ENVI 6100: Environmental Impact Assessment (4 credits)
   OR
   Any other relevant course approved by the Head of Department

3. Marketing and Agribusiness Management
   CORE COURSES
   - AGBU 6201: Agricultural Marketing (4 credits)
   - AGBU 6202: Agribusiness Management (4 credits)
   PLUS
   One (1) Elective Course (equivalent to 4 credits) which may include:
   - AGBU 6302: Investment Analysis and Financing for Agribusiness (4 credits)
   - AGBU 6902: Advanced Agricultural Marketing I (4 credits)
   - AGBU 6691: Advanced Agribusiness Management (4 credits)

(f) Nature of Elective Course
The Elective Course shall be relevant to the candidate’s area of research interest and must be approved by the Department.

(g) Duration of Study
The MSc (Agricultural Economics) is available to full-time and part-time students. Full-time students will normally be required to complete the degree within 2 years of registration.

Part-time students will normally be required to complete the degree within 4 years of registration.

The normal load for a part-time student is half that of a full-time student.

(h) Examination
Evaluation in all courses will normally be by both coursework and final examinations. Candidates must pass both coursework and final examination.

In Course AGBU 6999 Research Project, a project report will be evaluated.

(i) Award of Degree
The MSc (Agricultural Economics) degree will be awarded on successful completion of all prescribed courses including the Research Project (AGBU 6999).

The degree shall be awarded in the categories – Distinction and Pass. For the award of the degree with Distinction, the candidate must have obtained a minimum average mark of 70% in all core and elective courses as well as a minimum of 70% in the Research Project.
(iii) MPHIL AGRICULTURAL ECONOMICS

(a) Entry Requirements
1. At least an upper second class honours degree (minimum GPA of 3.0 or equivalent) in Agricultural Economics, Economics, Agriculture, Agribusiness, Agribusiness Management, Management Studies, Marketing or related area.

2. This is a research degree and candidates admitted to this programme will normally be expected to have a good undergraduate or postgraduate academic record.

3. Previous experience in research will be given special consideration in assessing a candidate’s suitability for admission.

(b) Course of Study
Candiates will be expected to complete AGBU 6301 (Research Methodology), a Graduate Research Seminar Course (GRSM 7000) and a minimum of eight credits from among the following courses:
- AGBU 6101: Statistics and Mathematics for Agribusiness (4 credits)
- AGBU 6602: Quantitative Methods II (Econometrics) (4 credits)
- AGBU 6301: Research Methodology (4 credits)
- AGBU 6501: Microeconomics (4 credits)
- AGBU 6302: Quantitative Methods I (Operations Research) (4 credits)
- AGBU 6103: Sustainable Rural Development (4 credits)

(c) Thesis
The candidate must fulfill the MPhil thesis requirements of the Faculty of Science and Agriculture and successfully defend his/her thesis at a public oral examination.

(iv) PHD AGRICULTURAL ECONOMICS

(a) Entry Requirements
1. For admission to the PhD Agricultural Economics programme, candidates should have successfully completed the MPhil degree in Agricultural Economics or an MSc degree in Agricultural Economics or Economics from an approved University and which should have included the writing of a substantial thesis, or an MSc degree with distinction in a relevant discipline.

2. All other candidates will be required to register for the MPhil degree in Agricultural Economics and seek an upgrade to the PhD degree in accordance with University Regulations.

(b) Course of Study
Candidates would normally be expected to have completed the following courses (or their equivalents) on entry into the PhD programme.*
- AGBU 6102: Statistics and Mathematics for Agribusiness (4 credits)
- AGBU 6602: Quantitative Methods II (Econometrics) (4 credits)
- AGBU 6301: Research Methodology (4 credits)
- AGBU 6103: Sustainable Rural Development (4 credits)
- AGBU 6501: Microeconomics (4 credits)
- AGBU 6302: Quantitative Methods I (Operations Research) (4 credits)

*CANDIDATES WHO HAVE NOT FULFILLED THESE REQUIREMENTS WILL BE REQUIRED TO COMPLETE THESE COURSES.

(c) Coursework Examinations
1. The PhD in Agricultural Economics is awarded on the successful completion of prescribed courses AND a thesis.

2. The following courses are required for ALL areas of specialisation:
- AGBU 6610: Economic Theory (4 credits)
- AGBU 6500: Quantitative Methods III (4 credits)

3. Courses required for EACH area of specialisation are:
   (i) Trade Policy and Competitiveness
   - AGBU 6650: Economic Development and International Trade (4 credits)
   (ii) Environmental and Natural Resource Economics
   - AGBU 6692: Advanced Natural Resource and Environmental Economics (4 credits)
   (iii) Marketing and Agribusiness Management
   - AGBU 6690: Advanced Agricultural Marketing II (4 credits)

(d) Programmes of study in the areas of specialisation will normally be offered according to the requirements of students and subject to the availability of staff.

(e) PhD Thesis
1. On successful completion of the Departmental COURSEWORK REQUIREMENTS, candidates must prepare a research proposal in the area of the thesis topic to be presented at a Departmental Seminar.

2. The procedures for the presentation of the PhD thesis are outlined in the Postgraduate General Regulations of The University of the West Indies.
(v) MPHIL DEGREE IN AGRICULTURAL EXTENSION
1. The MPhil Degree is offered both on a part-time and full-time basis. It is awarded on the successful completion of the required graduate courses and a thesis.

2. The normal time for the completion of this degree is two years for full-time students and four years for part-time students.

Entry Requirements
3. This is a research degree and candidates should have strong undergraduate academic qualifications. The normal requirement is at least an Upper Second Class Honours degree (minimum GPA of 3.0 or equivalent) in the following disciplines or other approved areas:
   - Agriculture
   - Agribusiness
   - Aquaculture
   - Forestry
   - Natural Resource Management
   - Human Ecology

4. Special consideration will also be given to candidates with lower level qualifications but whom, in the opinion of the Board for Graduate Studies and Research, have adequate research or teaching experience in relevant disciplines.

5. Promising research candidates with undergraduate degrees not considered suitable for direct admission may be admitted to a qualifying year. (Please refer to the general postgraduate regulations regarding Qualifying Examinations)

Departmental Course Requirements
6. In addition to the basic requirements for admission, candidates will be expected to have at least nine credits of approved undergraduate Extension courses at Level II/III or the equivalent. Candidates without these required number of credits will be required to take appropriate undergraduate courses, which they must pass before submitting the proposal for the thesis.

Taught Graduate Courses
7. Candidates accepted into the MPhil programme will be required to register for at least four taught graduate courses including Research Methodology AGBU 6301. Students who enter the programme with a taught Master's Degree or Postgraduate Diploma may be granted exemption from the course requirements. However, such students may be required to take additional courses to provide a specific knowledge base for their proposed research.

8. Students who fail more than 50% of their courses in their first attempt will normally be required to withdraw. Only one repeat attempt for each failed course will be allowed.

(vi) THE PHD DEGREE IN AGRICULTURAL EXTENSION
1. The PhD degree in Agricultural Extension is offered both on a part-time and full-time basis. It is awarded on the successful completion of required departmental courses and a thesis.

2. The maximum time allowed for completing this degree is five years after registration for full-time students and seven years for part-time students.

Entry requirements
3. Applicants who hold an MPhil Degree or other research-based Master's Degree in Agricultural Extension or related disciplines are eligible for direct entry to the PhD programme.

4. Applicants who hold taught Master's degrees may also be eligible for direct entry if the programmes included a research component of at least 25% of the total credits for the degree and if they attained at least a B+ average in both the taught courses and the research project.

5. All other candidates with Master's qualifications applying for admission to the PhD must register first for the MPhil and then apply to upgrade their registration to the PhD programme in accordance with the general regulations.

Taught Graduate Courses
6. Candidates gaining direct entry into the PhD programme are required to pass a minimum of 12 credits of taught graduate courses approved by the department.

PhD Thesis
The requirements for submission of the PhD thesis are outlined in the general regulations for postgraduate students.
DEPARTMENT OF AGRICULTURAL ECONOMICS & EXTENSION

COURSE DESCRIPTIONS

SEMESTER: 2
COURSE CODE: AGBU 6002
COURSE TITLE: INTERNATIONAL TRADE AND MARKETING
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: International trade in agricultural commodities, products and natural resources and the impact of international trading arrangements. Partial and general equilibrium models applied to problems in agricultural and natural resource trade and marketing. Analysis of trade and marketing policies of various countries. The impact of macroeconomic policy through exchange rates, interest rates, and inflation on international agricultural and resource markets.
Assessment:
Coursework 40%
Final examination 60%

SEMESTER: 1
COURSE CODE: AGBU 6102
COURSE TITLE: STATISTICS AND MATHEMATICS FOR AGRIBUSINESS
NUMBER OF CREDITS: 4
PREREQUISITE: AGBU 2003 APPLIED STATISTICS
COURSE DESCRIPTION: Probability distributions; mathematical expectations; estimation of parameters; tests of hypotheses; analysis of variance; functions of one and several variables; partial derivatives; total derivatives; matrices and determinants; integrals; constrained optimisation.
Assessment:
Coursework 40%
Final examination 60%

SEMESTER: 2
COURSE CODE: AGBU 6103
COURSE TITLE: SUSTAINABLE RURAL DEVELOPMENT
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: Advanced concepts of economic growth and sustainable development are covered especially as they relate to agriculture. The use of economic tools and theories to analyse the performance of the agricultural sector and assessing the potential for sustainable development through the wise use of available resources. The Human Development Index as it relates to Caribbean countries. The role of women in the development process is studied in-depth using real-life field situations. Analysis of the principal causes of rural environmental problems in the Caribbean and the provision of solutions to reduce their negative impact.

SEMESTER: 1
COURSE CODE: AGBU 6201
COURSE TITLE: AGRICULTURAL MARKETING
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
Assessment:
Coursework 40%
Final examination 60%

SEMESTER: 1
COURSE CODE: AGBU 6202
COURSE TITLE: AGRIBUSINESS MANAGEMENT
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: Concepts of Management; Forms of Business Organisation; Financial Management for Agribusiness; Production/Operations Management; Business Development; Human Resource Management; Information and Decision-Making; Project Management
Assessment:
Coursework 40%
Final examination 60%

SEMESTER: 1
COURSE CODE: AGBU 6301
COURSE TITLE: RESEARCH METHODOLOGY
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: Critical discussion of the application of scientific methodology of research. The role of inductive and deductive logic in Scientific research in the Caribbean. Preparation of research proposals, theses and research project reports.
Assessment:
Coursework 50%
Final examination 50%

SEMESTER: 2
COURSE CODE: AGBU 6302
COURSE TITLE: QUANTITATIVE METHODS I (OPERATIONS RESEARCH)
NUMBER OF CREDITS: 4
PREREQUISITE: AGBU 2003 - APPLIED STATISTICS
COURSE DESCRIPTION: Specification, estimation and interpretation of economic models. Application to empirical problems of agriculture. Use and interpretation of operations research techniques for problems encountered by agricultural economists. Linear programming and its variations such as transportation models, network analysis, spatial equilibrium models.
Assessment:
Coursework 40%
Final examination 60%
SEMESTER: 1
COURSE CODE: AGBU 6303
COURSE TITLE: INVESTMENT ANALYSIS AND FINANCING FOR AGRIBUSINESS
NUMBER OF CREDITS: 4
PREREQUISITE: AGBU 3000 - FARM BUSINESS MANAGEMENT
COURSE DESCRIPTION: Investment/Project Analysis; Capital Acquisition: Methods and Source of Finance; Developing and Evaluating Financing Packages; Managing Debt Portfolio; Business Planning and Development; Case Studies; Project Exercise.
Assessment:
Coursework 40%
Final examination 60%

SEMESTER: 1
COURSE CODE: AGBU 6501
COURSE TITLE: MICROECONOMICS
NUMBER OF CREDITS: 4
PREREQUISITES: ECON 2015, ECON 2000 AND ECON 2001 OR EQUIVALENT
COURSE DESCRIPTION: This course provides an advanced treatment of the scope and importance of economic theory, and shows how mathematical methods may be used in microeconomic analysis. It reviews the theory of the consumer: consumer budget, preferences and utility: choice and demand. Consumer surplus and market equilibrium. Theory of production: technology; profit maximisation; profit function; cost minimisation; cost functions; duality. Theory of the firm: competitive markets; monopoly; monopolistic competition; oligopoly. It also reviews welfare analysis, public goods and externalities.
Assessment:
Coursework 40%
Final examination 60%

SEMESTER: 1
COURSE CODE: AGBU 6502
COURSE TITLE: QUANTITATIVE METHODS II (ECONOMETRICS)
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: Evaluation of statistical estimation and testing of economic models, for use in agricultural policy development, marketing and production research. Emphasis is on the application of the multivariate linear regression model for estimating relationships important for agriculture and agribusiness management. Violations of basic assumptions: multicollinearity; misspecification; heteroskedasticity; autocorrelation. Estimation using panel data. Non-linear least squares. Time Series Modeling. Integrated use of software to support analysis and application to real-world problem solving.
Assessment:
Coursework 40%
Final examination 60%

SEMESTER: 2
COURSE CODE: AGBU 6602
COURSE TITLE: QUANTITATIVE METHODS II (ECONOMETRICS)
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: Evaluation of statistical estimation and testing of economic models, for use in agricultural policy development, marketing and production research. Emphasis is on the application of the multivariate linear regression model for estimating relationships important for agriculture and agribusiness management. Violations of basic assumptions: multicollinearity; misspecification; heteroskedasticity; autocorrelation. Estimation using panel data. Non-linear least squares. Time Series Modeling. Integrated use of software to support analysis and application to real-world problem solving.
Assessment:
Coursework 40%
Final examination 60%

SEMESTER: 2
COURSE CODE: AGBU 6610
COURSE TITLE: ECONOMIC THEORY
NUMBER OF CREDITS: 4 credits
PREREQUISITE: AGBU 6501 - MICROECONOMICS
COURSE DESCRIPTION: In-depth Treatment of Selected Topics given under AGBU 6501 (AM 65A). Foundations of macroeconomics. Public Sector economics
Assessment:
Coursework 40%
Final examination 60%

SEMESTER: 2
COURSE CODE: AGBU 6650
COURSE TITLE: ECONOMIC DEVELOPMENT AND INTERNATIONAL TRADE
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
Assessment:
Coursework 40%
Final examination 60%

SEMESTER: 2
COURSE CODE: AGBU 6690
COURSE TITLE: ADVANCED AGRICULTURAL MARKETING II
NUMBER OF CREDITS: 4
PREREQUISITE: AGBU 6903 - Advanced Agricultural Marketing
Assessment:
Coursework 40%
Final examination 60%

SEMESTER: 2
COURSE CODE: AGBU 6691
COURSE TITLE: ADVANCED AGRIBUSINESS MANAGEMENT I
NUMBER OF CREDITS: 4
PREREQUISITE: AGBU 2003 - Applied Statistics
COURSE DESCRIPTION: Problems, issues, regulations, policies, and procedures relevant to global agribusiness, with specific reference to perishable and storable agricultural commodities and food products. Recent advances in farm and agribusiness management with the focus on firm-level agribusiness concepts, international agribusiness and import and export management.
Assessment:
Coursework 40%
Final examination 60%
SEMESTER: 2  
COURSE CODE: AGBU 6692  
COURSE TITLE: ADVANCED NATURAL RESOURCE AND ENVIRONMENTAL ECONOMICS  
NUMBER OF CREDITS: 4  
PREREQUISITE: AGBU 6902 - Environmental Economics II  
Assessment:  
Coursework  40%  
Final examination  60%

SEMESTER: 2  
COURSE CODE: AGBU 6901  
COURSE TITLE: AGRICULTURAL POLICY AND ANALYSIS  
NUMBER OF CREDITS: 4  
PREREQUISITE: NONE  
COURSE DESCRIPTION: Conceptual approaches to economic analyses of public policy issues and programmes with emphasis on the relationship among institutes, behaviour of participants and performance.  
Assessment:  
Coursework  40%  
Final examination  60%

SEMESTER: 2  
COURSE CODE: AGBU 6902  
COURSE TITLE: ENVIRONMENTAL ECONOMICS II  
NUMBER OF CREDITS: 4  
PREREQUISITE: NONE  
Assessment:  
Coursework  40%  
Final examination  60%

SEMESTER: 2  
COURSE CODE: AGBU 6903  
COURSE TITLE: ADVANCED AGRICULTURAL MARKETING I  
NUMBER OF CREDITS: 4  
PREREQUISITE: NONE  
COURSE DESCRIPTION: An examination of concepts in economic theory and quantitative methods as they are applied to the solution of marketing problems. The focus will be on concepts that enhance abilities to: identify market problems, place these problems in an analytical framework with testable hypotheses, empirically implement the resulting hypothesis tests and draw policy implications from the results of hypothesis tests.  
Assessment:  
Coursework  40%  
Final examination  60%

SEMESTER: 1 & 2  
COURSE CODE: AGBU 6999  
COURSE TITLE: RESEARCH PROJECT  
NUMBER OF CREDITS: 12  
PREREQUISITE: NONE  
COURSE DESCRIPTION: A research project in the area of specialisation involving field studies at the farm/household/ organisational level or related archival investigation to provide experience of the research process and of relevant empirical techniques.

SEMESTER: 1  
COURSE CODE: AGEX 6001  
COURSE TITLE: PRINCIPLES OF RURAL SOCIOLOGY  
NUMBER OF CREDITS: 4  
PREREQUISITE: NONE  
COURSE DESCRIPTION: Theoretical perspectives for studying rural communities and developing societies in general. Profiles of rural communities and households in the Caribbean. Sociological variables in development projects. Case studies of rural development projects in the Caribbean and other countries. Field observations and exercises involving rural communities.  
Assessment:  
Coursework  40%  
Final examination  60%

SEMESTER: 1  
COURSE CODE: AGBU 8000  
COURSE TITLE: QUANTITATIVE METHODS III  
NUMBER OF CREDITS: 4  
PREREQUISITE: NONE  
COURSE DESCRIPTION: Detailed treatment of problems associated with single equation estimation: auto-correlation, errors in variables, multi-collinearity, heteroskedasticity, lagged variables. Simultaneous equation system: the concept of identification, structural equations and the reduced form, two-staged econometric models, mathematical programming and simulation application to agricultural economic research.  
Assessment:  
Coursework  40%  
Final examination  60%
DEPARTMENT OF
FOOD PRODUCTION

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Fax: 1-868-645-0479

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ABOUT THE DEPARTMENT

The Department of Food Production has a diverse and dynamic graduate programme and offers MSc degrees in Agrifood Safety and Quality, Tropical Animal Science and Production, Commodity Utilisation and Crop Protection (in conjunction with Life Sciences), MPhil and PhD degrees in the areas of Crop Science, Horticulture, Livestock Science, Food Quality and Safety, Soil Science, Earth and Environmental Science and Geography.

In the Crop Science discipline, research is directed towards increasing productivity, quality and profitability, as well as post-harvest physiology and tropical commodity utilisation of field and vegetable crops. Facilities are available at the University Field Station for agronomic and horticultural experimentation, including equipment for cultivation, seed storage and plant propagation.
In the Animal Science discipline, work is on-going with ducks, dairy cattle and goats, tropical hair sheep, poultry, rabbits and forage production. Research on captive rearing of wildlife species, in particular the agouti is undertaken. Evaluation of various synchronisation protocols for use in tropical hair sheep, the development and the use of timed artificial insemination protocols for dairy cattle and water buffaloes, characterisation of the growth and reproductive ability of various neo-tropical animal species and evaluation and design of management systems for duck and wild birds are undertaken.

In the Soil Science discipline, the main emphasis has been on soil as a key link in sustaining food production and ecosystem health. Fundamental studies on the genesis and classification of West Indian soils had been conducted extensively throughout the region and had established the foundation for the studies that followed. Among the active programmes are management of soil/plant systems in relation to enhancing nutrient availability with emphasis on nitrogen and phosphorus; soil organic matter dynamics and its role in soil fertility maintenance; soil genesis; land use studies; hillside management; biological nitrogen fixation; pollution abatement; water yield and quality management; fertilizer management and use efficiency; performance and management of cricket pitches; enhancing productivity and efficiency in key regional agro-industries.

PROGRAMME OFFERINGS
Currently the Department offers three (3) MSc programmes. MSc Programmes are offered subject to a minimum number of admissions.

MSC DEGREE IN TROPICAL ANIMAL SCIENCE AND PRODUCTION
Coordinator – Prof. Gary Garcia

OBJECTIVE
The MSc Degree in Tropical Animal Science and Production is designed to provide the graduate with a deeper knowledge and sensitivity of the needs for the Science of Livestock Production in Developing Tropical Environments with respect to domestic and non-domestic livestock species.


ADMISSION REQUIREMENTS
Admission into the MSc programme will normally be available to holders of a Bachelor’s Degree of at least Lower Second Class Honours (minimum GPA of 2.0 or equivalent) standing in Agriculture, or any other relevant discipline from recognised institutions.

Candidates who lack sufficient undergraduate training in Livestock Science may be required to make up the deficiencies by taking relevant courses from among the undergraduate offerings from the Department of Food Production.

PROGRAMME OUTLINE

Duration of Study
This programme is offered only as part of the Evening University at the St. Augustine campus. The programme will normally require 2 years of study, exclusive of the time required for taking departmental prerequisite courses where necessary. The maximum time limit for completion of the programme is 4 years.

Programme of Study
The MSc Degree in Tropical Animal Science and Production will be awarded on the successful completion of five core courses (20 credits), two elective courses (10 credits) and a Research Project (12 credits).

CORE COURSES (4 CREDITS EACH)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGLS 6001</td>
<td>Tropical Animal Science</td>
</tr>
<tr>
<td>AGLS 6002</td>
<td>Advanced Tropical Forage Utilisation</td>
</tr>
<tr>
<td>AGLS 6005</td>
<td>Advanced Non-Ruminant Production</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGLS 6003</td>
<td>Tropical Livestock Development</td>
</tr>
<tr>
<td>AGLS 6004</td>
<td>Advanced Ruminant Production</td>
</tr>
</tbody>
</table>

ELECTIVE COURSES (5 CREDITS EACH)
Electives are offered subject to student registration.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGRI 6901</td>
<td>Product Development</td>
</tr>
<tr>
<td>AGLS 6201</td>
<td>Advanced Animal Nutrition I*</td>
</tr>
<tr>
<td>AGLS 6202</td>
<td>Advanced Animal Nutrition II*</td>
</tr>
<tr>
<td>AGLS 6203</td>
<td>Advanced Animal Nutrition III*</td>
</tr>
<tr>
<td>AGLS 6302</td>
<td>Animal Breeding</td>
</tr>
<tr>
<td>AGLS 6401</td>
<td>Reproductive Physiology</td>
</tr>
<tr>
<td>AGLS 6402</td>
<td>Environmental Physiology</td>
</tr>
<tr>
<td>AGLS 6502</td>
<td>Tropical Zoo and Wildlife Production and Management</td>
</tr>
<tr>
<td>AGLS 6804</td>
<td>Tropical Commodity Utilisation (Livestock)</td>
</tr>
</tbody>
</table>

*Advanced Animal Nutrition courses should be taken sequentially from I to III in that order.

Research Project (12 credits) - Compulsory

Research Project (12 credits) - Compulsory

Course Code | Title
-------------|----------------------------|
AGLI 6006    | Research Project - Year Long

Candidates are required to submit a project proposal for approval by the Department of Food Production within six (6) months of being registered in the programme. The topic of the Project must be in the subject matter dealt with in one of the elective courses. Each candidate will be required to present a seminar on the proposed research project before the start of the project.

The research project must be presented in the form of a report of not more than 100 pages. This report must conform to the style approved by the University for MSc project Reports.
EXAMINATION AND AWARD OF THE DEGREE
A candidate must attain at least 50% in the coursework and 50% in the final examination in order to secure a passing grade for each course.

Coursework Assessment
The coursework component of each course will be 40%. Coursework assessment may consist of review papers in selected areas and/or in-course tests and reports on practical investigations.

Final Examinations
Candidates will be required to sit final written examinations in each course. The written examination shall consist of one 3-hour paper in each course. Final examination of each course will be held at the end of the semester in which it is offered. Final examination contributes 60% of the final mark.

Candidates who fail no more than two courses may be permitted to rewrite examinations only by the Board for Graduate Studies and Research on the recommendation of the Faculty’s Board of Examiners. Such examinations will be held during the Semester 3 or July/August Examinations period.

Candidates who fail more than two courses or who fail any course more than twice may be required to withdraw from the programme.

Candidates who do not sit examinations in courses for which they are registered shall be deemed to have failed.

MSc Project Assessment
The MSc project assessment is based on examination of the report and presentation. To attain a pass on the project the candidate must obtain at least 50% in the assessment of project report and presentation.

Award of the Degree
To qualify for the award of the degree, candidates must successfully complete all required courses and the project. The degree shall be awarded in 2 categories: Distinction and Pass.

For the award of the MSc with Distinction, candidates must have obtained an average of 70% or more in ALL written courses, and at least 70% in the Research Project.

Time Limit
Candidates who at the end of two years have not completed the programme of study leading to the MSc in Crop Protection will be required to withdraw from the programme unless they have been granted special permission by the Board for Graduate Studies to continue.

MSC DEGREE IN CROP PROTECTION
Coordinator - Dr. Wendy-Ann Isaac

OBJECTIVE:
The MSc in Crop Protection offers advanced training in Tropical Crop Protection with emphasis on control of pests and weeds and management of tropical diseases of plants. Special emphasis is given to biological control of tropical pests, diseases and pathogens.

MSC ENTRY REQUIREMENTS
Candidates applying for admission to the MSc in Crop Protection are required to satisfy the University's and the Faculty's Regulations governing entry to Master’s degrees, and should normally hold a Bachelor’s degree of at least lower second class Honours (minimum GPA 2.0 or equivalent) in Agriculture or in a related discipline.

Course of Study
The course of full-time study covers a twelve-month period from September of one year, to August of the following year. The programme is made up of 20 credits of core courses, 8 credits of an elective course and a project worth 12 credits.

Core Courses (4 credits each)

<table>
<thead>
<tr>
<th>Semester I</th>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGRI 6110</td>
<td>Principles of Crop Protection</td>
<td></td>
</tr>
<tr>
<td>AGRI 6210</td>
<td>Biology, Ecology and Epidemiology of Pests</td>
<td></td>
</tr>
<tr>
<td>AGRI 6220</td>
<td>Principles of Pest Management</td>
<td></td>
</tr>
<tr>
<td>AGRI 6230</td>
<td>Integrated Pest Management</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Semester II</th>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGRI 6120</td>
<td>Current Issues in Crop Protection</td>
<td></td>
</tr>
</tbody>
</table>

Elective Courses (8 credits each)

Students are required to choose ONE course from the following list of electives.

<table>
<thead>
<tr>
<th>Semester II</th>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGRI 6250</td>
<td>Applied Entomology</td>
<td></td>
</tr>
<tr>
<td>AGRI 6240</td>
<td>Plant Pathology</td>
<td></td>
</tr>
<tr>
<td>AGCP 6250</td>
<td>Weed Science</td>
<td></td>
</tr>
</tbody>
</table>

Compulsory Research Project: (12 credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGRI 6100</td>
<td>Research Project</td>
</tr>
</tbody>
</table>

Candidates will be allowed to submit the Research Project Report, only after successful completion of the core and elective courses.

Award of the Degree
The MSc Degree in Crop Protection shall be awarded on the successful completion of all required core and elective courses and a research project.
The degree shall be awarded in two categories - Distinction and Pass. For the award of the degree with Distinction, the candidate must have obtained a minimum average mark of 70% or more in all core and elective courses as well as 70% or more in the Research Project.

Examinations
A candidate must attain at least 50% in the coursework and 50% in the final examination in order to secure a passing grade for each course.

Coursework Assessment
Each candidate is required to complete one review paper (minimum of 2500 words) in each course, which will count for 25% of the overall mark in each course.

Final Examination
Each candidate is required to sit a final written examination in each course. The final examination will be held during the normal examination periods in Semesters I and II of the academic year. The written examinations shall consist of one paper in each course. Each paper will be of three hours duration.

Candidates who fail no more than two courses, may be permitted to rewrite examinations only by the Board for Graduate Studies and Research on the recommendation of the Faculty’s Board of Examiners. Such examinations will be held during the Supplemental Examinations period.

Candidates who fail more than two courses, or who fail any course more than twice, will normally be required to withdraw from the programme.

Candidates who do not sit examinations in courses for which they are registered shall be deemed to have failed.

Time Limit
Candidates who at the end of two years have not completed the programme of study leading to the MSc in Crop Protection will be required to withdraw from the programme unless they have been granted special permission by the Board for Graduate Studies to continue.

MSC DEGREE IN TROPICAL COMMODITY UTILISATION
Coordinator - Dr. Lynda Wickham

OBJECTIVE:
To introduce students to all the elements of food science and utilisation necessary to allow graduates the flexibility of self employment as well as preparing them for successful employment in several sectors of the food industry.

Training is student-focused and geared to facilitate individual interests. Both research and scheduling of teaching are flexible, arranged to encourage full student participation. Graduates of the MSc Programme are trained in areas of postharvest technology, commodity utilisation, food quality and food safety and product development and are qualified to work in several areas of the food industry.

MSc Entry Requirements
Candidates applying for admission to the MSc in Tropical Commodity Utilisation are required to satisfy the University’s and the Faculty’s Regulations governing entry to Master’s degrees, and should normally hold a Bachelor’s degree of at least lower second class Honours (minimum GPA 2.0 or equivalent) in Agriculture or in a related discipline.

Course of Study
The MSc (Tropical Commodity Utilisation) Degree will be awarded on the successful completion of FIVE core courses (5 credits each) ONE elective course (5 credits) and a project (12 credits). The course of full-time study covers a twelve-month period from September of one year, to August of the following year. Candidates must complete all their examinations within one year as full-time students. Part-time students will normally be expected to complete the programme in two (2) years.

Candidates will be required to register for the following courses:

Core courses (5 credits each):
**SEMESTER I**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGCP 6101</td>
<td>Postharvest Physiology and Biochemistry</td>
</tr>
<tr>
<td>AGRI 6201</td>
<td>Chemistry of Foods</td>
</tr>
<tr>
<td>AGRI 6301</td>
<td>Food Microbiology I</td>
</tr>
</tbody>
</table>

**SEMESTER II**

| AGRI 6702   | Food Quality and Food Analysis       |
| AGRI 6802   | Tropical Commodity Utilisation       |

One elective course chosen from the following (5 credits each):

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGRI 6901</td>
<td>Product Development</td>
</tr>
<tr>
<td>AGRI 6302</td>
<td>Food Microbiology II - (not offered in 2010/2011)</td>
</tr>
<tr>
<td>AGCP 6102</td>
<td>Advanced Postharvest Physiology - (not offered in 2010/2011)</td>
</tr>
</tbody>
</table>

Electives are offered subject to student numbers and staff availability.
Compulsory Research Project (12 credits)
Course Code  Course Title
AGCP 6100  Project

The project shall normally be of not more than six months duration and candidates will be required to submit the written report on the project by the 15th July but no later than 30th July.

Duration of the Programme
The Programme will normally be of twelve months duration of full time study. Candidates must complete all their examinations within two years maximum as full time students or within four years maximum as part time students.

Examination
A candidate must attain at least 50% in the coursework and 50% in the final examination in order to secure a passing grade for each course.

Coursework
The coursework component in each course will be 40%. Coursework assessment will consist of a combination of the following: preparation of review papers in selected areas, in-course tests, reports on practical sessions and seminar presentation.

Final Examination
Candidates will be required to sit final written examinations in each course. The written examination shall consist of one 3-hour paper in each course. Final examination of each course will be held at the end of the semester in which it is offered. Final examination contributes 60% of the final mark.

Candidates who fail no more than two courses, may be permitted to rewrite examinations only by the Board for Graduate Studies and Research on the recommendation of the Faculty's Board of Examiners. Such examinations will be held during the Supplemental Examinations period.

Candidates who fail more than two courses, or who fail any course more than twice, will normally be required to withdraw from the programme.

Candidates who do not sit examinations in courses for which they are registered shall be deemed to have failed.

Award of the Degree
To qualify for the award of the degree, candidates must pass all required core and elective courses and the research project.

The degree shall be awarded in two (2) categories - distinction and pass. For the award of the degree with distinction, the candidate must have obtained an average of 70% in all core and elective courses as well as in the Research Project.

POST-GRADUATE DIPLOMA AND MSC DEGREE IN AGRI-FOOD SAFETY AND QUALITY ASSURANCE
Coordinator: Prof. Neela Badrie

OBJECTIVES OF PROGRAMMES
The general objective is to provide quality and relevant education, training and research in food safety and quality to graduates who are farm managers, food processors, food service managers, nutritionists, regulators, public health inspectors, policy makers, importers and exporters regionally and world-wide who want to upgrade their skills.

GOALS
The programmes goals are to:
- Adopt a holistic approach to agri-food safety that encompasses the whole food chain-‘from farm or sea to plate’ and those aspects of food safety related to quality;
- Apply tracing techniques from the primary producers, animal husbandry, through post-harvest treatment, food processing, marketing of products, export trade and distribution to the consumers;
- Adopt a risk-based approach to agri-food control systems;
- Assess the current agri-food safety standards and food safety management programmes throughout the food chain;
- Support strategic elements such as risk analysis, scientific advice, consumer education in food and agriculture;
- Communicate effectively with policy makers.

Candidates would have the options of taking the postgraduate Diploma or MSc programmes.

I. Candidates must take and pass 6 (4 credits) courses for the postgraduate Diploma.
II. Candidates must take and pass 7 (4 credits) courses for 28 credits and a 12 credits research project for the MSc programme.

ENTRY REQUIREMENTS
The academic year is divided into two semesters as follows: August to December and January to May.

POST-GRADUATE DIPLOMA
In order to be admitted to the postgraduate Diploma, candidates must normally:

a. Have a first degree in Agriculture, Agri-Business, Natural Sciences, Life Sciences, Medical Sciences, Human Ecology, Public Health, Environmental Sciences, Chemical Engineering, Food Sciences, Veterinary Medicine or any related areas or;

b. Have previous equivalent level of education and relevant experience which would be acceptable to the University;

c. Mature students who do not satisfy the above requirements but who have considerable work experience and who are deemed capable of achieving the standard of work required for the programmes may be permitted to enter these programmes at the discretion of the Faculty and the University.
COURSE OF STUDY
Diploma programme comprises of 24 credits of courses. The Diploma will be awarded on the successful completion of the following prescribed courses.

Core Courses (4 credits each)
- FOSQ 5001 Agri-Food Safety
- FOSQ 5002 Project Management in Food and Agriculture
- FOSQ 5003 Food Quality Assurance & Evaluation of Agri-Food Policies
- FOSQ 5004 Agri Food Safety Risk Analysis
- FOSQ 5005 Epidemiology and Food-borne diseases
- FOSQ 5006 International Trade and Agri-Food Legislation

PROGRAMME DURATION
Diploma full-time: 2 semesters of courses
Diploma part-time: 4 semesters of courses

In order to be admitted to the MSc programme, candidates must normally:

a. Have a first degree (minimum grade of a lower second class honours or equivalent) in Agriculture, Agri-Business, Natural Sciences, Life Sciences, Medical Sciences, Human Ecology, Public Health, Environmental Sciences, Chemical Engineering, Food Sciences, Veterinary Medicine or any related areas OR;

b. Students with a pass degree may gain entry to the MSc programme subject to Departmental support and completion of qualifying courses.

c. Candidates who have successfully completed the requirements for the Diploma in Agri-Food Safety and Quality Assurance may apply to upgrade to the MSc degree. In the event that such candidates are unable to complete the requirements for the MSc, the post-graduate diploma will be awarded on successful completion of the prescribed courses.

COURSE OF STUDY
The MSc programme comprises 28 credits of courses and a compulsory 12-credits research project. The MSc degree shall be awarded on successful completion of the following prescribed courses and a compulsory research project in food safety and quality.

Core Courses (4 credits each)
- FOSQ 6001 Agri-Food Safety
- AGBU 6201 Research Methodology
- FOSQ 6002 Project Management in Food and Agriculture
- FOSQ 6003 Food Quality Assurance & Evaluation of Agri-Food Policies
- FOSQ 6004 Agri-Food Safety Risk Analysis
- FOSQ 6005 Epidemiology and Food-borne diseases
- FOSQ 6006 International Trade and Agri-Food Legislation (12 credits)
- FOSQ 6010 Research Project on Agri-Food Safety and Quality Assurance

PROGRAMME DURATION
MSc full-time: 2 semesters of courses and research programme - 12 months (minimum) - 15 months (maximum)
MSc part-time: 4 semesters of courses and research programme - 24 months (minimum) - 30 months (maximum).

THE MPHIL AND PHD DEGREES:
The Department currently offers MPhil and PhD degrees in the areas of Crop Science, Horticulture, Livestock Science, Food Quality and Safety, Soil Science, Earth and Environmental Science and Geography.

CROP SCIENCE
Students admitted to pursue research degrees in the programme can carry out their research in aspects of crop production and utilisation spanning areas from crop propagation and agronomy to post-harvest physiology and commodity utilisation including tropical products development. The department can also provide training in sustainable farming systems and diversity studies in tropical root crops and selected tropical tree crops.

HORTICULTURE
This programme provides advanced training in tropical horticulture that will equip graduates for careers in research, development and higher education. Research areas include germplasm evaluation, propagation and management of horticultural crops, landscape plants and turfgrasses and management of green spaces.

LIVESTOCK SCIENCE
Students admitted to pursue research degrees in Livestock Science have the opportunity to choose from a wide range of research activities in Tropical Livestock Science and production. Current departmental research involves research in ruminant production and improvement; poultry production; rabbit production and captive production of the agouti.

SOIL SCIENCE
Students admitted into research programmes in Soil Science may choose to pursue research in one of the following areas:
- Organic matter management for sustainable crop production
- Soil and land use studies
- Management of hill side soils
- Engineering properties of Caribbean soils

FOOD QUALITY AND SAFETY
This programme provides quality education, training and research in food safety and quality to graduates in support of consumers, farmers, food businesses, regulatory agencies and export industries regionally.
GEOGRAPHY
This programme provides high quality research training in multi-disciplinary geographical research methods, to facilitate candidates to conduct research in areas of regional importance and international significance, and to produce graduates capable of developing and leading their own research projects, either in academia or industry.

EARTH AND ENVIRONMENTAL SCIENCE
This programme will train students for careers in research and teaching in Tropical Earth and Environmental Science. A graduate from the MPhil programme could expect to take up a position as a research technician, or apply their skills in consultancy. The PhD graduates of the programme are expected to make a significant contribution to the field and be able to carry out independent research. These graduates would be suited as research scientists in forestry, agriculture or the oil industry, environmental consultants, university or college lecturers or other positions requiring sophisticated training at the PhD level.

DEPARTMENTAL REQUIREMENTS:
In addition to Faculty requirements, students admitted for advanced research degrees in the department are required to take and pass the following two courses (4 credits each)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGRI 6620</td>
<td>Statistics</td>
</tr>
<tr>
<td>AGBU 6301</td>
<td>Research Methodology</td>
</tr>
</tbody>
</table>

DEPARTMENT OF FOOD PRODUCTION

COURSE DESCRIPTIONS
SEMESTER: I / II (BASED ON REGISTRATION NUMBERS)
<table>
<thead>
<tr>
<th>COURSE CODE: AGCP 6101</th>
</tr>
</thead>
<tbody>
<tr>
<td>COURSE TITLE: POST-HARVEST PHYSIOLOGY AND BIOCHEMISTRY NUMBER OF CREDITS: 5</td>
</tr>
<tr>
<td>PREREQUISITE: NONE</td>
</tr>
<tr>
<td>COURSE DESCRIPTION: The physiology and biochemical processes in fresh tropical crop produce which influence postharvest behaviour and storage potential are emphasised. Product maturation and maturity indices, ripening and senescence. The physiology and biochemistry of stored crop produce including effects of environmental modifications are further topics of study.</td>
</tr>
<tr>
<td>Assessment: Coursework 40% Final examination 60%</td>
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</tbody>
</table>

SEMESTER: 1
<table>
<thead>
<tr>
<th>COURSE CODE: AGCP 6102</th>
</tr>
</thead>
<tbody>
<tr>
<td>COURSE TITLE: ADVANCED POSTHARVEST PHYSIOLOGY NUMBER OF CREDITS: 5</td>
</tr>
<tr>
<td>PREREQUISITE: NONE</td>
</tr>
<tr>
<td>COURSE DESCRIPTION: Advanced studies in the physiology of harvested tropical produce. Stress metabolism. Dormancy and growth regulation. Membrane function in physiology and biochemistry of stored crop produce including effects of environmental modifications, are further topics of study.</td>
</tr>
<tr>
<td>Assessment: Coursework 40% Final examination 60%</td>
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</tbody>
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SEMESTER: 2
<table>
<thead>
<tr>
<th>COURSE CODE: AGCP 6250</th>
</tr>
</thead>
<tbody>
<tr>
<td>COURSE TITLE: WEED SCIENCE NUMBER OF CREDITS: 8</td>
</tr>
<tr>
<td>PREREQUISITE: NONE</td>
</tr>
<tr>
<td>COURSE DESCRIPTION: This course introduces students to: the role of weeds in crop ecosystems; weed biology; dissemination; cultural, chemical and biological control of important weed species of tropical crops. All topics have particular reference to Caribbean agriculture. Practicals and field trips are included.</td>
</tr>
<tr>
<td>Assessment: Coursework 25% Final examination 75%</td>
</tr>
</tbody>
</table>
SEMESTER: I OR 2 (BASED ON REGISTRATION NUMBERS)
COURSE CODE: AGCP 6251
COURSE TITLE: CROP PRODUCTION I
NUMBER OF CREDITS: 5
PREREQUISITE: NONE
COURSE DESCRIPTION: This course provides a broad scope of physiology of vegetative and reproductive growth, and production technology of some of the most important perennial crops of economic importance in the tropics including: coffee, citrus, cocoa, banana, palms, pineapple and a number of popular tree fruits (e.g. guava, mango and cashew). Current tree crop management research and research needs for tropical species are emphasised.
Assessment:
Coursework 40%
Final examination 60%

SEMESTER: I OR 2 (BASED ON REGISTRATION NUMBERS)
COURSE CODE: AGCP 6252
COURSE TITLE: CROP PRODUCTION 2
NUMBER OF CREDITS: 5
PREREQUISITE: NONE
COURSE DESCRIPTION: The crops dealt with in this course include the cereals, root crops, sugarcane, oil seeds and pulses, tobacco, fibre and vegetable crops. A description of the technology of production of the most important short-term crops cultivated in the tropics is provided.
Assessment:
Coursework 40%
Final examination 60%

SEMESTER: 1
COURSE CODE: AGLS 6001
COURSE TITLE: TROPICAL ANIMAL SCIENCE
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: This course covers the different aspects involved in improving output from Tropical Livestock, including through breeding, health, feeding and housing programmes integrated in animal production systems and aspects of processing livestock products.
Assessment:
Coursework 40%
(3 review papers and 3 seminars on the review papers)
Final examination 60%

SEMESTER: 1
COURSE CODE: AGLS 6002
COURSE TITLE: ADVANCED TROPICAL FORAGE UTILISATION
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: This is a course emphasising the nutrition of ruminants with particular reference to forage utilisation. Included here are those factors affecting forage utilisation and methods of forage utilisation, including hay and silage production and feeding. Pasture management including the use of electric fencing is looked at, as a tool to improve utilisation. Forage tree crop and multipurpose tree crop production and utilisation. Production and utilisation schedules of selected forages. Fodder budgeting.
Assessment:
Coursework 40%
Final examination 60%

SEMESTER: 2
COURSE CODE: AGLS 6003
COURSE TITLE: TROPICAL LIVESTOCK DEVELOPMENT
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: Areas covered in this course include: What is Livestock Development? Sustainable Livestock Development. Agricultural Diversification and Livestock Development, Factors influencing Livestock Development - Globally, in the tropics and in the Caribbean. Some technical imperatives are also discussed including; demand for livestock products; efficiency criteria; choice of production technology. Livestock Production Systems - Pastoralism ranching, intensive and extensive production systems; landless livestock production systems, integrated systems. The nature of livestock products and market for livestock products. Government and the Livestock Sector, the Private Sector's and Government's role in Livestock Development, International Trade and the effect of GATT on Livestock Development in the Developing Tropics.
Assessment:
Coursework 40%
(1 project 10% and 3 seminars - 30%)
Final examination 60%

SEMESTER: 2
COURSE CODE: AGLS 6004
COURSE TITLE: ADVANCED RUMINANT PRODUCTION
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: Here, those techniques used for providing improvements in and increased production of meat, milk and hides from sheep, goats, dairy and beef cattle, including water buffalo are studied. This includes management of the housing and environment to alleviate stress. Heat stress management, non-conventional methods of feeding ruminants.
Assessment:
Coursework 40%
Final examination 60%
SEMESTER: 1
COURSE CODE: AGLS 6005
COURSE TITLE: ADVANCED NON-RUMINANT PRODUCTION
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: The use of innovative techniques for arriving at improvements in and increased production of meat, plumage and hides from poultry, pigs and rabbits are dealt with in this course. This focuses on such areas as: Management for breeding; Management of the housing and environment to alleviate heat and humidity stress; Physiology of heat stress management of non-ruminants; Unconventional methods of feeding non-ruminants; elements of feed milling and mixing.
Assessment:
Coursework 40%
Final examination 60%

SEMESTER: 1 OR 2 (BASED ON REGISTRATION NUMBERS)
COURSE CODE: AGLS 6201
COURSE TITLE: ADVANCED ANIMAL NUTRITION I - ELECTIVE
NUMBER OF CREDITS: 5
PREREQUISITE: NONE
COURSE DESCRIPTION: More in-depth hands-on experience of laboratory techniques and experimental designs in animal nutrition research are exposed to students in this course.
Assessment:
Coursework 40%
Final examination 60%

SEMESTER: 1 OR 2 (BASED ON REGISTRATION NUMBERS)
COURSE CODE: AGLS 6202
COURSE TITLE: ADVANCED ANIMAL NUTRITION II - ELECTIVE
NUMBER OF CREDITS: 5
PREREQUISITE: AGLS 6201
COURSE DESCRIPTION: Energy and protein metabolism in farm animals.
Assessment:
Coursework 40%
Final examination 60%

SEMESTER: 1 OR 2 (BASED ON REGISTRATION NUMBERS)
COURSE CODE: AGLS 6203
COURSE TITLE: ADVANCED ANIMAL NUTRITION III - ELECTIVE
NUMBER OF CREDITS: 5
PREREQUISITE: AGLS 6201 & AGLS 6202
COURSE DESCRIPTION: Mineral and vitamin nutrition in farm animals.
Assessment:
Coursework 40%
Final examination 60%

SEMESTER: 1 OR 2 (BASED ON REGISTRATION NUMBERS)
COURSE CODE: AGLS 6302
COURSE TITLE: ANIMAL BREEDING - ELECTIVE
NUMBER OF CREDITS: 5
PREREQUISITE: NONE
COURSE DESCRIPTION: Reproductive efficiency in farm livestock; methods of selection and rates of genetic improvement. Progeny and Sib-testing for one or more characters. Genetic environment interactions. In-breeding, line breeding and cross breeding. Resistance to pests and diseases, techniques of control.
Assessment:
Coursework 40%
Final examination 60%

SEMESTER: 1 OR 2 (BASED ON REGISTRATION NUMBERS)
COURSE CODE: AGLS 6401
COURSE TITLE: REPRODUCTIVE PHYSIOLOGY - ELECTIVE
NUMBER OF CREDITS: 5
PREREQUISITE: NONE
COURSE DESCRIPTION: The course will entail a discussion of the concepts underlying reproductive physiology in male and female farm animals. In particular, it explores the reproductive physiology of bovines, including water buffalo, sheep, goats, pigs, rabbits, dogs, poultry and equines. Semen evaluation, artificial insemination techniques, induction and synchronisation of ovulation and embryo transfer in selected animal species.
Assessment:
Coursework 30%
Final examination 70%

SEMESTER: 1 OR 2 (BASED ON REGISTRATION NUMBERS)
COURSE CODE: AGLS 6502
COURSE TITLE: TROPICAL ZOO AND WILDLIFE - ELECTIVE PRODUCTION AND MANAGEMENT
NUMBER OF CREDITS: 5
PREREQUISITE: NONE
Assessment:
Coursework 40%
Final examination 60%
SEMESTER: 1 OR 2 (BASED ON REGISTRATION NUMBERS)
COURSE CODE: AGLS 6804
COURSE TITLE: TROPICAL COMMODITY - ELECTIVE UTILISATION (LIVESTOCK)
NUMBER OF CREDITS: 5
PREREQUISITE: NONE
COURSE DESCRIPTION: Alternative methods of utilising of tropical crop and animal products for food and other uses from the foundation of this course, including utilisation of culls. Factors affecting availability are studied, as are processing, options and their effect on food quality and commodity utilisation. Relationships among technical and socio-economic factors of production, availability, processing, marketing and utilisation are focused on. A practical project is a significant part of this course.
Assessment:
Coursework 40%
(2 practical investigations and 2 research seminars)
Final examination 60%

SEMESTER: YEAR LONG
COURSE CODE: AGRI 6100
COURSE TITLE: RESEARCH PROJECT
NUMBER OF CREDITS: 12
PREREQUISITE: SUCCESSFUL COMPLETION OF CORE COURSES AND ELECTIVE
COURSE DESCRIPTION: Candidates who successfully complete the core courses, the elective course and research papers in the MSc Crop Protection, will be allowed to undertake a 13-week independent research project. This project may involve field, greenhouse and/or laboratory investigations in some aspect of crop protection and may be conducted anywhere in the region providing suitable arrangements can be made.

SEMESTER: 1
COURSE CODE: AGRI 6110
COURSE TITLE: PRINCIPLES OF CROP PROTECTION
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: The definition of pest; the historical development of crop protection in tropical agriculture; crop losses due to pests; methods for the development of an effective crop protection programme; a review of relevant case studies.
Assessment:
Coursework 25%
Final examination 75%

SEMESTER: 2
COURSE CODE: AGRI 6120
COURSE TITLE CURRENT ISSUES IN CROP PROTECTION
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: This course covers some of the major current global issues in crop protection, particularly with regard to their impact on international trade in agricultural commodities. It aims to provide modern-day plant protection specialists with the information and tools to deal with some of the key issues which they will encounter in their day-to-day work situations, especially in the role of plant protection officer whether in the private or public sector. Also and equally importantly, the course will provide an understanding of a country’s phytosanitary obligations under the major international agreements such as the International Plant Protection Convention and the WTO Agreement on the Application of Sanitary and Phytosanitary Measures, as well as provide some insight into other contemporary issues such as invasive alien species and the impact of climate change on agriculture and crop pests.
Assessment:
Coursework 25%
Final examination 75%

SEMESTER: 1
COURSE CODE: AGRI 6201
COURSE TITLE: CHEMISTRY OF FOODS
NUMBER OF CREDITS: 5
PREREQUISITE: NONE
COURSE DESCRIPTION: In this course, the chemistry of crop and animal produce relating to their compositional and other characteristic properties which are important in their manufacture into food products are studied, with emphasis on tropical commodities.
Assessment:
Coursework 40%
Final examination 60%

SEMESTER: 1
COURSE CODE: AGRI 6210
COURSE TITLE: BIOLOGY, ECOLOGY AND EPIDEMIOLOGY OF PESTS
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: An introduction to: ecological principles and the concept of the ecosystem; cropping systems and the pest concept; the ecological origins of pest status; crop yields and assessment methods in relation to an effective crop protection programme; biology, ecology and epidemiology of plant pathogens including the classification, symptomatology and pathogenesis; abiotic diseases; the biology, ecology and recognition of insects, mites, rodents, birds and other crop pests; biology, ecology and recognition of weeds, weed identification and weed surveys.
Assessment:
Coursework 25%
Final examination 75%
SEMESTER: 1
COURSE CODE: AGRI 6220C
COURSE TITLE: PRINCIPLES OF PEST MANAGEMENT
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: Cultural and physical control strategies, biological control and its classification, microbial control, growth regulators, pheromones, and sterile insect techniques, biological control in the Caribbean, chemical control, pesticide chemistry, bioassays, formulations and application equipment, pesticide selectivity, consequences of pesticide abuse, resistance and environmental impact and human health, legislative control, plant quarantine, methods for preventing and combating recent pest introduction, seed laws and weed laws, mechanisms of resistance to pest attack.
Assessment:
Coursework 25%
Final examination 75%

SEMESTER: 1
COURSE CODE: AGRI 6230
COURSE TITLE: INTEGRATED PEST MANAGEMENT (IPM)
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: IPM concept; elements of IPM including sampling methods; the concept of economic threshold level; decision-making; socio-economic factors of IPM; IPM and farming in the Caribbean.
Assessment:
Coursework 25%
Final examination 75%

SEMESTER: 2
COURSE CODE: AGRI 6240
COURSE TITLE: PLANT PATHOLOGY
NUMBER OF CREDITS: 8
PREREQUISITE: NONE
COURSE DESCRIPTION: The importance, etiology, epidemiology and control of crop diseases under different farming systems in the Caribbean is studied here, including those caused by fungi, bacteria, viruses, nematodes, mycoplasma and abiotic agents. Strategies for disease control examine the merits and demerits of chemical, cultural, integrated and other cheap and practical measures. Practicals include field trips to farmers' fields and a plant disease clinic where students learn to recognise, diagnose and control disease.
Assessment:
Coursework 25%
Final examination 75%

SEMESTER: 2
COURSE CODE: AGRI 6250
COURSE TITLE: APPLIED ENTOMOLOGY
NUMBER OF CREDITS: 8
PREREQUISITE: NONE
COURSE DESCRIPTION: The major topics covered in this course are: population dynamics and the regulation of insect populations; introduction to insect toxicology; profit analysis and LD₅₀ measurements; description and identification of major pest groups including mites; biology and control of pests of important crop groups in the tropics with special reference to the Caribbean. Practical classes and field trips are included.
Assessment:
Coursework 25%
Final examination 75%

SEMESTER: 1
COURSE CODE: AGRI 6301
COURSE TITLE: FOOD MICROBIOLOGY I
NUMBER OF CREDITS: 5
PREREQUISITE: NONE
COURSE DESCRIPTION: This course explores the nature and function of micro-organisms in tropical foods. This includes post-harvest pathology, food borne illness, effects of processing, storage and distribution on food microorganisms, techniques for isolation and identification of microorganisms from foods.
Assessment:
Coursework 40%
Final examination 60%

SEMESTER: NOT OFFERED IN 2010/2011
COURSE CODE: AGRI 6302
COURSE TITLE: FOOD MICROBIOLOGY II
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: In this advanced course, the following areas are covered: factors governing microbial changes in tropical foods; bacterial fermentations; modern concepts in quality assurance programs; problem-solving in the food industry. A practical project is included.
Assessment:
Coursework 40%
Final examination 60%

SEMESTER: 1 OR 2 (BASED ON REGISTRATION NUMBERS)
COURSE CODE: AGRI 6620
COURSE TITLE: STATISTICS
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: This course exposes students to the basic statistical tools needed to draw inference based on empirical data, simple linear regression models, Multiple Regression Models and subset selections, as well as Probit Analyses for binary response. Design of experiments and analysis and interpretation of the generated data are also covered. Covariance analysis. Factorial experiments, including, confounding and fractional replication, and Split plot design are some of the topics covered.
Assessment:
Coursework 40%
Final examination 60%
SEMESTER: 2
COURSE CODE: AGRI 6702
COURSE TITLE: FOOD QUALITY AND FOOD ANALYSIS
NUMBER OF CREDITS: 5
PREREQUISITE: NONE
COURSE DESCRIPTION: The physiological, biochemical basis of quality in fresh tropical produce. Physical, chemical and biochemical properties of foods. Effects of storage and processing on the fundamental attributes of flavour, odour, colour, texture and nutrition. Pathological effects. Assessment of analytical methods and instruments in order to understand their principles, application and limitations in the analysis of food and food products with particular reference to the chemical, nutritional and organoleptic qualities of food.
Assessment:
Coursework 40%
Final examination 60%

SEMESTER: 2
COURSE CODE: AGRI 6901
COURSE TITLE: PRODUCT DEVELOPMENT
NUMBER OF CREDITS: 5
PREREQUISITE: NONE
COURSE DESCRIPTION: A study of the elements that are important in the development of tropical food products for the local and international markets. A practical project is included.
Assessment:
Coursework 40%
Final examination 60%

SEMESTER: 1 OR 2 (BASED ON REGISTRATION NUMBERS)
COURSE CODE: AGRI 6720
COURSE TITLE: AGRICULTURAL ENGINEERING
NUMBER OF CREDITS: 5
PREREQUISITE: NONE
COURSE DESCRIPTION: Inferential tools for simple sample and two samples problems are introduced. Students are grounded in farm power, tractor and implement mechanics are the major topics covered here. Important control systems, internal and external hydraulics, and traction and traction aids. The theory of cultivations, including design of soil engaging implements, selection of implements for tillage and cultivation operations under different soil physical conditions are areas also focussed on in this course.
Assessment:
Coursework 40%
Final examination 60%

SEMESTER: 1 OR 2 (BASED ON REGISTRATION NUMBERS)
COURSE CODE: AGSL 6140
COURSE TITLE: SOIL CHEMISTRY AND FERTILITY
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: Students are given an introduction to the following: Chemistry of weathering processes and weathered products, classification with special reference to West Indian soils; composition, fractionation, properties and classification of soil organic matter; cation and anion exchange; ion uptake by plants; chemical, physical and biological factors affecting soil fertility; methods of assessing fertility including radioisotope techniques.
Assessment:
Coursework 40%
Final examination 60%

SEMESTER: 1 OR 2 (BASED ON REGISTRATION NUMBERS)
COURSE CODE: AGSL 6141
COURSE TITLE: SOIL WATER MANAGEMENT
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: Soil water retention; Soil water/plant relationships; the physics of soil moisture movement; drainage of agriculture lands; the principles and practices of irrigation; predicting irrigation requirements and scheduling of irrigation; water development for agriculture; water storage; management of water on flat land and slopes.
Assessment:
Coursework 40%
Final examination 60%

SEMESTER: 1 OR 2 (BASED ON REGISTRATION NUMBERS)
COURSE CODE: AGSL 6142
COURSE TITLE: SOILS OF THE WEST INDIES
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: This course lays the foundation for understanding the genesis, distribution, properties and use of West Indian soils.
Assessment:
Coursework 40%
Final examination 60%
SEMESTER: 1 OR 2 (BASED ON REGISTRATION NUMBERS)
COURSE CODE: AGSL 6143
COURSE TITLE: TROPICAL SOIL SCIENCE
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: The pedology, classification and soil/crop relationships of tropical soils are the focus areas of this course.
Indian soils.
Assessment:
Coursework 40%
Final examination 60%

SEMESTER: 1 OR 2 (BASED ON REGISTRATION NUMBERS)
COURSE CODE: AGSL 6144
COURSE TITLE: SOIL PHYSICS
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: In this course, the student is provided with an overview of: Soil structure - classical concepts, nature and properties of clay mineral surfaces, advances made in measuring and defining soil structure; soil structure and root growth; mechanical impedance; water flow; measurement and prediction/modeling; measurement of water in soils aeration and available water; temperature flow in soils.
Assessment:
Coursework 40%
Final examination 60%

SEMESTER: 1 OR 2 (BASED ON REGISTRATION NUMBERS)
COURSE CODE: AGSL 6145
COURSE TITLE: SOIL MICROBIOLOGY
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: This course exposes students to the various classes of micro-organisms and the various microbiological cycles, including: sulphur and iron bacteria, bacterial metabolism, mineralisation and immobilisation, nitrification and denitrification; symbiotic and non symbiotic nitrogen fixation; biogeochemical cycles; microbial ecology rhizosphere and phyllosphere.
Assessment:
Coursework 40%
Final examination 60%

SEMESTER: 1 OR 2 (BASED ON REGISTRATION NUMBERS)
COURSE CODE: AGSL 6146
COURSE TITLE: SOIL AND WATER CONSERVATION
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: This course introduces the student to hydrology; factors affecting the erosion of soil by water and wind; soil erosion modeling current practices and developments in soil and water conservation; land use as a factor in soil conservation; watershed management; land reclamation and development.
Assessment:
Coursework 40%
Final examination 60%
SEMMETER: 1
COURSE CODE: FOSQ 5003
COURSE TITLE: FOOD QUALITY ASSURANCE AND
EVALUATION OF AGRI-FOOD POLICIES
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: The course covers areas such as
agricultural produce and food quality, food quality assurance,
total quality management, agriculture and food quality
management systems, fertilizer use and sustainable pesticide
management, genetically modified biosafety and quality
standard systems, formulation, implementation, evaluation
of agricultural and food public policies from domestic and
international trade perspectives. The socio-economic and
environmental change and its influence on public policies’
viability are examined. The course also describes the process
of food security public policy formulation, implementation,
monitoring and evaluation. The role and functions of institutions
and other stakeholders involved in the process of public policy
formulation and implementation as it relates to food safety
and quality. The role of international trade in agricultural and
food safety, current debates about the effect of globalization on
developing countries and evolution of trade policies. The course
comprises of two project assignments, laboratory practical and
a final exam.
Assessment:
Coursework 40%
Final examination 60%

SEMMETER: 2
COURSE CODE: FOSQ 5004
COURSE TITLE: AGRI-FOOD SAFETY RISK ANALYSIS
NUMBER OF CREDITS: 4
PREREQUISITE: FOSQ 5001
COURSE DESCRIPTION: This course will deal with the
components of risk assessment, risk management and risk
communication as well as their application to support the
management of food and agriculture safety programmes. The
course comprises of two case study assignments and an exam.
Assessment:
Coursework 40%
Final examination 60%

SEMMETER: 2
COURSE CODE: FOSQ 5005
COURSE TITLE: EPIDEMIOLOGY AND FOOD-BORNE
DISEASES
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: The course includes epidemiological
methods and concepts of food borne diseases that are critical
in the evaluation, analysis and interpretation of data related
to public health. To get around the problems posed by such
under-reporting and describe disease burden more adequately,
a number of innovative and creative approaches have been
used in recent years for some food-borne diseases from various
causes. These include the use of active surveillance and field
studies, risk assessment methods, and epidemiological disease
modeling. Students have the opportunity to work on exercises
and case studies as related to the topics. The topics include
epidemiological surveys, investigating food-borne illness
outbreaks, basic epidemiological methods and food borne
diseases. The course comprises of case assignments, laboratory
practical and an exam.
Assessment:
Coursework 40%
Final examination 60%

SEMMETER: 2
COURSE CODE: FOSQ 5006
COURSE TITLE: INTERNATIONAL TRADE AND AGRI-FOOD
LEGISLATION
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: The course covers International Trade
and Food Legislation in food and agriculture produce safety
and quality. Current debates about the effect of globalization on
food and agriculture produce safety and quality on developing
countries. The course examine International Food Safety Systems
such as the applications of Sanitary and Phytosanitary Measures,
Technical Barriers to Trade, Codex Alimentarius, Agreement on
Agriculture and the harmonization of food and agriculture
legislation for world food trade, and the consequences of food
safety in world food trade. The course would be examined by
two case studies and a final exam.
Assessment:
Coursework 50%
Final examination 50%
SEMESTER: 1
COURSE CODE: FOSQ 6001
COURSE TITLE: AGRI-FOOD SAFETY
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: This course focuses on the application of modern scientific principles for the inspection systems, based on good agricultural and manufacturing practices and the analysis of hazards and critical control points along the food chain. ISO 22000:2005 specifies requirements for a food and agriculture safety management system where an organization in the food chain needs to demonstrate its ability to control food safety hazards in order to ensure that food is safe at the time of human consumption. It is applicable to all organizations, regardless of size. The course is comprised of two case study assignments and a final exam.
Assessment:
Coursework 40%
Final examination 60%

SEMESTER: 1
COURSE CODE: FOSQ 6002
COURSE TITLE: PROJECT MANAGEMENT IN FOOD AND AGRICULTURE
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: The course Project Management in Food and Agriculture will introduce the students to the rationale, context and methods of planning and assessing food and agriculture management projects. Management issue and will be the starting point to explore deeply into the necessary processes for the successful preparation and management of the projects. It will create a common basis from the project definitions and the project management and form the relation between this and other administrative disciplines, and with other related efforts. The understanding of the phases and the life cycle of a project, the identification of the stakeholders - those project-related individuals or institutions - and the organizational and socioeconomic influences to which the project is subject, will be achieved with the study of the project management context. It will make possible to establish the usefulness of the project management to among other things, satisfy the users' needs to ensure that the available resources are used in the most efficient possible way, and to plan, implement and control the management of company and government strategies. The financial and economic analysis of food projects will be included. The course will provide supplementary reading material, case studies and the presentation of project management-related issues by students. The objective of the learning experiences is to promote the critical thinking with a view to solving the current problems in the project management field. The course would be examined by course work of essay and a case study and final exam of multiple choice questions, structured questions and essays.
Assessment:
Coursework 40%
Final examination 60%

SEMESTER: 2
COURSE CODE: FOSQ 6003
COURSE TITLE: FOOD QUALITY ASSURANCE AND EVALUATION OF AGRI-FOOD POLICIES
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: The course covers areas such as agricultural produce and food quality, food quality assurance, total quality management, agriculture and food quality management systems, fertilizer use and sustainable pesticide management, genetically modified biosafety and quality standard systems, formulation, implementation, evaluation of agricultural and food public policies from domestic and international trade perspectives. The socio-economic and environmental change and its influence on public policies' viability are examined. The course also describes the process of food security public policy formulation, implementation, monitoring and evaluation. The role and functions of institutions and other stakeholders involved in the process of public policy formulation and implementation as it relates to food safety and quality. The role of international trade in agricultural and food safety, current debates about the effect of globalization on developing countries and evolution of trade policies. The course comprises of two project assignments, laboratory practical and a final exam.
Assessment:
Coursework 40%
Final examination 60%

SEMESTER: 2
COURSE CODE: FOSQ 6004
COURSE TITLE: AGRI-FOOD SAFETY RISK ANALYSIS
NUMBER OF CREDITS: 4
PREREQUISITE: FOSQ 6001
COURSE DESCRIPTION: This course will deal with the components of risk assessment, risk management and risk communication as well as their application to support the management of food and agriculture safety programmes. The course comprises of two case study assignments and an exam.
Assessment:
Coursework 40%
Final examination 60%
SEMMESTER: 2  
COURSE CODE: FOSQ 6005  
COURSE TITLE: EPIDEMIOLOGY AND FOOD-BORNE DISEASES  
NUMBER OF CREDITS: 4  
PREREQUISITE: NONE  
COURSE DESCRIPTION: The course includes epidemiological methods and concepts of food borne diseases that are critical in the evaluation, analysis and interpretation of data related to public health. To get around the problems posed by such under-reporting and describe disease burden more adequately, a number of innovative and creative approaches have been used in recent years for some food-borne diseases from various causes. These include the use of active surveillance and field studies, risk assessment methods, and epidemiological disease modeling. Students have the opportunity to work on exercises and case studies as related to the topics. The topics include epidemiological surveys, investigating food-borne illness outbreaks, basic epidemiological methods and food borne diseases. The course comprises of case assignments, laboratory practical and an exam.  
Assessment:  
Coursework 40%  
Final examination 60%

SEMMESTER: 2  
COURSE CODE: FOSQ 6006  
COURSE TITLE: INTERNATIONAL TRADE AND AGRI-FOOD LEGISLATION  
NUMBER OF CREDITS: 4  
PREREQUISITE: NONE  
COURSE DESCRIPTION: The course covers International Trade and Food Legislation in food and agriculture produce safety and quality. Current debates about the effect of globalization on food and agriculture produce safety and quality on developing countries. The course examine International Food Safety Systems such as the applications of Sanitary and Phytosanitary Measures, Technical Barriers to Trade, Codex Alimentarius, Agreement on Agriculture and the harmonization of food and agriculture legislation for world food trade, and the consequences of food safety in world food trade. The course would be examined by two case studies and a final exam.  
Assessment:  
Coursework 50%  
Final examination 50%

SEMMESTER: 3 (SUMMER)  
COURSE CODE: FOSQ 6010  
COURSE TITLE: RESEARCH PROJECT ON AGRI-FOOD SAFETY AND QUALITY ASSURANCE  
NUMBER OF CREDITS: 4  
PREREQUISITE: COMPLETION OF ALL WRITTEN COURSES  
COURSE DESCRIPTION: The chosen project could to link to job description and interest and should contribute to knowledge and application in managing safety and quality in food and agriculture. The project would draw upon previous knowledge and experience gained in the courses completed in the MSc degree programme. The project will be based on an oral presentation and an examination on submission of written project. Students must obtain at least 50% to pass the project component.  
Assessment  
Oral presentation 10%  
Written project 90%  

The project will be based on an oral presentation and an examination on submission of written project. The written project will be examined by internal and external examiners.

BUSINESS DEVELOPMENT UNIT

CERTIFICATE/POSTGRADUATE DIPLOMA AND MSC IN AGRICULTURAL AND RURAL DEVELOPMENT (BY DISTANCE)

INTRODUCTORY NOTES

1. In order to complete the requirements for the Diploma and MSc students must take and pass a total of four or seven courses respectively. Before you register, please consider carefully the following information about how courses are organised and the study commitment they require. Students should note that distance education demands a high degree of commitment, determination and self-discipline on the part of students.

2. The duration of each course is 31 - 35 weeks of teaching/study time and 4 weeks allocated for revision and preparation for examinations at the end of the course. At the beginning of the academic year you will receive your distance learning course packages. These packages will form the bulk of your study load and should be completed before examinations are held.

3. COURSE PACKAGE:  
Each course study package will consist of:  
- A course file, which is a detailed guide including exercises and assignment topics  
- Core textbook(s)  
- Other published texts and/or an integrated collection of readings  
- Supplementary study materials (audiocassettes, calculator etc. as necessary)

4. TUTOR MARKED ASSIGNMENTS (TMAs):  
Each course file contains three (3) or four (4) Tutor Marked Assignments (TMAs) printed on green paper. The TMAs are expected to be completed and submitted in a timely manner to the EPA Office for assessment by the course tutor. The TMAs provide feedback to both tutors and students. Experience has shown that students who complete their TMAs are more likely to be successful in their examinations and students are therefore encouraged to complete the TMAs for each course even though these assignments are not credited towards the course assessment.
5. **TUTORIAL SESSIONS:**
An Induction Workshop (at the beginning of the academic year) and tutorial sessions will be conducted for registered students through The UWI’s teleconferencing facility (UWIDEC). These tutorial sessions are normally held on Saturdays during the study year. Teleconferencing facilities do not exist in Guyana and Suriname. The schedule for the tutorials is prepared in advance, and students are strongly advised to attend sessions.

6. **STUDY REQUIREMENTS:**
The average weekly study target for each course is six to seven hours. In practice, some students will find that they need more than six hours a week to study, particularly in the early stages of a course until they become familiar with the method of study as well as the subject matter. This is perhaps most relevant if you have not studied a particular discipline before, or if your knowledge of the discipline is ‘rusty’. In view of the above we strongly recommend that you start with no more than two courses.

7. **METHOD OF EXAMINATION:**
For each course there will be a three hour written examination. Examinations in the UWI campus territories are normally held in St. Augustine, Mona and Cave Hill, while in non-campus territories the School of Continuing Studies or other authorised bodies administer them.

8. **NOTIFICATION OF COURSES TO BE TAKEN IN A PARTICULAR YEAR:**
Students are requested to notify the EPA Office as early as possible of the courses that they wish to take in the following year.

9. **COMMUNICATIONS:**
All correspondence about the Postgraduate Diploma or MSc degree should be addressed to:

- Academic Coordinator
- External Programme in Agriculture
- Faculty of Science and Agriculture
- The University of the West Indies
- St. Augustine, Trinidad
- Tel: (868) 662-3719/2686 or 662-2202
- Ext. 83327/82318/83322
- Fax: (868) 663-9686
- E-mail: epa@fsa.uwi.tt

**REGULATIONS**

**1. QUALIFICATIONS FOR ADMISSION**
(a). In order to be admitted to the Postgraduate Diploma a student must:

(i) Have a first Degree in agriculture, agronomy, agricultural economics, or other appropriate discipline, or equivalent qualifications.

or

(ii) Have previous education and relevant experience, which is acceptable to the University.

(b). In order to be admitted to the MSc a student must:

(i) Have a First degree of at least Lower Second Class Honours standing (minimum GPA 2.0 or equivalent) in agriculture, agronomy, agricultural economics, the biological sciences, economics or other appropriate disciplines.

or

(ii) Have completed the requirements for the Diploma in Agricultural and Rural Development with a B+ average or better.

2. **COURSE OF STUDY**
(a) In order to be eligible for the award of the Postgraduate Diploma, students must satisfactorily complete FOUR (4) courses equivalent to 24 credits taken from among the following Part I Courses.

**PART I courses (6 credits each)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGPD 6001</td>
<td>Agricultural Economics for Development</td>
</tr>
<tr>
<td>AGPD 6002</td>
<td>Managing Agricultural Development</td>
</tr>
<tr>
<td>AGPD 6003</td>
<td>Agricultural Policy Analysis</td>
</tr>
<tr>
<td>AGPD 6004</td>
<td>Business Management for Agricultural Enterprises</td>
</tr>
<tr>
<td>AGPD 6005</td>
<td>Project Planning, Monitoring and Evaluation</td>
</tr>
<tr>
<td>AGPD 6006</td>
<td>Sociology of Agrarian Transformation &amp; Rural Development</td>
</tr>
<tr>
<td>AGPD 6007</td>
<td>Finance, Investment &amp; Credit for Agribusiness &amp; Rural Development</td>
</tr>
<tr>
<td>AGPD 6000</td>
<td>Research Methods and Data Analysis</td>
</tr>
</tbody>
</table>

The courses taken for the Diploma will be considered to fulfill the requirements of Part I of the MSc Degree.

Courses not taken during completion of Part I of the programme may be added to the list of Part II courses and may be substituted according to the students area of interest. But such choices should be made at the start of the programme, particularly for those students who wish to follow the full MSc Degree programme.

Students will not be permitted to begin Part II of the Programme until all the requirements of Part I are met.

**MSC IN AGRICULTURAL AND RURAL DEVELOPMENT**

(a) **MSc DEGREE**

- In order to be eligible for the award of the MSc students are required to complete seven (7) courses, four from Part I above and three from Part II below, which must include Research Methods and Data Analysis and a Research Project.

- Students who wish to register for a project are required to submit a Research Proposal to the EPA office for approval, no later than the end of the previous academic year.
(b) Courses not taken during completion of Part 1 of the programme may be added to Part II courses and may be substituted according to the student area of interest. But such choices should be made at the start of the programme, particularly for those students who wish to follow the full MSc Degree Programme.

PART II Courses (6 Credits Each)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGPD 6501</td>
<td>Agricultural &amp; Food Marketing in Developing Countries</td>
</tr>
<tr>
<td>AGPD 6502</td>
<td>Land Degradation and Sustainability</td>
</tr>
<tr>
<td>AGPD 6503</td>
<td>Gender Issues in Agrarian and Environmental Change</td>
</tr>
<tr>
<td>AGPD 6504</td>
<td>Applied Econometrics for the Agricultural &amp; Food Sector</td>
</tr>
<tr>
<td>AGPD 6505</td>
<td>Crop Production and Development</td>
</tr>
<tr>
<td>AGPD 6506</td>
<td>Livestock Development for Small States</td>
</tr>
<tr>
<td>AGPD 6507</td>
<td>A Research Project</td>
</tr>
</tbody>
</table>

Pre-requisite: AGDP 6000 Research Methods & Data Analysis

In exceptional cases where the conduct of a research project is not deemed practical or possible, a student may apply to the Board for Graduate Studies and Research for permission to read a substitute course. In cases where such permission is granted, the Board will also specify the nature of the substitute course to be taken.

Where a student takes an additional course over and above those prescribed for Part II of the Degree, such a course shall not count towards the award of the Degree. Each student will be required to indicate at the time of entry into the examination those courses in which they wish to be examined for the Degree.

3. REGISTRATION

a. Students must normally register for courses within the first four (4) weeks of the academic year.

b. The maximum number of courses, for which Diploma and MSc students may register in any one year, is four.

c. A student who has recorded a pass in a course will not be permitted to re-register for that course.

d. Registration for a course includes registration for the associated examination and any student who, having registered for a course and examination, fails to take the examination shall be deemed to have failed the examination unless:

i. Prior approval was given for the student to withdraw from the examination by the Chairman, Campus Committee for Graduate Studies and Research; (see 8, deferral of exam) or

ii. He/she could not attend because of illness or other grave cause.

e. A student wishing to withdraw from a course must apply in writing to the Senior Assistant Registrar (Postgraduate) for permission to do so. The EPA Office should receive such applications no later than the end of the 28th week after the start of teaching in any given year. In such cases the candidate must take the examination in the following academic year and will be allowed to do so without penalty. Deferral of the examination in a course will not normally be allowed on more than one occasion.

f. Students will not be permitted to repeat a failed course more than once, but may register for another course, subject to permission from the Chair, Campus Committee for Graduate Studies and Research and provided that the maximum time is not exceeded.

4. UPGRADING/RE-GRADING OF REGISTRATION

Upgrade from Postgraduate Diploma to MSc

(a) Students who have completed the requirements for the Postgraduate Diploma may apply to upgrade their registration from the Postgraduate Diploma to the MSc Degree. The success of such applications would be dependent on the performance in the Postgraduate Diploma examinations.

(b) In the event that such students are unable to complete the requirements for the MSc the Postgraduate Diploma will be awarded.

Re-grading of MSc students to Postgraduate Diploma

(c) MSc students who have been unable to complete the requirements within the maximum time but who have met the requirements for the Postgraduate Diploma may be awarded the Postgraduate Diploma.

5. TIME LIMITS FOR COMPLETION

The minimum and maximum times for completion of the MSc degree/ diploma are as follows:

- **MSc**
  - (a) Minimum: two (2) academic years from entry into the Programme.
  - (b) Maximum: six (6) academic years from entry into the Programme.

- **Diploma**
  - (a) Minimum: one (1) academic year from entry into the Programme.
  - (b) Maximum: four (4) academic years from entry into the Programme.

In special cases, students who have not completed the requirements within the prescribed maximum period and require one course to graduate may apply for an extension of time. Such cases will be determined on an individual basis.

6. LEAVE OF ABSENCE

(a) A candidate who for good reason wishes to be absent from the programme for an academic year must apply for formal leave of absence to the Campus Committee for Graduate Studies and Research through the Office of the External Programme in Agriculture, stating reasons for the application;
(b) The length of such leave of absence, if granted, will be subject to approval by the Campus Committee for Graduate Studies & Research, but will not exceed one academic year in the first instance, terminating at the end of the academic year for which the application is approved;

(c) Leave of absence will not be granted for more than two consecutive academic years;

7. RULES OF PROGRESSION
In order to enter Part II of the MSc Degree a student must normally: Either
(a) have successfully completed Part I of the Degree or
(b) have transferred their registration from the Postgraduate Diploma to the MSc Degree following a recommendation by the Board of Examiners that their performance in the Diploma examination was such that they may proceed to Part II of the Degree.

(c) In the circumstances of paragraph 7 (b) above the Board of Examiners may also recommend, if they think it appropriate, that students who transfer their registration from the Postgraduate Diploma to the MSc Degree may hold their pass at the Postgraduate Diploma to their credit in the event that they do not satisfy the Board of Examiners at Part II of the Degree.

(d) The Board of Examiners may also recommend, after completion of either the Part I or Part II examination for the MSc Degree, that a student should not be awarded the Degree, but be invited to apply instead for the award of the Diploma.

8. DEFERRAL OF EXAMINATION
a. In exceptional cases where a student may not be able to take the examination(s) in a particular academic year it may be possible to arrange for the examination(s) to be taken in the following academic year. Request for deferral of examination for any course(s) must be sent to the External Programme in Agriculture Office in writing, formally requesting a deferral no later than the 28th week of the academic year.

b. In the case where a request for a deferral has been denied, the examination will have to be taken as scheduled. You are strongly advised to continue the examination preparation until/unless you receive from the External Programme in Agriculture Office approval for deferral.

c. The time limit for completion will not be modified to take deferral into account. For example, if you are registered for the Postgraduate Diploma and you have no passes to your credit by the end of the third academic year of registration, deferral will not be granted and you must successfully complete the requisite four courses in the fourth year in order to comply with the maximum time limit for the completion of the Postgraduate Diploma (Reg. 5).

9. METHODS OF EXAMINATION
a. Each individual course for the Postgraduate Diploma and MSc in Agricultural and Rural Development will be examined by a three (3) hour written paper. Examinations will be supervised and held at authorised university centres. All examinations shall be completed without aids unless otherwise prescribed.

b. There shall be at least two internal examiners approved by the Board for Graduate Studies for each examination. In addition, there shall be one external examiner approved by the Board for Graduate Studies.

10. CONDUCT OF EXAMINATIONS
a. Students taking written Examinations shall be subject to the University Examination Regulations for First Degrees. Diplomas and Certificates save that the functions assigned to the Campus Committee on Examinations shall be performed by the Campus Committee for Graduate Studies or its Chairman.

b. Students will be informed (by letter) of the Examination timetable in respect of written examinations at least one month before the series of examinations begins. Students will also be informed by letter of any subsequent change in dates, and in no case will any such change be made later than one week prior to the commencement of the examination series.

c. Students should be at the examination room at least ten minutes before the scheduled time of any examination. Students shall be admitted up to half an hour after the start of the examination. Students arriving late may be admitted to the examination room but his/her work will be accepted for marking only if he/she could satisfy the Campus Registrar as to his/her reason for being late.

d. Whilst in the Examination Room students are required at all times to comply with the instructions of the Chief Invigilator and/or Assistant Invigilators. Failure to comply may result in the student being disqualified from the examination. Disorderly behaviour may result in the student being expelled from the Examination Room. In such cases the Chief Invigilator shall write a report to the Campus Registrar.

e. Any student, who, for reason of permanent or temporary incapacity, desires special arrangements during examinations, shall apply to the Campus Registrar through the EPA office. The arrangements desired should be specified and the Registrar may require a Medical Certificate as proof of such incapacity. Such student(s) shall not be given extra time in which to write. The Registrar shall inform the Board of Examiners of the circumstances under which the examination was performed.
f. The Campus Registrar shall approve any amanuensis or secretarial assistance provided to handicapped or incapacitated students. Normally the university will defray the additional costs involved. No extra time shall be allowed for any examination so written.

g. In cases of illness, the student shall present to the Campus Registrar a Medical Certificate as proof of illness, signed by the University Health Officer or by other Medical Practitioners approved for this purpose by the University. The student shall send the Medical Certificate to the Campus Registrar within seven days from the date of the examination in which the performance of the student is affected. A certificate received after this period will be considered only in exceptional circumstances.

h. Where in the opinion of the medical advisor concerned a student is unable to submit a Medical Certificate in person, the Medical advisor may do so on his/her behalf within the prescribed time.

i. Students who, for good reason, cannot sit the examinations in their country of residence may apply to be examined elsewhere. Such applications must normally reach the EPA Office no later than two months before the scheduled start of examinations.

j. The University is not responsible for any expenses incurred by students in attending examinations.

k. In the event that there is an excessive delay in the start of an examination at any venue, a new paper for the relevant course will be prepared and the examination held with as little deviation as possible from the original date assigned. Students are required to abide by any such revised arrangements.

l. The student should collect an Examination Card from the Examinations section of the UWI in his/her respective campus territory, or from the SOCS in their country of residence at least two weeks before the start of the examination period. A student who has not received this Examination Card within ten days of the date of their first examination should contact the EPA Office immediately.

m. If the performance of a student in any part of any examination is likely to have been affected by factors of which the examiners have no knowledge, the student may report the circumstances in writing to the Campus Registrar. If the student decides to report such circumstances, he must do so within seven days of that part of the examination which, may have been affected.

n. The Campus Registrar may pass the information to the Chairperson of the Board of Examiners if in his opinion it is likely to assist the examiners in the performance of their duties. Boards of Examiners shall not take cognisance of illness or other circumstances which, have not been referred to them by the Campus Registrar.

1. Students are required to supply themselves with pens, pencils, rulers, erasers, and the usual geometrical instruments. No books, paper, printed or written document or pictures or any unauthorised aid may be taken into or be received in an examination room by any student, except as specifically permitted and stated in the rubric of the question paper.

2. Silent, cordless, non-programmable electronic calculators may be used in examination rooms where examiners so decide, provided that this is stated in the rubric of the examination paper.

o. Students are required to deposit all unauthorised material including bags, briefcases, folders, clipboards and notebooks at the place provided for this purpose before the start of each examination. Where a student fails to comply with this Regulation a report shall be made to the Campus Registrar who shall report the matter to the Chairperson, Campus Committee for Graduate Studies and Research.

p. A student must not directly or indirectly give assistance to any other student, or permit any other student to copy from or otherwise use his/her papers.

q. A student must not directly or indirectly accept assistance from any other student or use any other student's papers.

(i) If any student is suspected of cheating, the circumstances shall be reported in writing to the Campus Registrar who shall refer the matter to the Chairperson Campus Committee for Graduate Studies and Research. If the Chairperson so decides, the Committee shall invite the student for interview and shall conduct an investigation. If the student is found guilty of cheating or of attempting to cheat, the Committee shall disqualify the student from the examination and may, subject to the student's right of appeal to the Senate, exclude him from all further examinations of the University. If the student fails to attend and does not offer a satisfactory excuse, the Committee may hear the case in the student's absence. The Campus Committee for Graduate Studies and Research, in dealing with such cases, shall proceed as described in the University Examination Regulations for First Degrees, Diplomas and Certificates.

(ii) An Appeal Committee of Senate shall hear appeals against decisions of Campus Committees for Graduate Studies and Research. Such an Appeal Committee may uphold or reverse the decision and may vary the penalty in either direction within the limits prescribed in (i) above.
Every script shall bear the student's index/identification number but not his/her name.

The University reserves the right to require students to remain within the examination hall or its precincts for the duration of the relevant paper, and to retain the question papers of candidates.

11. NOTIFICATION OF RESULTS AND AWARD OF CERTIFICATES:
(a) The results of the examinations for the Postgraduate Diploma and MSc will be published annually, and an individual notification of grades will be sent to each student at the same time.
(b) A certificate for the Postgraduate Diploma or the MSc Degree, under the seal of the University, will be delivered to each student who is awarded a Postgraduate Diploma or MSc Degree respectively.
(c) The University reserves the right to withhold the results of any student not in good financial standing, up to the time of release of examination results.

12. REVIEW OF EXAMINATION RESULTS
(a) A student who is dissatisfied with the results of an examination, may inform the Campus Registrar no later than two weeks after the date of mailing of the results that he/she wishes to have his/her script re-marked and pay a fee of US$50.00 to have the script re-marked by a new examiner.
(b) Where the re-marking of a script (as in (a) above) results in a higher mark than that previously recorded, the fee shall be refunded provided that the increased mark results in a change of grade.
(c) The Campus Registrar shall inform the candidate of the result of the re-marking.

13. COURSE FEES AND REFUNDS:
(a) In order to register for the Postgraduate Diploma or MSc, students are required to pay an initial registration fee of US$ 700 or US$ 1000 respectively, which is valid for a period of four or six years respectively.
(b) In addition students are also required to pay a fee of US$ 900 for each course of study taken in a particular year.
(c) Alternatively, Postgraduate Diploma students may make a single payment of US$ 4300 covering the registration fee and the fees for the four courses required for the award of the Postgraduate Diploma. While MSc students may make a single payment of US$ 7300 covering the registration fee and the fees for the seven courses required for the award of the degree.
(d) Fees are to be paid by certified cheque or bankers draft made payable to “University of the West Indies - EPA” and should be sent by registered mail to the External Programme in Agriculture, Office of the Dean, Faculty of Science and Agriculture, University of the West Indies, St. Augustine, Trinidad.
(e) Sponsors may pay fees. In such cases, a letter of undertaking is required from the sponsoring body in order that the student may be registered.

14. REPEAT EXAMINATION
(a) A student who enters an examination on a second occasion having failed on the first occasion, must pay a repeat examination fee of US$120 for one paper; US$180 for two papers and US$245 for three papers. If the student wishes, further tutorial guidance on assignments is available for an additional US$145 for each course. The deadline for payment of an examination re-entry fee shall be the date of the examination to be re-taken.

15. TRANSFER OF REGISTRATION
(a) When a student's registration is transferred from the Diploma to the MSc Degree, the following fees shall be payable:
   • the difference between the two registration fees: - US$300
   • the relevant course fees.

16. REFUNDS
Registration and course fees shall not be refunded except as provided below:

In the event of cancellation of registration by a student, the following schedule of refunds shall apply:
• Half of the Programme registration fee provided that cancellation has been applied for within one year of the initial registration;
• US$130 for each course registered for in the year in which the cancellation of registration is sought;
• The full course fees for all courses for which the student has already paid but has not yet received materials.

In exceptional circumstances and in accordance with the principles above, the registration and course fees already remitted may be refunded at the discretion of the Dean, Faculty of Science and Agriculture provided that such medical or other evidence is submitted as may be required.

Refunds consequent upon an amendment to a student's original notification of courses to be taken in a particular year shall be at the discretion of the Dean, Faculty of Science and Agriculture.

The University reserves the right to change the fee structure. In such cases, students will be given notice prior to the implementation of such adjustment.

INTERPRETATION OF THESE REGULATIONS
On all matters concerning the interpretation of these Regulations, or on which they are silent, the decision of the UWI shall be final.
COURSE DESCRIPTIONS

COURSE CODE: AGPD 6000
COURSE TITLE: RESEARCH METHODS AND DATA ANALYSIS
NUMBER OF CREDITS: 6
COURSE DESCRIPTION: This course covers two main areas of interest to students of developing countries, one focusing on research methods, the other concerned with statistical techniques relevant to social scientists. The first part introduces the student to the nature and role of research in developing countries, including how to identify and formulate research problems, as well as the use of secondary information. In addition, a variety of research and data collection methods are explored, emphasising both qualitative and quantitative approaches. The second part of the course, which begins with an examination of formal sampling design and methods, focuses on techniques of data analysis, including hypothesis testing, measures of association and correlation, and an introduction to regression analysis.
Assessment:
Final examination 100%

COURSE CODE: AGPD 6001
COURSE TITLE: AGRICULTURAL ECONOMICS FOR DEVELOPMENT
NUMBER OF CREDITS: 6
COURSE DESCRIPTION: This course is one that students are strongly recommended to take in their first year. The first part of the course covers production economics, including production functions and technical change. The second part focuses on supply and demand, including the analysis of market structures. The third part deals with welfare economics, and introduces the analysis of international trade in agricultural commodities, and of food and agricultural policy.
Assessment:
Final examination 100%

COURSE CODE: AGPD 6002
COURSE TITLE: MANAGING AGRICULTURAL DEVELOPMENT
NUMBER OF CREDITS: 6
COURSE DESCRIPTION: This course examines the main theoretical approaches used to study organisations and management, and demonstrates where and how these are relevant to agricultural development. It investigates management practices in different activities concerned with agricultural development, and discusses how management may be improved or reformed. Part one examines the structure and behaviour of organisations and the main tasks of management, while Part two looks at these tasks in more detail and questions the applicability of management theory. Part three is concerned with the application of management theory and practice in relation to specific areas of activity, while Part four considers the current issues in reforming and improving the management of agricultural development.
Assessment:
Final examination 100%

COURSE CODE: AGPD 6003
COURSE TITLE: AGRICULTURAL POLICY ANALYSIS
NUMBER OF CREDITS: 6
COURSE DESCRIPTION: This course focuses is concerned with policy in the agriculture and food sectors of developing countries. The first part introduces agricultural policy analysis and incorporates a case study of a country undergoing economic reforms. The second part examines macroeconomic influences on the agricultural sector, with consideration of expenditure revenue, monetary, balance of payments and exchange rate issues. The third part is concerned with trade, agricultural and food sector policies. Part four deals with policy analysis techniques. Finally, Part five covers issues in policy reform in the agricultural and food sectors including adjustment programmes, theory and evidence on the economic and social effects of adjustment and problems in the transition of the formerly centrally planned economies.
Assessment:
Final examination 100%

COURSE CODE: AGPD 6004
COURSE TITLE: BUSINESS MANAGEMENT FOR AGRICULTURAL ENTERPRISES
NUMBER OF CREDITS: 6
COURSE DESCRIPTION: This course is concerned with the rationale and methods of business management as used in agricultural enterprises, with the main emphasis on the principles and practice of financial management and planning. Part one of the course focuses on the process of business organisation and management, and Part two is concerned with the various types of financial accounting. Part three demonstrates methods of budget construction and explains the role of budgetary control, while Part four is concerned with procedures for optimising resource use within agricultural businesses, and the role of operations research.
Assessment:
Final examination 100%
COURSE CODE: AGPD 6005
COURSE TITLE: PROJECT PLANNING, MONITORING AND EVALUATION
NUMBER OF CREDITS: 6
COURSE DESCRIPTION: This course considers the planning and management of public investment in the agricultural sector. It teaches economic concepts for project identification, preparation and appraisal and the methodologies of logical framework, and financial and economic cost benefit analysis. Detailed financial analysis from the viewpoint of the farmer, project organisation and government is explained. Exercises are used at each stage to reinforce understanding of techniques. Social and environmental issues in planning are identified and approaches for their more effective integration into project appraisal reviewed. The course also provides guidelines for the design and management of project monitoring and evaluation, essential activities for effective project monitoring and implementation and the project cycle. It concludes by assessing the relation of agricultural projects to their wider macroeconomic and policy context.
Assessment:
Final examination 100%

COURSE CODE: AGPD 6006
COURSE TITLE: THE SOCIOLOGY OF AGRARIAN TRANSFORMATION AND RURAL DEVELOPMENT
NUMBER OF CREDITS: 6
COURSE DESCRIPTION: Is a new course about the sociology of development within agrarian and rural societies. The course is divided into six parts. The first and second parts introduce the basic sociological concepts and definitions and discuss various theoretical perspectives on development, particularly those that are more relevant to developing societies. Part three gives a historical overview of agriculture and rural development, followed by Part four, which identifies the historical and contemporary approaches, models and strategies for development for agrarian/rural communities. The next section describes the socio-cultural and economic profiles of rural people and communities. The course concludes with part six, which address policy issues important for future agriculture and/or rural development particularly the generation and transfer of appropriate technologies, nutrition and food security, credit, marketing and trade agreements
Assessment:
Final examination 100%

COURSE CODE: AGPD 6007
COURSE TITLE: FINANCE INVESTMENT AND CREDITS FOR AGRIBUSINESS AND RURAL DEVELOPMENT
NUMBER OF CREDITS: 6
COURSE DESCRIPTION: This new course was designed to meet the need for training by bankers and rural development personnel in the areas of business, finance, credit and investment. The course provides a general background to financial management and relevant institutions servicing the rural community. Sections on financial management of the farm business and financial planning discuss issues on land control, estate management, valuation of stocks, shares and debt financing. The latter sections develop the area of credit management, commercial credit, asset valuation and inflation accounting issues. The course concludes with section on capital investment appraisals and planning, monitoring and evaluation of development projects.
Assessment:
Final examination 100%

COURSE CODE: AGPD 6500
COURSE TITLE: ECONOMICS OF WATER RESOURCES
NUMBER OF CREDITS: 6
COURSE DESCRIPTION: This course focuses on how economic concepts can be used to inform policy decisions regarding the use of surface and groundwater in developing economies. The first part of the course reviews recent and current trends in the water sector both globally and regionally, exploring in detail the reasons for its increasing scarcity. In Part two, a framework, within which a number of policy approaches are explained, is developed allowing the assessment of alternative policy responses to a given situation. The third part of the course considers the possibilities for improving irrigation system performance by examining the relative advantage of agency and farmer management. Finally, the political and social dimensions of water use at project, sectoral and international levels are discussed.
Assessment:
Final examination 100%

COURSE CODE: AGPD 6501
COURSE TITLE: AGRICULTURAL AND FOOD MARKETING IN DEVELOPING COUNTRIES
NUMBER OF CREDITS: 6
COURSE DESCRIPTION: This course explores the various activities involved in the marketing of agricultural and food products. Two main approaches are followed. The first concerns the analysis of markets from an economic perspective. After defining the subject matter and its relationship to economic development, a framework for the economic analysis of markets is developed, together with analytical methods for assessing market system performance. These are elaborated with reference to case studies of performance analysis and an exploration of policy issues. The second approach focuses on the adoption of a business orientation to marketing. The introduction to key concepts of marketing management such as marketing research and market strategies and planning, is followed by case studies which explore the practice of marketing management by different institutional types.
Assessment:
Final examination 100%
COURSE CODE: AGPD 6502
COURSE TITLE: LAND DEGRADATION AND SUSTAINABILITY
NUMBER OF CREDITS: 6
COURSE DESCRIPTION: This course sets out to explain the wide variety of ways in which the productive capacity of land is being reduced. It critically reviews the mechanical and biological means by which land degradation might be controlled and sometimes reversed. It suggests longer term changes in land use and management, by which agriculture and forestry may continue more or less indefinitely. The overall context in which this takes place is that of human societies and ideologies within which conservation and the sustainable use of land has to be achieved. The course is extensively illustrated with case study materials.
Assessment:
Final examination 100%

COURSE CODE: AGPD 6503
COURSE TITLE: GENDER ISSUES IN AGRARIAN AND ENVIRONMENTAL CHANGE
NUMBER OF CREDITS: 6
COURSE DESCRIPTION: This course demonstrates the importance of understanding the interrelationships between gender relations and environmental and agrarian change. It focuses on the ways in which the outcomes of development programmes are affected by gender relations and, in turn, the ways in which development programmes themselves affect and change the roles and responsibilities of men and women. The first module of the course provides an introduction by looking at the extent to which women's work is often ignored or undervalued in agrarian and environmental development. The second module focuses on issues of policy and practice, looking critically at the ways in which gender analysis has been incorporated into environmental and agrarian policy, and including practical frameworks for gender analysis. The third module looks at gender analysis and practice in specific sectors and the final section is concerned with research and needs analysis methods for gender issues.
Assessment:
Final examination 100%

COURSE CODE: AGPD 6504
COURSE TITLE: APPLIED ECONOMETRICS FOR AGRICULTURAL AND FOOD SECTOR
NUMBER OF CREDITS: 6
COURSE DESCRIPTION: This course is concerned with the application of econometric methods to the estimation and testing of the unknown parameters of economic relationships. Priority is given to both the statistical reasoning underlying the methodology and the practical considerations involved in using this methodology with a variety of models and real data. The focus of the course is on the classical linear regression model, and the content spans the principles of regression analysis and its statistical foundations; simple and multiple regression models; non-classical disturbances; dynamic modelling and aspects of model specification. A feature of the course is the practical exercises designed to reinforce each stage of the learning. For this purpose, the Microsoft software package is provided together with detailed, step by step guides to assist students in its use.
Assessment:
Final examination 100%

COURSE CODE: AGPD 6505
COURSE TITLE: CROP PRODUCTION FOR DEVELOPMENT
NUMBER OF CREDITS: 6
COURSE DESCRIPTION: Is a new course written to complement the revised course on Livestock Development. The first section describes the importance of specific tropical crops in terms of production, trade and production systems as well as the factors, which contributed to their development and the crop's development process. The second section discusses the economic, policy, social and technical factors which determine the potential for crop development and provide guidelines for the design of appropriate production systems. The final section addresses issues on the sustainability of cropping systems and consideration for consumer health.
Assessment:
Final examination 100%

COURSE CODE: AGPD 6506
COURSE TITLE: LIVESTOCK DEVELOPMENT FOR SMALL STATES
NUMBER OF CREDITS: 6
COURSE DESCRIPTION: The Course on Livestock Development has been completely rewritten to include issues specifically related to small states and the recent advances in livestock development. The specific needs of small states have been highlighted. The livestock industry in small states is explored including the role, functions and production systems of traditional livestock. A new section on the role and potential of non-traditional livestock has been included. The next section discusses the factors affecting livestock development including economic and financial issues and their relationship between trade (local and international) and the stakeholders in the industry. The course concludes with a module on the approaches to livestock development for small states beyond the year 2000, by linking the units with each of the step suggested for developing the strategies.
Assessment:
Final examination 100%

COURSE CODE: AGPD 6507
COURSE TITLE: RESEARCH PROJECT
NUMBER OF CREDITS: 6
COURSE DESCRIPTION: For the research project, students will be expected to illustrate their ability to apply research and problem-solving techniques to the analysis of a problem in their workplace or country of residence. This exercise should draw upon previous knowledge and experience gained in the courses completed in the MSc degree Programme. In addition to local supervision, provision is made for limited travel of campus-based project supervisors to the location of both the project and the candidate for discussions related to the student's work.
Assessment:
Final examination 100%
SCHOOL OF SCIENCE

The School of Science offers training at the graduate level in the Life and Physical Sciences with a wide range of practical and business applications from Environmental and Natural Resources Management to Information Technology, Computational Mathematics, Material Science, Molecular Biology, Alternate Energy, Medical Physics and Natural Products to name a few. A number of these programmes are multidisciplinary in nature and are done in conjunction with other Departments/Faculties. This training allows students to acquire the range of marketable skills essential in the light of globalisation. The School currently offers postgraduate programmes in the following areas:

POSTGRADUATE DIPLOMA:
- Science and Management of Tropical Biodiversity (available only to continuing students)
- Biodiversity Conservation and Sustainable Development in the Caribbean

MASTER OF SCIENCE (MSC) DEGREES:
- Computer Science
- Mathematics
- Statistics
- Occupational and Environmental Safety and Health
- Science and Management of Tropical Biodiversity (available only to continuing students)
- Biodiversity Conservation and Sustainable Development in the Caribbean

MASTER OF PHILOSOPHY (MPHIL) AND DOCTOR OF PHILOSOPHY (PHD) DEGREES:
- Biochemistry
- Chemistry
- Computer Science
- Environmental Biology
- Mathematics
- Microbiology
- Physics
- Plant Science
- Zoology

DEPARTMENT OF CHEMISTRY

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PROGRAMMES:
MSc/ MPhil/PhD
The Department of Chemistry offers one taught Master's programme leading to the MSc in Occupational and Environmental Health and Safety as well as MPhil and PhD degrees by research in the areas of Natural Products, Inorganic and Materials Chemistry, Liquid Crystals, Environmental Chemistry and Waste Management, Bioanalytical Chemistry, Nuclear Magnetic and Nuclear Quadrupole Resonance Spectroscopy, Supramolecular Chemistry, Organic Synthesis, Microcalorimetric studies on Biological Systems; Corrosion Chemistry and Chemical Education.

Students may register on a part-time or full-time basis. The Board for Graduate Studies and Research offers a limited number of scholarships to students of the highest academic standing registering for MPhil/ PhD. Some Departmental funding, in the form of full-time demonstratorships, is available for registered MPhil/ PhD students not on scholarship.

RESEARCH INTERESTS
Topics which are currently being actively investigated by staff include:

- isolation and structure elucidation of Natural Products from terrestrial plants and marine organisms including synthesis and bioactivity testing;
- optical, electronic, magnetic and catalytic properties of organometallic complexes;
- solar cell materials;
- perfluorated phosphine based catalysts;
- rational design and construction of supramolecular assemblies;
- environmental monitoring and hazardous waste management and disposal;
- food safety;
- biosensors for environmental clinical and forensic applications;
- applications of immobilised enzymes and biomolecules, bioseparation processes;
- nuclear magnetic and quadrupole resonance studies of dynamic equilibria;
- calorimetric studies on biological systems;
- the preparation of carbohydrates and novel boron-based catalysts for organic synthesis;
- hydration processes in cement admixtures;
- investigation of aggregate structures in biological membrane models;
- virgin and waste polymer cracking in a fluidised-bed reactor;
- synthesis of chiral ligands based on the [2.2] paracyclophane framework for use in chiral synthesis;
- microbial degradation and fate of xenobiotics in environmental systems;
- air quality monitoring endocrine disruptors in freshwater systems;
- corrosion chemistry;
- electroanalytical methods;
- carbohydrate synthesis;
- biological/biophysical chemistry;
- oxidation of methane;
- peptide chemistry;
- enzymes in ionic liquids;
- thermotropic phase behaviour of metal containing liquid crystal compounds;
- chemical education - assessment teaching and curriculum development.
FACILITIES:
The Department is well equipped with laboratory space, computer facilities, and instrumentation to support research programmes. Instruments include:
- Gas, Liquid and Droplet Countercurrent Chromatographs;
- Setaram Modular TGA/DSC/DTA/TMA (up to 1700°C);
- Setaram micro DSC III microcalorimeter (with batch and continuous flow cells, heat capacity and flow mix cells);
- Two (2) Gamry high sensitivity modular electrochemical workstations for electrochemical and corrosion measurements;
- Home-constructed Taylor-Aris equipment for diffusion measurements;
- Inert Atmosphere Glove Box;
- Bruker 300, 400 and 600 (cryoprobe) NMR spectrometers;
- FTIR (ATR), Diode-Array, and UV-VIS Spectrometers;
- Nuclear Quadrupole Double Resonance Spectrometer;
- GC- and LC-/Electron spray ionisation (ESI)-Time of Flight Mass Spectrometers;
- Rapid Stopped-flow Kinetic Spectrometer
- Perkin-Elmer Fluorescence Spectrometer
- Perkin-Elmer Inductively Coupled Plasma Mass Spectrometer
- Jasco Model J-720 Spectropolarimeter;
- Veeco Multimode V Atomic Force Microscope/Scanning Electrochemical Microscope
- Linux cluster parallel supercomputer with GROMACS and GAUSSIAN and computational software
- KSV Langmuir-Blodgett apparatus

MSC IN OCCUPATIONAL AND ENVIRONMENTAL SAFETY AND HEALTH (OESH)

Recent developments in areas such as legislation, global trade, rapidly changing technology, have placed new expectations and demands of occupational and environmental safety and health on governments, environmental management, business enterprises, educational institutions, trade unions, workers and the public. Within this scenario, there is urgent and growing need for the development of a cadre of professionals with competencies in Occupational and Environmental Safety and Health (OESH). Developed in 2005 in Mona, Jamaica, UWI’s OESH Programme addresses the growing requirement for all employers, managers, supervisors, policy makers and public leaders to have a functional awareness of the key issues related to environmental and occupational safety and health. The Master of Science in Occupational and Environmental Safety and Health commenced at the St. Augustine campus in September 2009.

OBJECTIVES
The Master’s Programme is designed to prepare persons to function in key areas such as:
- Enforcement - to ensure compliance, research and development, training, organisational systems and practice, policy and standards development.

Graduates would be able to develop, design, implement and manage complex OESH programmes and systems and to provide consultancy services and to educate others.

ENTRY REQUIREMENTS
Applicants must have either a First Degree or its equivalent in basic or applied sciences; candidates with any other bachelor’s degree or equivalent with suitable work experience will also be considered.

DELIVERY MODE
Intense, modular face-to-face sessions conducted on weekends and holidays, a few weekdays (when foreign lecturers are involved) and agreed evenings. Full-time practitioners in the OESH field are especially encouraged to apply.

The programme will be delivered by international, regional and local lecturers.

COURSE OF STUDY
For the MSc in OESH, students are required to complete 34 credits of core courses and a research project of 9 credits as outlined below. Each 4 credit course consists of 48 hours of lectures and field visits and/or laboratory work where applicable. Full-time students will normally require 18 months and part-time students three years to complete the programme requirements. The full-time programme will normally consists of two semesters of coursework and examinations followed by the research project while the part-time programme involves four semesters of coursework and examinations followed by the research project.
COURSE EVALUATION
This involves coursework, in-course tests and a three (3) hour written examination paper at the end of each semester.

Year I
Semester 1 (17 Credits)
Course Code Course Title Credits
OESH 6100 Advanced Environmental Health 4
OESH 6200 Advanced Occupational Safety and Health 4
OESH 6000 OESH and Public Policy 4
OESH 6600 Independent Study and Research Method 4
OESH 6300 Seminar 1

Semester 2 (17 Credits)
Course Code Course Title Credits
OESH 6030 Advanced Topics in OESH: OESH Disorders 4
OESH 6010 Advanced Topics in OESH: Measurement methods and Ventilation 4
OESH 6040 Advanced OESH Management Systems 4
OESH 6050 Advanced Topics in OESH: Ergonomics 4
OESH 6300 Seminar 1

Year II
Course Code Course Title Credits
OESH 6700 Research Project 9

COURSE DESCRIPTIONS

SEMESTER: 1
COURSE CODE: OESH 6000
COURSE TITLE: OESH AND PUBLIC POLICY
NUMBER OF CREDITS: 4
COURSE DESCRIPTION: Understanding of the complex, dynamic and delicate relationship between business pursuits, public interests and public policy. For example, fundamentals of public policy-definition, goals and objectives of public policies (regulations, legislation). People, policy agenda, policy institutions, policy formulations, policy implementation and evaluation
Assessment:
Coursework and in-course tests 50%
Final Examination One 2 hour written paper 50%

SEMESTER: 2
COURSE CODE: OESH 6010
COURSE TITLE: ADVANCED TOPICS IN OESH: MEASUREMENT METHODS AND VENTILATION
NUMBER OF CREDITS: 4
COURSE DESCRIPTION: Respiratory system; Dermal exposure; Threshold limit vales and permissible exposure limits; Instruments/equipment used in OESH, including outdoor indoor (air, dust), workplace (air, skin), source emission (both stationary and mobile sources) and noise pollution measuring techniques, in both real-time and with time-integration; Environmental and personal exposure measurements; Calibration, service and preventive maintenance; Survey preparations and performance; Field and Laboratory Analytical Methods practices; Laboratory accreditation; Certification of analysts (biological, chemical and physical measurements); General principles of ventilation, including principles of air flow, duct losses, acceleration of air and hood losses and exhaust systems; Dilution ventilation principles including dilution ventilation for; health, fire and explosion and mixtures; Exhaust Hoods- capture velocity, worker position effect and hood design factors; Air cleaning devices; Principles of exhaust system design; Acute heat disorders.
Assessment:
Coursework Personal and area sampling in the field, written reports: 50%
Final Examination One 3 hour written paper 50%

SEMESTER: 2
COURSE CODE: OESH 6030
COURSE TITLE: ADVANCED TOPICS IN OESH: OESH DISORDERS
NUMBER OF CREDITS: 4
COURSE DESCRIPTION: Understanding of advanced concepts of occupational safety and hygiene. For example, Chemical hazards in industries; Hazardous substances in industries and their target organs; Respiratory disorders - pneumoconiosis; chronic obstructive pulmonary disease; Occupational Illness vs. Work-Related; HIV/AIDS as a work place issue; ILO Code of Practice on HIV/AIDS and the world of work; Policy and legislation for impacting HIV/AIDS in the workplace; ILO Conventions (Health and Safety).
Assessment:
Course work Written reports 50%
Final Examination One 3 hour written paper 50%

SEMESTER: 2
COURSE CODE: OESH 6040
COURSE TITLE: ADVANCED OESH MANAGEMENT SYSTEM
NUMBER OF CREDITS: 4
COURSE DESCRIPTION: Advanced exposure Assessment techniques, including self Assessment of exposure; Exposure Assessment strategies and models, such as control banding; Delivery of occupational and environmental health services; Global warming and trans-boundary pollution transport; Hazardous waste management; Management of air quality and water resources; Basic land-use planning; Occupational and environmental audit systems; Disaster management.
Assessment:
Course work, Laboratory reports and in-course tests 50%
Final Examination One 2 hour written paper 50%
SEMESTER: 2
COURSE CODE: OESH 6050
COURSE TITLE: ADVANCED TOPICS IN OESH: ERGONOMICS
NUMBER OF CREDITS: 4
COURSE DESCRIPTION: Advanced understanding of Ergonomics. For example, Work-Related Musculoskeletal Disorders; Evaluating Ergonomic Risk Factors; Application of Ergonomics to design of work space and tools; Office Ergonomics.
Assessment:
Coursework In course test and field work 50%
Final Examination One 3 hour written paper 50%

SEMESTER: 1
COURSE CODE: OESH 6100
COURSE TITLE: ADVANCED ENVIRONMENTAL HEALTH
NUMBER OF CREDITS: 4
COURSE DESCRIPTION: Advanced understanding of concepts and issues of environmental health. For example, Environmental toxicology and risk assessment; Population dynamics and geographical information systems; Environmental hazards; Indoor air quality; Ambient air quality; Soil pollution; Water pollution; Sanitation and wastewater treatment; Solid waste disposal and mining pollution; Solid waste disposal; Environmental noise; Emissions control technologies for air; Environmental auditing and impact assessments; Environmental impact of tourism; National and regional guidelines, standards and regulations; International guidelines, standards and regulations
Assessment:
Coursework Laboratory and field studies 50%
Final Examination One 2 hour written paper 50%

SEMESTER: 1
COURSE CODE: OESH 6200
COURSE TITLE: ADVANCED OCCUPATIONAL SAFETY AND HEALTH
NUMBER OF CREDITS: 4
COURSE DESCRIPTION: Develop a deep understanding of advanced concepts of occupational safety and hygiene. For example, OSH professionals and the resources available to assist them; contemporary methods of toxicology and risk assessment of workplace hazards; contemporary issues on chemical hazards in the workplace; measurement of chemical hazards in the workplace; measurement of physical hazards in the workplace; ergonomics; occupational epidemiology; national and regional guidelines, standards and regulations International guidelines, standards and regulations
Assessment:
Coursework Laboratory 20%
Field survey and report 30%
Final Examination One 2 hour written paper 50%

SEMESTER: 1 AND 2
COURSE CODE: OESH 6300
COURSE TITLE: SEMINAR
NUMBER OF CREDITS: 1
COURSE DESCRIPTION: Students will attend seminars or technical presentation once a week and will be required to prepare and make presentations once per semester.

SEMESTER: 1
COURSE CODE: OESH 6600
COURSE TITLE: INDEPENDENT STUDY AND RESEARCH METHODS IN OESH
NUMBER OF CREDITS: 4
COURSE DESCRIPTION: OESH area to be chosen in consultation with a supervisor; study must be on current issues and phenomena in OESH and is designed to prepare students for a productive research Project. Learning activities include: Critical and extensive literature review, use of library and electronic sources of information; Definition of a research question; Research goals and objectives, anticipated results of study and their significance; Research methodologies and ethics, including instrumentation where applicable; Results and their interpretation, discussion and conclusions; literature cited.
Assessment:
Coursework Laboratory reports and in-course tests 50%
One research paper 50%

SEMESTER: 1
COURSE CODE: OESH 6700
COURSE TITLE: RESEARCH PROJECT
NUMBER OF CREDITS: 9
COURSE DESCRIPTION: This involves an independent research programme supervised by academic staff members. OESH areas are to be chosen in consultation with a supervisor; study must be on current issues and phenomena in OESH; project designed to prepare students for productive research.
POSTGRADUATE RESEARCH PROGRAMME

Every MPhil/PhD student is required to pursue a minimum of two 4 credit courses. One of these is a general course for all students called Introduction to Research Techniques in Chemistry (CHEM 6560) and the other course is one in the student’s area of interest. In addition, each MPhil or PhD student is required to register for graduate research seminars two for the MPhil (GRSM 7001 and GRSM 7002) and three for the PhD (GRSM 8001, GRSM 8002 and GRSM 8003).

The list of courses (4 credits each) offered by Chemistry Department for MPhil/PhD students:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 6160</td>
<td>Metal - Organic Chemistry</td>
</tr>
<tr>
<td>CHEM 6161</td>
<td>Physico-Chemical Properties of Inorganic Complexes</td>
</tr>
<tr>
<td>CHEM 6260</td>
<td>Advanced Topics in Spectroscopy and Organic Synthesis</td>
</tr>
<tr>
<td>CHEM 6460</td>
<td>Advanced Topics in Analytical Chemistry</td>
</tr>
<tr>
<td>CHEM 6461</td>
<td>Advanced Topics in Bio-analytical Chemistry</td>
</tr>
<tr>
<td>CHEM 6560</td>
<td>Introduction to Research Techniques in Chemistry</td>
</tr>
<tr>
<td>CHEM 6561</td>
<td>Advanced Topics in Environmental Chemistry</td>
</tr>
<tr>
<td>CHEM 6562</td>
<td>Advanced Topics in Polymer Chemistry</td>
</tr>
</tbody>
</table>

COURSE DESCRIPTIONS:

**SEMESTER: 1 AND/OR 2**
**COURSE CODE: CHEM 6160**
**COURSE TITLE: METAL-ORGANIC CHEMISTRY**
**NUMBER OF CREDITS: 4**
**COURSE DESCRIPTION:** Transition metal coordination complexes and their structural motifs; Transition metal mediated organic transformations: Stotichiometric reagents; Catalysts; Carbon-hydrogen bond activation; Training in the use of the NMR Spectrometer: Running of $^{1}P$, $^{1}H$, $^{13}C$ and $^{19}F$ NMR spectra; NMR Spectroscopy in Inorganic Chemistry: Structure Determination of Organometallic Compounds (using NMR and other techniques); Elucidation of Fluxional processes using NMR

**Assessment:**
Coursework 100%

**SEMESTER: 1 AND/OR 2**
**COURSE CODE: CHEM 6161**
**COURSE TITLE: PHYSICO-CHEMICAL PROPERTIES OF INORGANIC COMPLEXES**
**NUMBER OF CREDITS: 4**
**COURSE DESCRIPTION:** Magnetochemistry of Inorganic complexes; the use and applications of nuclear magnetic resonance (NMR) spectroscopy in Inorganic Chemistry; the uses and applications of electronic spectroscopy in Inorganic Chemistry; the uses and applications of fluorescence spectroscopy.

**Assessment:**
Coursework 100%
COURSE CODE: CHEM 6560
COURSE TITLE: RESEARCH TECHNIQUES IN CHEMISTRY
NUMBER OF CREDITS: 4
COURSE DESCRIPTION: Chemical Information Sources and Information retrieval; Format and Style of a Report - ACS Style; Operation of basic chemical instrumentation (IR, UV, Polarimeter, NMR, GC and HPLC etc.); Selected Practical Techniques for the Chemistry; Computers in Chemistry - Chemical drawing and modelling package - spreadsheet package, word processing - basic computer literacy, operating in the Windows environment; Statistical concepts and experiment design; Data treatment; Selected Practical Techniques: Inert atmosphere techniques, purification of solvents and reagents, Analysis of alkyl lithium and organomagnesium, vacuum distillation, cooling baths, crystallization techniques, chromatography: tic, column and HPLC, liq-iiq extraction, sublimation, special reaction techniques: liq Ammonia reactions, hydrogenation, ozonolysis etc.
Assessment:
Coursework 100%

SEMESTER: 1 AND/OR 2
COURSE CODE: CHEM 6561
COURSE TITLE: ADVANCED TOPICS IN ENVIRONMENTAL CHEMISTRY
NUMBER OF CREDITS: 4
COURSE DESCRIPTION: Introduction to the environment; energy and cycles of energy; matter and cycles of matter; human impact and pollution; analytical techniques in environmental chemistry
Assessment:
Coursework Essays, seminar presentations 40%
Written exam One 3 hour written paper 60%

SEMESTER: 1 AND/OR 2
COURSE CODE: CHEM 6562
COURSE TITLE: ADVANCED TOPICS IN POLYMER CHEMISTRY
NUMBER OF CREDITS: 4
COURSE DESCRIPTION: Conducting Polymers, electroactive polymers, sol gel and hydrogels; Analytical application of conducting and electroactive and non-conducting polymers.
Assessment:
Course Work 60%
Final Examination One 3 hour written paper 40%
RESEARCH INTERESTS AND FACILITIES

The Department of Computing and Information Technology offers MSc Degrees in Computer Science. The Department also offers programmes leading to the MPhil and PhD degrees. The MSc degree is awarded on the basis of taught courses and a research project.

The MPhil and PhD are research degrees awarded on the submission and successful defence of a thesis. Each MPhil/PhD student must do a minimum of 8/9 credits at graduate level, as recommended by his/her Supervisor. Interested applicants should consult the Head of the Department concerning available research facilities.

Transfer from the MPhil to the PhD degree programme is possible but depends on the progress of the research undertaken and the recommendation of the supervisor and the approval of the Board for Higher Degrees.

The main research areas in Computer Science are Distributed Computing, Networking, Artificial Intelligence, Neural Networks, Database Systems, Internet Technologies, Object-Oriented Systems, Information Visualization, Programming Aptitude, Teaching Music for the Pan, Advanced Learning Technologies.

POSTGRADUATE COURSES

MSC DEGREE IN COMPUTER SCIENCE

OBJECTIVES

To develop a comprehensive and advanced knowledge of Computer Science thereby enabling graduates to perform more effectively in the work place as well as enhance their research capability.

PROGRAMME CO-ORDINATOR - DR. MARGARET BERNARD

Entry Requirements

To be admitted to this programme a candidate should possess a BSc degree in Computer Science or a major in Computer Science or equivalent (minimum GPA 2.0) with a minimum average of B+ (3.0) in any two (2) of the following courses or equivalent.

Course Code  Course Title
COMP 2000  Data Structures
COMP 2500  Object-Oriented Programming
COMP 3000  Design and Analysis of Algorithms
COMP 3100  Operating Systems

Candidates without the above may be considered for entry upon successful completion of qualifying courses.
Examination
Students will be required to pass both the coursework and the written examination. The pass mark is 50%. The grading scheme for graduate degrees is as follows: A 70 - 100%; B+ 60-69%; B 50-59%. In the case of the Research Project, evaluation will be based on the project report.

Award of Degree
To qualify for the award of the degree, candidates must pass all four core courses, four/five elective courses and the Research Project. The degree shall be awarded in two categories - Distinction and Pass. For the award of the degree with distinction, the candidate must have obtained an average mark of 70% or more across all core courses and elective courses as well as 70% or more in the Research Project. A Candidate failing a course shall be ineligible for the award of distinction.

PRIZES
The Microsoft Trinidad & Tobago prize is awarded to the candidate with the best MSc Research Project in Computer Science.

Course of Study
For the MSc programme in Computer Science, students are required to complete 4 core courses and 4/5 elective courses, as follows:

Either
4 elective courses and an 8-credit Research Project (COMP 6000)

OR
5 elective courses and a 4-credit Research Project (COMP 6001)

Full-time students will normally require a minimum of 3 semesters to complete the programme requirements. Part-time students will normally require a minimum of 5 semesters.

CORE COURSES (4 CREDITS EACH)
Course Code | Title
--- | ---
COMP 6150 | Distributed Systems
COMP 6300 | Advanced Internet Technologies
COMP 6400 | Design and Analysis of Algorithms
COMP 6450 | Object-Oriented Design and Programming

ELECTIVE COURSES (4 CREDITS EACH)
Course Code | Title
--- | ---
COMP 6104 | Advanced Computer Networks
COMP 6105 | M-Business and M-Commerce Technologies
COMP 6106 | Wireless Communication and Networks
COMP 6200 | Theory of Computing
COMP 6350 | E-Commerce Systems
COMP 6500 | Computer Architecture
COMP 6550 | Computer Graphics
COMP 6560 | Computer Forensics
COMP 6600 | Artificial Intelligence
COMP 6650 | Web Usability
COMP 6730 | Cryptography
COMP 6750 | Internet Security
COMP 6800 | Database Systems
COMP 6980 | Scientific Computing
COMP 6990 | Operations Research

COURSE DESCRIPTIONS
SEMESTER: NOT OFFERED IN 2011/2012

COURSE CODE: COMP 6104
COURSE TITLE: ADVANCED COMPUTER NETWORKS
NUMBER OF CREDITS: 4
PREREQUISITES: NONE
COURSE DESCRIPTION: Congestion Control mechanisms; ATM traffic management; Internet traffic management; Differentiated and Integrated Services; Internet routing protocols and multicast routing protocols; Resource reservation; Admission Control mechanisms; Compression techniques; Self-similar data traffic; Quality of Service; Virtual Private Networks; GRID Architectures and Services; Security mechanisms and services; Research topics in emerging new technologies.

Assessment:
Coursework 40%
Final Examination - One 3 hour written paper 60%

SEMESTER: NOT OFFERED IN 2011/2012

COURSE CODE: COMP 6105
COURSE TITLE: M-BUSINESS AND M-COMMERCE TECHNOLOGIES
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: Mobile Commerce Landscape: Mobile ISP; Mobile devices; Mobile Software platforms; Mobile Application Services; J2ME Architecture and Components; Smart Client paradigm and Managed Smart Clients; Mobile Design Patterns; The Smart Ticket Blueprint; Advanced HTTP techniques; End-To-End Best practices; pervasive devices and ubiquitous integration; Mobile Messaging Applications; Converted MobileP2P Messaging and Enterprise Messaging; Mobile Databases and Synchronization Engines; Mobile Databases for MIDP Devices; Database Synchronization; Access Backend Databases; XML and Mobile Web Services; SOAP Web Services on Smart Clients; the J2ME Web Services; Advanced Mobile Security; Implementing WAP Services.

Assessment:
Coursework 40%
Final Examination - One 3 hour written paper 60%

SEMESTER: NOT OFFERED IN 2011/2012

COURSE CODE: COMP 6106
COURSE TITLE: WIRELESS COMMUNICATIONS AND NETWORKS
NUMBER OF CREDITS: 4
PREREQUISITES: NONE
COURSE DESCRIPTION: The fundamentals wireless communications topics; Antennae and Propagation; Signal Encoding Techniques; The Concept of Spread Spectrum; Coding and Error Control; Wireless Networking; Satellite Communications; Cellular Wireless Networks; Cordless Systems and Wireless Local Loop; Mobile IP; Wireless Access Protocol; The Wireless LAN Technologies; Infrared LANS; IEEE 802.11; Wireless LAN Standard, Bluetooth; Wireless Security Mechanisms; Traffic Analysis,Wireless Routing and Resource Allocation Mechanisms; Ad-hoc Networks; Emerging New technologies

Assessment:
Coursework 40%
Final Examination - One 3-hour written paper 60%
SEMESTER: 2  
COURSE CODE: COMP 6150  
COURSE TITLE: DISTRIBUTED SYSTEMS  
NUMBER OF CREDITS: 4  
PREREQUISITE: NONE  
Assessment:  
Coursework 40%  
Final Examination - One 3-hour written paper 60%  

SEMESTER: NOT OFFERED IN 2011/2012  
COURSE CODE: COMP 6200  
COURSE TITLE: THEORY OF COMPUTING  
NUMBER OF CREDITS: 4  
PREREQUISITE: NONE  
COURSE DESCRIPTION: TURING machines: computing with Turing machines, nondeterministic Turing machines, grammars, numerical functions. Undecidability: Universal Turing machines, the halting problem, unsolvable problems, recursive languages Computational Complexity: the class P, the class NP, Boolean satisfiability NP-Completeness: selected examples, Cook's theorem  
Assessment:  
Coursework 40%  
Final Examination - One 3-hour written paper 60%  

SEMESTER: 2  
COURSE CODE: COMP 6300  
COURSE TITLE: ADVANCED INTERNET TECHNOLOGIES  
NUMBER OF CREDITS: 4  
PREREQUISITE: NONE  
COURSE DESCRIPTION: XML and XSL; Document Type Definition; Document Object Model; Special XML-concepts (SAX, XPath, Xlink, Xpointer,O); Active Server Pages; Building Web Services; Web Service Description Language.  
Assessment:  
Coursework 40%  
Final Examination - One 3-hour written paper 60%  

SEMESTER: 2  
COURSE CODE: COMP 6350  
COURSE TITLE: E-COMMERCE SYSTEMS  
NUMBER OF CREDITS: 4  
PREREQUISITE: NONE  
COURSE DESCRIPTION: Overview of Electronic Commerce (EC) and Electronic Business (EB): Introduction to Internet Business Models; EC and EB Technologies; EC and EB Architectures for Scalable Systems; Business to Consumer Electronic Commerce Systems; Design Templates and Software Components for Typical EC and EB systems; Intranets and the automation of Business to Business Transactions; Key issues and Technologies in EC Security; Developing and Supporting Trust Models on the Internet; Future Directions in EC and EB technologies.  
Assessment:  
Coursework 40%  
Final Examination - One 3-hour written paper 60%  
Details: http://www2.sta.uwi.edu/~anikov/comp6350/index.htm (PSW:6350comp)  

SEMESTER: 1  
COURSE CODE: COMP 6400  
COURSE TITLE: DESIGN AND ANALYSIS OF ALGORITHMS  
NUMBER OF CREDITS: 4  
PREREQUISITE: NONE  
Assessment:  
Coursework 40%  
Final Examination - One 3-hour written paper 60%  

SEMESTER: 1  
COURSE CODE: COMP 6450  
COURSE TITLE: OBJECT-ORIENTED DESIGN AND PROGRAMMING  
NUMBER OF CREDITS: 4  
PREREQUISITE: NONE  
Assessment:  
Coursework 40%  
Final Examination - One 3-hour written paper 60%
SEMESTER: NOT OFFERED IN 2011/2012
COURSE CODE: COMP 6500
COURSE TITLE: COMPUTER ARCHITECTURE
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: Microprocessor Design; Super Computers; Instruction Sets; Microprogramming; Memory Management; Execution Enhancement Techniques; Computer Arithmetic Processors; Multiprocessor Systems.
Assessment:
Coursework 40%
Final Examination - One 3 hour written paper 60%

SEMESTER: 2
COURSE CODE: COMP 6550
COURSE TITLE: COMPUTER GRAPHICS
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: This course familiarizes the student with the graphics rendering pipeline, as used in computer games, digital special effects and 3-dimensional hardware for scientific visualization. There is in depth examination of important and frequently used graphics algorithms, ranging from simple primitive rasterization to advanced global illumination shading. Detailed mathematical treatment of common 3D coordinate transforms is given without need of a background in linear algebra. Advanced modeling and animation topics are also discussed. Topics include: Fundamental concepts; Drawing 2D primitives - raster graphics; Geometrical transformations; Viewing transforms; Curves and Surfaces; Object Hierarchy; Colour Spaces; Surface Visibility; Illumination Shading and Realism; Animation and Physically Based Simulation.
Assessment:
Coursework 40%
Final Examination - One 3 hour written paper 60%

SEMESTER: NOT OFFERED IN 2011/2012
COURSE CODE: COMP 6560
COURSE TITLE: COMPUTER FORENSICS
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: Computer Forensics is the scientific, systematic inspection of a computer system and its contents for evidence or supportive evidence of a crime or other computer misuse. Computer forensics requires specialized expertise that goes beyond normal data collection and preservation techniques available to end-users or system support personnel. This process often involves investigating computer systems to determine whether they are or have been used for illegal or unauthorized activities. Mostly, computer forensics experts investigate data storage devices; these include but are not limited to hard drives, portable data devices such as USB Drives, external drives, micro drives.
This course covers the fundamental principles and techniques of forensic science with emphasis on digital evidence. Forensic computer science involves the identification, collection, preservation and analysis of computer evidence stored on various computer storage devices. The course requires advanced knowledge of computer systems, especially the low level details of storage and file systems. It will expose students to the investigative techniques for seizure and forensic examination of computer systems. The teaching/learning approach will be a mix of lectures and labs. Students will gain hands-on practice in networking and forensic tools in the lab sessions.
Assessment:
Coursework 30%
Midterm Exam 20%
Final Examination 50%

SEMESTER: 1
COURSE CODE: COMP 6600
COURSE TITLE: ARTIFICIAL INTELLIGENCE
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: Topics will be taken from any area of Artificial Intelligence that are relevant to current research activities within the department or which are advanced versions of techniques taught at the undergraduate level. Topics will be taken from, but are not limited to the following: Advanced search techniques; Expert systems; Planning; Reasoning; Natural Language Processing; Machine Learning; Embodied cognition.
Assessment:
Coursework 40%
Final Examination - One 3 hour written paper 60%
SEMESTER: 1
COURSE CODE: COMP 6650
COURSE TITLE: WEB USABILITY
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: Web usability has become an essential requirement of web-based systems. A major cause underlying poor web usability is a lack of understanding of a usability engineering process for developing usable web interface designs. Software developers often still have primary responsibility for developing interactive systems, but most are not trained in web usability methods and, therefore, do not have the knowledge and skills to include web usability methods in their life cycle activities. The purpose of this course is to learn about the process of developing web sites. This course will take a user-centered approach to designing web sites and will focus on the entire lifecycle of a web site, from the initial idea of developing a web site, collecting the requirements, designing the pages, performing usability testing, and implementing and managing a web site. It examines the basic design and usability issues for web development. Current platforms and technologies for web applications are presented. The course focuses on usability of web sites in terms of content organization, navigation, page and site design, and the general principles of web usability. Case studies are presented and explain how user-centered design concepts have been applied to web development in real-world situations. During the course the students will work on a group project following the user-centered approach for designing websites.
Assessment:
Coursework (project): 70%
Final Examination - One 2-hour written paper: 30%
Details: http://www2.sta.uwi.edu/~anikov/comp6650/index.htm (PSW:6650comp)

SEMESTER: NOT OFFERED IN 2011/2012
COURSE CODE: COMP 6730
COURSE TITLE: CRYPTOGRAPHY
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: Classical Cryptography: some simple cryptosystems, cryptanalysis; Shannon’s theory: entropy, Huffman encodings; Block ciphers and the Advanced Encryption Standard (AES); Cryptographic Hash functions; The RSA cryptosystem and factoring integers; Signature Schemes; Applications (e.g. Remote Payments with Bank Cards).
Assessment:
Coursework: 40%
Final Examination - One 3 hour written paper: 60%

SEMESTER: 2
COURSE CODE: COMP 6800
COURSE TITLE: DATABASE SYSTEMS
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: Database Design (UML); Query Processing and Performance Tuning; XML-enabled Databases; Databases and the Internet; Object-Related Databases; Transaction Management - Concurrency Control and Recovery Management; Data Warehousing; Business Intelligence; OLAP; Data Mining; Distributed Databases; Database Administration; Temporal and Spatial Databases; Text/Document Databases (Content Management Systems).
Assessment:
Coursework: 40%
Final Examination - One 3 hour written paper: 60%

SEMESTER: NOT OFFERED IN 2011/2012
COURSE CODE: COMP 6980
COURSE TITLE: SCIENTIFIC COMPUTING
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: This course delivers an introduction to Scientific Computing. It introduces the requisite mathematics and computer science in the course of solving realistic problems. It will be based on the use of Java and Maple. Getting Started with Maple; Numbers, Expressions, Functions; Visualizing Data; Differentiation and Integration; Matrices and Vectors; Web Computing; Scientific Document Processing.
Assessment:
Coursework: 100%
No Final Written Examination
SEMMESTER: NOT OFFERED IN 2011/2012
COURSE CODE: COMP 6990
COURSE TITLE: OPERATIONS RESEARCH
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: Elements of a Decision Model; Introduction to Linear Programming; The Simplex Method, Sensitivity Analysis; Applications to Transportation and Networks Models; Probability and Statistics Review; Data Presentation and Statistical Techniques, Forecasting; Decision Analysis, Bayes Procedure; Competitive Strategies - Game Theory; Project Management, Scheduling by Pert-CPM; Inventory Models; Stochastic Inventory Models; Waiting lines. Steady-State Measures of Performance.
Assessment:
Coursework 40%
Final Examination - One 3 hour written paper 60%
M. Alkins-Koo
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J. A. Spence
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P. Umaharan
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Email: pathmanathan.umaharan@sta.uwi.edu
RESEARCH INTERESTS AND FACILITIES

The Department of Life Sciences specialises in two of the most innovative and dynamic areas of current research and development, namely (a) Small Island Biodiversity and Environmental Management and (b) Biotechnology and Molecular Biology. Research focuses on biodiversity and ecosystem services, conservation biology, pollution impacts and management, and natural resources management (e.g. tropical forests, fisheries and aquaculture). There is also a long history of research and development projects in Biotechnology and Molecular Biology as they relate to agriculture and human wellness. Current research projects use approaches such as Recombinant DNA Technology. Research also focuses on providing new knowledge on the physiology and metabolism of tropical plants in important areas such as tuberisation, abscission and mechanism of resistance to pests and pathogens. Studies in Microbiology and Crop Protection are also important focal areas. In addition to the above, research is ongoing in the traditional disciplines such as Biochemistry, Botany, Zoology, Ecology, Epidemiology and control of diseases of public health importance.

The Department offers graduate programmes leading to MPhil and PhD degrees in all areas of research being pursued by academic staff as outlined above. The Department has supporting specialist research laboratories in Biotechnology and Tissue Culture, Entomology, Environmental Biology, Ecology, Parasitology, Ecotoxicology, Biosystematics, Biochemistry, Histology, Microbiology, and Aquaculture and Fisheries. The Department also maintains the National Herbarium, Zoology Museum, Land Arthropod Collection and several greenhouses.

Applicants to the MPhil or PhD research programme, should liaise with their potential supervisor for guidance in developing a clear research project and research proposal which must be submitted to the Head of Department. Guidelines for the preparation of a research proposal are available at http://sta.uwi.edu/fsa/lifesciences/documents/researchproposal.pdf. Supervisors listed in the application form should have agreed to do so.

DIPLOMA/ MSC IN SCIENCE & MANAGEMENT OF TROPICAL BIODIVERSITY (DISCONTINUED WITH EFFECT FROM 2011/12 - AVAILABLE ONLY TO CONTINUING STUDENTS)

The graduate degree in Science & Management of Tropical Biodiversity is a taught program geared towards building and strengthening capacity in environmental management, biodiversity conservation and sustainable development in the Caribbean.

OBJECTIVES

The main objective of this graduate degree is to supply the region with qualified professionals who have a comprehensive knowledge of the concepts and principles of a wide range of science and environmental management issues related to tropical biodiversity. Advanced practical skills in environmental monitoring, impact analysis, environmental management, data management and policy issues a working knowledge and appreciation of the major disciplines within environmental science and a multidisciplinary overview of environmental data collection and analysis an acquired and improved range of transferable skills including group work, scientific research, data analysis, report writing and oral presentation. As such it will provide students with a set of skills that will allow them to advance their careers in the environmental management and biodiversity conservation fields within their government, public sector, NGOs and industrial organisations.

PROGRAMME STRUCTURE

Diploma in Science & Management of Tropical Biodiversity

The Diploma program consists of 24 credits and students will be required to complete seven (7) core courses and one (1) of the options in order to successfully complete it. Each course carries 3 credits.

CORE COURSES

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 5100</td>
<td>Characteristics of Biodiversity and Tropical Environments</td>
</tr>
<tr>
<td>BIOL 5101</td>
<td>Threats to Tropical Biodiversity and Tropical Environments</td>
</tr>
<tr>
<td>BIOL 5102</td>
<td>Introduction to Environmental Law and Policy</td>
</tr>
<tr>
<td>BIOL 5103</td>
<td>Environmental Economics &amp; Environmental Management</td>
</tr>
<tr>
<td>BIOL 5105</td>
<td>Principles and Practice of Geoinformatics</td>
</tr>
<tr>
<td>BIOL 5106</td>
<td>Management and Analysis of Geoinformatic Data</td>
</tr>
<tr>
<td>BIOL 5110</td>
<td>The Practical Toolbox</td>
</tr>
</tbody>
</table>

OPTIONS

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 5104</td>
<td>Environmental Impact Assessment</td>
</tr>
<tr>
<td>BIOL 5107</td>
<td>Sustainable Use and Management of Natural Resources</td>
</tr>
<tr>
<td>BIOL 5108</td>
<td>Conservation &amp; Management of Tropical Biodiversity</td>
</tr>
<tr>
<td>BIOL 5109</td>
<td>Pollution and Ecotoxicology</td>
</tr>
</tbody>
</table>
MSC IN SCIENCE & MANAGEMENT OF TROPICAL BIODIVERSITY (DISCONTINUED WITH EFFECT FROM 2011/12 - AVAILABLE ONLY TO CONTINUING STUDENTS)

The M.Sc. program consists of 45 credits and students will be required to complete 11 courses which carry 3 credits each as well as a Research Project which carries 12 credits.

COURSES

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Number of Credits</th>
<th>Prerequisite</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 6100</td>
<td>Characteristics of Biodiversity and Tropical Environments</td>
<td>3</td>
<td>None</td>
</tr>
<tr>
<td>BIOL 6101</td>
<td>Threats to Tropical Biodiversity and Tropical Environments</td>
<td>3</td>
<td>None</td>
</tr>
<tr>
<td>BIOL 6102</td>
<td>Introduction to Environmental Law and Policy</td>
<td>3</td>
<td>None</td>
</tr>
<tr>
<td>BIOL 6103</td>
<td>Environmental Economics &amp; Environmental Management</td>
<td>3</td>
<td>None</td>
</tr>
<tr>
<td>BIOL 6104</td>
<td>Environmental Impact Assessment</td>
<td>3</td>
<td>None</td>
</tr>
<tr>
<td>BIOL 6105</td>
<td>Principles and Practice of Geoinformatics</td>
<td>3</td>
<td>None</td>
</tr>
<tr>
<td>BIOL 6106</td>
<td>Management and Analysis of Environmental Data</td>
<td>3</td>
<td>None</td>
</tr>
<tr>
<td>BIOL 6107</td>
<td>Sustainable Use and Management of Natural Resources</td>
<td>3</td>
<td>None</td>
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<tr>
<td>BIOL 6108</td>
<td>Conservation &amp; Management of Tropical Biodiversity</td>
<td>3</td>
<td>None</td>
</tr>
<tr>
<td>BIOL 6109</td>
<td>Pollution and Ecotoxicology</td>
<td>3</td>
<td>None</td>
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<tr>
<td>BIOL 6110</td>
<td>The Practical Toolbox</td>
<td>3</td>
<td>None</td>
</tr>
<tr>
<td>BIOL 6111</td>
<td>Research Project</td>
<td>12</td>
<td>None</td>
</tr>
</tbody>
</table>

DURATION

Students enrolled in the Diploma Program will be required to complete the course in either 1 year (full time) or 2 years (part time). While students enrolled in the MSc Program will be required to complete the degree in 1 1/2 years (full time) or 3 years (part time).

MODES OF DELIVERY

As a post-graduate Diploma/MSc level course, a variety of methods of delivery will be employed, which include face-to-face lectures, seminars, tutorials, field visits and a research project. This will be supported by distance learning and e-based course assignments as well as project and scenario based workshops, case studies and assignments in which group work and student centred learning approaches are adopted. Thus increasing onus will be put on the student to take responsibility and control of their own learning. This will lead to the point of the final research project in which the student will be responsible for the development, management and reporting of a study with the supervisor acting as an advisor and facilitator. Additionally the programme aims to maximise access by professionals working in government, NGO and commercial organisation by supporting face-to-face sessions with distance learning, assignments etc. which students can undertake from their home.

COURSE ASSESSMENT

A variety of course assessment techniques will be utilized throughout the program, inclusive of final examinations and coursework assignments.

RESEARCH PROJECT

A Research Project is a fundamental component of the MSc programme and this is reflected, not only in the credit weighting, but by the fact that the MSc runs for an extra 6 months so that the student may have the necessary time to complete the project to a high standard.

The aim of the research project is to allow the student to synthesise and articulate several aspects of the taught programme within a single themed research topic. In addition, it will provide the opportunity for further detailed skills training in aspects of environmental monitoring, assessment or management of tropical biodiversity. It will allow the student to pursue an individual study on a particular research topic or issue of interest to the student and will incorporate technical skills training specific to the individual student. As such, the research project will provide the opportunity to develop a specific set of practical and reporting skills that will be of use to the student in their future career.

COURSE DESCRIPTIONS

SEMESTER: 1

COURSE CODE: BIOL 5100/BIOL 6100
COURSE TITLE: CHARACTERISTICS OF BIODIVERSITY AND TROPICAL ENVIRONMENTS
NUMBER OF CREDITS: 3
PREREQUISITE: NONE
COURSE DESCRIPTION: This course includes basic concepts of biodiversity from molecular to ecosystem. This is placed in the context of international treaties including the Convention on Biological Diversity. It highlights the importance of biodiversity in terms of ecosystem goods, services and function.

Assessment:
Coursework 100%

SEMESTER: 1

COURSE CODE: BIOL 5101/BIOL 6101
COURSE TITLE: THREATS TO TROPICAL BIODIVERSITY AND TROPICAL ENVIRONMENTS
NUMBER OF CREDITS: 3
PREREQUISITE: NONE
COURSE DESCRIPTION: This course examines the major threats to tropical biodiversity and ecosystems. It highlights the major threats, as described in the CBD including habitat loss and degradation, over-exploitation, climate change, pollution and introduction of alien species. It also examines the history of human intervention in tropical environments, particularly in the Insular Caribbean.

Assessment:
Coursework 100%
POSTGRADUATE REGULATIONS & SYLLABUSES 2011 - 2012
THE FACULTY OF SCIENCE AND AGRICULTURE

SEMESTER: 1
COURSE CODE: BIOL 5102/BIOL 6102
COURSE TITLE: INTRODUCTION TO ENVIRONMENTAL LAW AND POLICY
NUMBER OF CREDITS: 3
PREREQUISITE: NONE
COURSE DESCRIPTION: This course provides a fundamental knowledge of the sources of environmental laws, and of the particular regulatory framework that apply to selected Caribbean islands for environment and regulation of the environment. As such it provides the legal framework within which environmental science and management sit.
Assessment:
Coursework 50%
Final Examination 50%

SEMESTER: 2
COURSE CODE: BIOL 5103/BIOL 6103
COURSE TITLE: ENVIRONMENTAL ECONOMICS & ENVIRONMENTAL MANAGEMENT
NUMBER OF CREDITS: 3
PREREQUISITE: NONE
COURSE DESCRIPTION: The course presents relevant basic theory in environmental and natural resource economics and discusses the economic basis for environmental degradation. It provides an introduction to economic value of environmental assets and costs of environmental problems. Environmental economics will be explored through theory of the consumer, firm, general equilibrium and the concept of social welfare function, market failure, externalities and property right. Cost-benefit analysis in environmental management is also considered. Specific management strategies such as the promotion of industry-based eco-efficiency and community-based collaborative management are studied and participatory approaches for the sustainable management of the environment are explored.
Assessment:
Coursework 60%
Final Examination 40%

SEMESTER: 1
COURSE CODE: BIOL 5104/BIOL 6104
COURSE TITLE: MANAGEMENT & ANALYSIS OF ENVIRONMENTAL DATA
NUMBER OF CREDITS: 3
PREREQUISITE: NONE
COURSE DESCRIPTION: This course provides students with a fundamental understanding of the importance of storage, retrieval and analysis of environmental data. In particular, the course provides practical training in statistical analysis of environmental data and demonstrates the storage and retrieval of biodiversity information using national and international databases. As such, this course shows students how data, through appropriate management and analysis, becomes information which then informs the decision making process. In addition, it provides the student with fundamental skills which may underpin many elements of their future research project and career.
Assessment:
Coursework 100%

SEMESTER: 2
COURSE CODE: BIOL 5105/BIOL 6105
COURSE TITLE: PRINCIPLES & PRACTICE OF GEOINFORMATICS
NUMBER OF CREDITS: 3
PREREQUISITE: NONE
COURSE DESCRIPTION: This course provides an overview of the principles of geoinformatics including an introduction to geographic information systems, Global Positioning Systems and field survey techniques. The course also covers spatial data acquisition using GPS and field survey techniques, GIS data structures and capabilities. It describes GIS and network analysis and spatial data analysis, and GIS functionality. Finally it considers hardware and software systems and the design and implementation of GIS.
Assessment:
Coursework 30%
Final Examination 70%

SEMESTER: 1
COURSE CODE: BIOL 5106/BIOL 6106
COURSE TITLE: MANAGEMENT & ANALYSIS OF ENVIRONMENTAL DATA
NUMBER OF CREDITS: 3
PREREQUISITE: NONE
COURSE DESCRIPTION: This course provides students with a fundamental understanding of the importance of storage, retrieval and analysis of environmental data. In particular, the course provides practical training in statistical analysis of environmental data and demonstrates the storage and retrieval of biodiversity information using national and international databases. As such, this course shows students how data, through appropriate management and analysis, becomes information which then informs the decision making process. In addition, it provides the student with fundamental skills which may underpin many elements of their future research project and career.
Assessment:
Coursework 60%
Final Examination 40%
SEMESTER: 2  
COURSE CODE: BIOL 5107/BIOL 6107  
COURSE TITLE: SUSTAINABLE USE & MANAGEMENT OF NATURAL RESOURCES  
NUMBER OF CREDITS: 3  
PREREQUISITE: NONE  
COURSE DESCRIPTION: This course will address important tropical ecosystem based industries including forestry, agriculture, fisheries, energy, the pharmaceutical industry and tourism. Topics covered include an analysis and determination of land capability and optimal land use. Social aspects of land use and land degradation, together with participatory approaches in sustainable development. The integration of soil and water conservation into farming systems, integrating water needs in agriculture with industrial and potable supply requirements are described. Agro-ecological systems are considered in relation to sustainable mono-cropping, multiple cropping and agro-forestry systems for tropical environments. Sustainable forestry and timber production, development and exploitation of alternative energy sources including solar, hydroelectric and wind power will also be considered in response to anticipated climate change issues. Finally, achieving 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 are described.  
Assessment:  
Coursework 30%  
Final Examination 70%  

SEMESTER: 2  
COURSE CODE: BIOL 5108/BIOL 6108  
COURSE TITLE: CONSERVATION & MANAGEMENT OF TROPICAL BIODIVERSITY  
NUMBER OF CREDITS: 3  
PREREQUISITE: NONE  
COURSE DESCRIPTION: Conservation topics include development of priorities for conservation, conservation of genes and genetic diversity, selection and design of protected areas, the application of island biogeography theory and SLOSS, population dynamics and population viability analysis to protected area design. Students gain an understanding of the principles of protected area selection site management. The use of zoning schemes, particularly in relation to coastal zone management schemes will also be covered. The use of management plans will be discussed together with the assessment of management effectiveness.  
Assessment:  
Coursework 30%  
Final Examination 70%  

SEMESTER: 2  
COURSE CODE: BIOL 5109/BIOL 6109  
COURSE TITLE: POLLUTION & ECOTOXICOLOGY  
NUMBER OF CREDITS: 3  
PREREQUISITE: NONE  
COURSE DESCRIPTION: The course examines traditional methods of environmental assessment, ecotoxicology, basics concepts in toxicology, major classes of pollutants, routes of entry into the environment, movement in the environment, routes of entry into organisms, fate of contaminant in the environment and organisms, acute and chronic toxicity, general principles of toxicity testing and development of toxicity standards. It also includes principles of biotic and abiotic factors affecting the toxicity of compounds population and community ecotoxicology, risk assessment and regulatory toxicology.  
Assessment:  
Coursework 100%  

SEMESTERS: 1, 2 & 3  
COURSE CODE: BIOL 5110/BIOL 6110  
COURSE TITLE: PRACTICAL TOOLBOX  
NUMBER OF CREDITS: 3  
PREREQUISITE: NONE  
COURSE DESCRIPTION: This course runs across the first two semesters and consists of six, 4 week, group based practical activities that take the students from the design and execution of a field based survey and stakeholder survey, through laboratory analysis and data analysis, to the development of an environmental management plan and the communication of scientific information.  
Assessment:  
Coursework 100%  

SEMESTER: 3 - 1  
COURSE CODE: BIOL 6111  
COURSE TITLE: RESEARCH PROJECT  
NUMBER OF CREDITS: 12  
PREREQUISITE: NONE  
COURSE DESCRIPTION: The research project may cover any feasible aspect of environmental management of tropical biodiversity. It may involve a pure research study toward a fundamental aspect of tropical biodiversity or address more applied issues. It may involve field or laboratory based work or may be a desk study involving data analysis or interrogation of legal documents. It may underpin studies being undertaken by staff within UWI or it may address an issue related to a student's employer. For students from outside of Trinidad, the project may be undertaken within Trinidad or in the student's home country.  
Assessment:  
Coursework 100%
DIPLOMA/ MSC IN BIODIVERSITY CONSERVATION & SUSTAINABLE DEVELOPMENT IN THE CARIBBEAN

The online graduate degree in Biodiversity Conservation and Sustainable Development in the Caribbean is a taught program geared towards building and strengthening capacity in environmental management, biodiversity conservation and sustainable development in the Caribbean. The program will be offered in two forms, Graduate Diploma and M.Sc. and can be undertaken either on a full time or part time basis. Teaching on this programme will involve a blend of internet-based distance teaching and face-to-face training.

OBJECTIVES

The main objective of this graduate degree is to supply the region with qualified professionals who have a comprehensive knowledge of the concepts and principles of a wide range of science and environmental management issues related to tropical biodiversity. Advanced practical skills in environmental monitoring, impact analysis, environmental management, data management and policy issues will be taught in this programme. In addition, a working knowledge and appreciation of the major disciplines within environmental science and a multidisciplinary overview of environmental data collection and analysis together with an acquired and improved range of transferable skills including group work, scientific research, data analysis, report writing and oral presentation, will be provided to learners in this programme. As such it will provide students with a set of skills that will allow them to advance their careers in the environmental management and biodiversity conservation fields within their government, public sector, NGOs and industrial organisations.

ENTRY REQUIREMENTS

Candidates applying for admission are required to satisfy the relevant general regulations of the Faculty and the University’s Board for Graduate Studies and Research. The prerequisite for entry into the programme is a bachelor’s degree in one of the following disciplines: natural sciences, engineering, agricultural sciences, geography, education or an appropriate social sciences from an approved university, with at least lower second-class honours or a minimum GPA 2.0 (or equivalent qualification and work experience).

PROGRAMME STRUCTURE

Diploma in Biodiversity Conservation and Sustainable Development in the Caribbean

The Diploma program consists of 24 credits and students will be required to complete seven (7) core courses and one (1) of the options in order to successfully complete it. Each course carries 3 credits.

MSC IN BIODIVERSITY CONSERVATION & SUSTAINABLE DEVELOPMENT IN THE CARIBBEAN

The M. Sc. program consists of 45 credits and students will be required to complete 11 courses which carry 3 credits each as well as a Research Project which carries 12 credits.

For the full details, please refer to the provided document.
DURATION
Students enrolled in the Diploma Program will be required to complete the course in either 1 year (full time) or 2 years (part time). While students enrolled in the M.Sc. Program will be required to complete the degree in 1 1/2 years (full time) or 3 years (part time).

MODES OF DELIVERY
As a post-graduate Diploma/M.Sc. level course, a variety of methods of delivery will be employed, which include face-to-face interactions, virtual seminars, tutorials, field visits and a research project. This will be supported by distance learning and e-based course assignments as well as project and scenario based workshops, case studies and assignments in which group work and student centred learning approaches are adopted. Thus, increasing onus will be put on the student to take responsibility and control of their own learning. This will lead to the point of the final research project in which the student will be responsible for the development, management and reporting of a study with the supervisor acting as an advisor and facilitator. Additionally, the programme aims to maximise access by professionals working in government, NGO and commercial organisations by supporting face-to-face sessions with distance learning, assignments etc. which students can undertake from their home.

COURSE ASSESSMENT
A variety of course assessment techniques will be utilized throughout the program.

RESEARCH PROJECT
A Research Project is a fundamental component of the MSc programme and this is reflected, not only in the credit weighting, but by the fact that the MSc runs for an extra 6 months so that the student may have the necessary time to complete the project to a high standard.

The aim of the research project is to allow the student to synthesise and articulate several aspects of the taught programme within a single themed research topic. In addition, it will provide the opportunity for further detailed skills training in specific aspects of environmental monitoring, assessment or management of tropical biodiversity. It will allow the student to pursue an individual study on a particular research topic or issue of interest to the student and will incorporate technical skills training specific to the individual student. As such, the research project will provide the opportunity to develop a specific set of practical and reporting skills that will be of use to the student in their future career.

AWARD OF DIPLOMA/DEGREE
In this joint Diploma/MSc, the main awarding University will be the University delivering the most teaching to the specific student. Thus, prospective students should note that their degree will be awarded based on the number of credits taught by the various partner institutions.

COURSE DESCRIPTIONS

SEMESTER: 1
COURSE CODE: BIOL 5200/BIOL 6200
COURSE TITLE: CHARACTERISTICS OF BIODIVERSITY
NUMBER OF CREDITS: 3
PREREQUISITE: NONE
COURSE DESCRIPTION: This course will form part of the background information to the programme. It will include basic concepts of biodiversity from the molecular- to the ecosystem-scale. This will be placed in the context of the extinction crisis and international treaties such as the Convention on Biological Diversity that have been formulated to address this crisis. It will, in particular, highlight the importance of biodiversity in terms of ecosystem function, goods and services. The course will define biodiversity in terms of species richness and diversity indices and explore the cline in diversity across different latitudes. Within this concepts such as endemicity and keystone species will also be described. The molecular genetic component of the course will cover the concepts of molecular genetics, intra-specific variation, inter and intra-specific genetic diversity, processes of evolution and speciation. The course will then go on to describe the regional ecosystems including forest, savannah, riverine, wetland, mangrove and coastal-marine systems including coral reefs. Impacted ecosystems such as urban and agricultural landscapes will also be treated. In each case, these systems will be considered holistically in relation to their diversity, distribution, ecology and ecosystem function, including the goods and services they provide.

Assessment:
Coursework 100%

SEMESTER: 1
COURSE CODE: BIOL 5201/BIOL 6201
COURSE TITLE: THREATS TO TROPICAL BIODIVERSITY
NUMBER OF CREDITS: 3
PREREQUISITE: NONE
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 specific 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 some of the ecosystems described in BIOL6100. 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.

Assessment:
Coursework 100%
SEMESTER: 1
COURSE CODE: BIOL 5202/BIOL 6202
COURSE TITLE: ENVIRONMENTAL LAW AND MULTILATERAL ENVIRONMENTAL AGREEMENTS
NUMBER OF CREDITS: 3
PREREQUISITE: NONE
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 MEAs. 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 MEAs, 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-jurisdictionally protected natural areas.

Assessment:
Coursework 100%

SEMESTER: 2
COURSE CODE: BIOL 5204/BIOL 6204
COURSE TITLE: ENVIRONMENTAL IMPACT ASSESSMENT
NUMBER OF CREDITS: 3
PREREQUISITE: NONE
COURSE DESCRIPTION: The course provides 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 Environmental Impact Statement (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.

Assessment:
Coursework 100%

SEMESTER: 1
COURSE CODE: BIOL 5205/BIOL 6205
COURSE TITLE: PRINCIPLES & PRACTICE OF GEOINFORMATICS
NUMBER OF CREDITS: 3
PREREQUISITE: NONE
COURSE DESCRIPTION: 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.

Assessment:
Coursework 100%
SEMESTER: 1
COURSE CODE: BIOL 5206/BIOL 6206
COURSE TITLE: MANAGEMENT & ANALYSIS OF ENVIRONMENTAL DATA
NUMBER OF CREDITS: 3
PREREQUISITE: NONE
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 packages 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.

Assessment:
Coursework 100%

SEMESTER: 1
COURSE CODE: BIOL 5207/BIOL 6207
COURSE TITLE: SUSTAINABLE USE & DEVELOPMENT OF NATURAL RESOURCES
NUMBER OF CREDITS: 3
PREREQUISITE: NONE
COURSE DESCRIPTION: This course will address important tropical ecosystem based industries including forestry, wildlife, 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 externality. 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, and participatory approaches in sustainable development, will be discussed. The need for the integration of soil and water conservation in farming systems, and integration of water needs in agriculture with industrial and potable supply requirements. Agro-ecosystems 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. Participants to the course will also be exposed to development and exploitation of biodiversity for renewable energy (bio-fuels) and carbon sequestration in the context of REDD+ and related discussions in the Climate Change arena. 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.

Assessment:
Coursework 100%

SEMESTER: 2
COURSE CODE: BIOL 5208/BIOL 6208
COURSE TITLE: CONSERVATION & MANAGEMENT OF BIODIVERSITY
NUMBER OF CREDITS: 3
PREREQUISITE: NONE
COURSE DESCRIPTION: The course will include development of priorities for species conservation, conservation of genes and genetic diversity, selection and design of protected areas, the application of island biogeography theory and SLOSS, population dynamics and population viability analysis to protected area design. Students will gain an understanding of the principles of protected area selection site management. The use of zoning schemes, particularly in relation to coastal zone management schemes will also be covered. The use of management plans will be discussed together with the assessment of management effectiveness. The course will also examine ex-situ conservation programmes and re-introductions of species as well as aspects of habitat restoration. The important role and participation of the public will also be considered with regard to the selection, design and management of protected areas as well as through the potential benefits of tourism and ecotourism.

Assessment:
Coursework 100%

SEMESTER: 1
COURSE CODE: BIOL 5209/BIOL 6209
COURSE TITLE: POLLUTION & ECOTOXIOCOLOGY
NUMBER OF CREDITS: 3
PREREQUISITE: NONE
COURSE DESCRIPTION: This course is designed to give students an understanding of the basic principles of pollution monitoring and ecotoxicology and how toxicants are distributed, taken up, assimilated and impact the environment. The course will also distinguish between structural and functional endpoints and how these can highlight the potential impacts of industry on the natural environment. The course will also look are particular pollutants that are of concern to Trinidad, such as: pesticides, industrial effluents and heavy metals. Students will also be able to understand how environmental monitoring tools such as toxicology, environmental chemistry and ecology can be used together to understand the relationship between industry and ecology by using these tools to conduct Ecological Risk Assessments.

Assessment:
Coursework 100%
HE FACULTY OF SCIENCE AND AGRICULTURE

POSTGRADUATE REGULATIONS & SYLLABUSES 2011 - 2012

SEMESTERS: 3 (SUMMER)
COURSE CODE: BIOL 5210/BIOL 6210
COURSE TITLE: FIELD PRACTICUM (BELIZE OR SURINAME)
NUMBER OF CREDITS: 3
PREREQUISITE: NONE
COURSE DESCRIPTION: This course comprises the main practical portion of the programme. It will provide students with the opportunity to apply and test their understanding of concepts covered in the taught courses of the programme, as well as allow them to develop their practical skills techniques, provide a face to face setting for interaction with faculty and with other distance learners on the programme. The course will go over the appropriate collection and survey techniques for various biological taxonomic groups. Status surveys and other population ecological work will be covered. Socio-economic survey work will also be undertaken in the field. (Students are expected to fund their own expenses incurred during and for this field course).

Assessment:
Coursework 100%

SEMESTER: 3 - 1
COURSE CODE: BIOL 6211
COURSE TITLE: RESEARCH PROJECT
NUMBER OF CREDITS: 12
PREREQUISITE: NONE
COURSE DESCRIPTION: The Research Project is a fundamental component of the M.Sc. programme and this is reflected, not only in the credit weighting, but by the fact that the M.Sc. runs for an extra 6 months so that the student may have the necessary time to complete the project to a high standard. Students will come to the Course Leader and/or University Focal Point during the first semester of the M.Sc. with potential ideas for their research project. A list of potential projects will be also be made available for those students who do not have a specific topic in mind. During the first two semesters, the student and Course Leader and/or University focal point will meet either face-to face or through a virtual platform (as determined by the Course Leader), at least twice, to further develop the research project idea, develop clear aims and objectives, and identify appropriate second supervisors. The research project may cover any feasible aspect of environmental management of tropical biodiversity. It may involve a pure research study toward a fundamental aspect of tropical biodiversity or address more applied issues in biodiversity conservation. It may involve field or laboratory based work or may be a desk study involving data analysis or interrogation of legal documents. It may support studies being undertaken by staff within UWI or the partner Universities of the MSc. Programme, or it may address an issue related to a student’s employer. For students from outside of Trinidad, the project may be undertaken within Trinidad or in the student’s home country. The project should, however, give the student a chance to further develop technical skills learnt during the field practicum and a more detailed understanding of some theoretical component of the course.

Assessment:
Coursework 100%

SEMESTER: 2
COURSE CODE: BIOL 5213/6213
COURSE TITLE: ADVANCED GIS
NUMBER OF CREDITS: 3
PREREQUISITE: BIOL 5205/6205
COURSE DESCRIPTION: This course commences with a brief review of GIS fundamentals including its historical development, data sources, data structures, hardware and software environments. It will provide students with an advanced view of database development and management and image processing. Students will then review land cover preparation and develop an understanding of the range of available spatial statistical tools and sources for various types of spatial data. The students will then be introduced to Windows-based visual basic environments and spend some time developing their skills in developing GIS modules for these environments, as well as introduce them to the range of GIS platforms available for biodiversity problem-solving. The final third of the course will focus, through case studies, on the use of GIS to problem-solve in the fields of fisheries, threatened species management and climate change modelling. Students will then be presented with biodiversity problems which can be addressed through GIS, and asked to develop individual solutions for these GIS based problem sets.

Assessment:
Coursework 100%
COURSE CODE: BIOL 5214/6214
COURSE TITLE: ENVIRONMENTAL RESOURCES POLICY
NUMBER OF CREDITS: 3
PREREQUISITE: NONE
COURSE DESCRIPTION: This policy course provides an overview of the basic foundations for environmental resource policy, its evolution and the linkages with a wide scope of socio-economic and socio-ecological issues. It affords students the opportunity to understand the various concepts of environmentally and ecologically sustainable development processes emerging from social consciousness of environmental impacts on natural resources and their management. It provides a learning process for understanding the basic principles involved in setting environmental resource goals and articulating a vision for various environmental resource policies. Key natural resource issues are reviewed from the perspective of developing policy making processes using best practices. It provides students with a level of understanding of the relevant issues and techniques for scoping and developing environmental resource policies. Students are afforded the opportunity to prepare policy briefs for specific environmental and natural resource issues including a step-by-step policy making exercises and simulations of practical problems and issues involved in the policy making process. Overviews of carefully selected international environmental instruments and their nexus with natural resource management and environmental drivers facilitate an understanding of the globalization of environmental policy making. It provides opportunities for students to have basic understanding and appreciation for environmental resource governance models and how these impact policy.

Assessment:
Coursework 100%

COURSE CODE: BIOL 5215/6215
COURSE TITLE: SOCIO-ECOLOGY AND NATURAL RESOURCES MANAGEMENT
NUMBER OF CREDITS: 3
PREREQUISITE: NONE
COURSE DESCRIPTION: 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 basis 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.

Assessment:
Coursework 100%
ADDITIONAL COURSES TO BE OFFERED IN 2011/2012

The following four (4) credit courses offered by the Department of Life Sciences are available for MPhil/PhD students:

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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>BIOL 6062</td>
<td>Bioethics</td>
</tr>
<tr>
<td>BIOL 7063</td>
<td>Light Microscopy &amp; Digital Image Processing</td>
</tr>
</tbody>
</table>

COURSE DESCRIPTIONS

SEMESTER: 2
COURSE CODE: BIOL 6062
COURSE TITLE: BIOETHICS
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: The course is designed to expose postgraduate students to a wide array of topics from various disciplines. The field of bioethics is not dominated by a single discipline but rather it concerns cross disciplines, that is, they are both scientific and ethical. Hence this course provides the opportunity for sustained, cross-disciplinary work in the fields of biology, natural sciences, medicine, philosophy, sociology, demography and theology. It enables a student to pursue topics where life sciences and ethics converge. Some of the areas that postgraduates should have some working knowledge of and which shall be helpful while pursuing the course in bioethics include genetics, use of scientific technology, allocation of resources, philosophy of science, environmental studies and so on.
Assessment:
Coursework 60%
Final Examination 40%

SEMESTER: 1
COURSE CODE: BIOL 7063
COURSE TITLE: LIGHT MICROSCOPY & DIGITAL IMAGE PROCESSING
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: The course provides theoretical and practical background information, as well as hands-on experience, with a variety of advanced light microscopy and image processing techniques. Since individual supervision is provided during the integrated lecture and practical sessions, enrolment is limited to about six students whose research will benefit significantly from what the course has to offer. Students must consult with the lecturer prior to registering for BIOL 7063.
Assessment:
Coursework 40%
Final Examination 60%
RESEARCH INTERESTS AND FACILITIES

The Department of Mathematics and Statistics offers MSc Degrees in Mathematics and in Statistics. The Department also offers programmes leading to the MPhil and PhD degrees. The MSc degrees are awarded on the basis of taught courses and a research project.

The MPhil and PhD are research degrees awarded on the submission and successful defence of a thesis. Each MPhil/PhD student must also do a minimum of 8/9 credits at graduate level, as recommended by his/her Supervisor. After evaluation by his/her supervisor, MPhil and PhD candidates may be required by the Department to take substantially more credits of taught courses than the University stipulated minimum. Interested applicants should consult the Head of the Department concerning available research facilities.

Transfer from the MPhil to the PhD degree programme is possible but depends on the progress of the research undertaken and the recommendation of the supervisor and the approval of the Board for Higher Degrees.

In Mathematics, the current research areas are Graph Theory and Combinatorics, Fluid Dynamics, Mathematical Modelling and Biomathematics.

MSC DEGREE IN STATISTICS

Objectives
To provide graduates with a comprehensive and advanced knowledge of Statistics so as to enable them to function effectively as professional Statisticians and to provide them with an adequate background for further study and research in Statistics.

PROGRAMME CO-ORDINATOR: DR. ROBIN ANTOINE

Entry Requirements
To be admitted to the programme a candidate should possess a BSc degree with at least Lower Second Class Honours or its equivalent (GPA 2.0). Candidates are expected to have a minimum grade B (GPA 3.0) in the following courses or its equivalent:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 2110</td>
<td>Linear Algebra</td>
</tr>
<tr>
<td>MATH 2120</td>
<td>Analysis &amp; Mathematical Methods I</td>
</tr>
<tr>
<td>MATH 2140</td>
<td>Introduction to Probability</td>
</tr>
<tr>
<td>MATH 2150</td>
<td>Introduction to Statistics</td>
</tr>
</tbody>
</table>

In addition to the above, the following courses offered by the Department of Mathematics and Computer Science will be an asset: MATH 3450 (M 35A) Statistical Theory I and MATH 3460 (M 35B) Statistical Theory II. Applicants who do not satisfy these requirements may be admitted upon successful completion of qualifying courses.
Course of Study
For the MSc programme in Statistics, students are required to complete (32 credits) consisting of:
(i) 5 core courses (20 credits)
AND
(ii) 3 elective courses (12 credits) with an 8-credit Research Project (STAT 6000) which must be chosen in collaboration with at least one Lecturer in Statistics.

The course of study shall extend over one (1) year of full time study or two (2) years of part time study, however, at the present time, only a part-time programme is available.

Examination
Students will be required to pass both the coursework and the written examination. The pass mark is 50%. The grading scheme for graduate degrees is as follows: A 70-100%; B+ 60-69%; B 50-59%. In the case of the Research Project, evaluation will be based on the project report.

Award of Degree
To qualify for the award of the degree, candidates must pass all five Core courses, three Elective courses and the Research Project. The degree shall be awarded in two categories - Distinction and Pass. For the award of the degree with distinction, the candidate must have obtained an average mark of 70% or more, across all Core courses and Elective courses as well as 70% or more in the Research Project.

A candidate failing a course shall be ineligible for the award of distinction.

CORE COURSES: (4 CREDITS EACH)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 6100</td>
<td>Applied Probability Theory</td>
</tr>
<tr>
<td>STAT 6110</td>
<td>Applied Statistical Inference</td>
</tr>
<tr>
<td>STAT 6120</td>
<td>Linear Statistical Methods</td>
</tr>
<tr>
<td>STAT 6130</td>
<td>Sampling Theory &amp; Techniques</td>
</tr>
<tr>
<td>STAT 6140</td>
<td>Experimental Design and Analysis</td>
</tr>
</tbody>
</table>

SELECT 3 OF THE FOLLOWING ELECTIVE COURSES (4 CREDITS)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>STAT 6150</td>
<td>Stochastic Process &amp; Applications</td>
</tr>
<tr>
<td>STAT 6160</td>
<td>Data Analysis</td>
</tr>
<tr>
<td>STAT 6170</td>
<td>Multivariate Analysis</td>
</tr>
<tr>
<td>STAT 6180</td>
<td>Advanced Topics in Statistics</td>
</tr>
</tbody>
</table>

COURSE DESCRIPTIONS

SEMESTER: 1

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 6100</td>
<td>APPLIED PROBABILITY THEORY</td>
</tr>
</tbody>
</table>

PREREQUISITE: NONE

SEMESTER: 2

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 6110</td>
<td>APPLIED STATISTICAL INFERENCE</td>
</tr>
</tbody>
</table>

PREREQUISITE: NONE

SEMESTER: NOT OFFERED IN 2010/2011

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>STAT 6120</td>
<td>LINEAR STATISTICAL METHODS</td>
</tr>
</tbody>
</table>

PREREQUISITE: NONE

SEMESTER: 3

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>STAT 6130</td>
<td>SAMPLING THEORY &amp; TECHNIQUES</td>
</tr>
</tbody>
</table>

PREREQUISITE: NONE

SEMESTER: 4

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 6140</td>
<td>EXPERIMENTAL DESIGN AND ANALYSIS</td>
</tr>
</tbody>
</table>

PREREQUISITE: NONE

SEMESTER: 5

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 6150</td>
<td>STOCHASTIC PROCESS &amp; APPLICATIONS</td>
</tr>
</tbody>
</table>

PREREQUISITE: NONE

SEMESTER: 6

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 6160</td>
<td>DATA ANALYSIS</td>
</tr>
</tbody>
</table>

PREREQUISITE: NONE

SEMESTER: 7

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
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</thead>
<tbody>
<tr>
<td>STAT 6170</td>
<td>MULTIVARIATE ANALYSIS</td>
</tr>
</tbody>
</table>

PREREQUISITE: NONE

SEMESTER: 8

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT 6180</td>
<td>ADVANCED TOPICS IN STATISTICS</td>
</tr>
</tbody>
</table>

PREREQUISITE: NONE
SEMESTER: NOT OFFERED IN 2010/2011
COURSE CODE: STAT 6130
COURSE TITLE: SAMPLING THEORY AND TECHNIQUES
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: Theory of Equal and Unequal Probability Sampling; Selected Topics from Simple Random Sampling, Stratified Sampling, Systematic Sampling and PPS Sampling; Ratio and Regression Estimation; Two-stage and k-stage Sub-sampling Procedures; Double Sampling Procedure; Repetitive Surveys; Non-sampling Errors.
Assessment:
Coursework 40%
Final Examination: One 3 hour written paper 60%

SEMESTER: NOT OFFERED IN 2010/2011
COURSE CODE: STAT 6140
COURSE TITLE: EXPERIMENTAL DESIGN AND ANALYSIS
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: Designs for Eliminating One-way, Two-way, Three-way and Multi-way Heterogeneity; Fixed, Mixed and Random Effects Models; Incomplete Block Designs; Factorial and Fractional Factorial Designs; Responses Surface Methods; Confounded Designs; Analysis of Covariance.
Assessment:
Coursework 40%
Final Examination: One 3 hour written paper 60%

SEMESTER: NOT OFFERED IN 2010/2011
COURSE CODE: STAT 6150
COURSE TITLE: STOCHASTIC PROCESSES AND APPLICATIONS
NUMBER OF CREDITS: 4
PREREQUISITE(S): STAT 6100
COURSE DESCRIPTION: Markov Chains; Markov processes with discrete states in continuous time; Queueing Theory; Renewal Theory; Branching Processes, Epidemic Theory.
Assessment:
Coursework 40%
Final Examination: One 3 hour written paper 60%

SEMESTER: 2
COURSE CODE: STAT 6170
COURSE TITLE: MULTIVARIATE ANALYSIS
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: Multivariate Distributions; Normal, Wishart, T and Others with Applications; Regression Correlation and General Linear Hypothesis in the Multivariate setting; MANOVA and MANOCOVA; Principal Component Analysis; Factor Analysis; Cluster Analysis; Multidimensional Scaling.
Assessment:
Coursework 40%
Final Examination: One 3 hour written paper 60%

SEMESTER: 1
COURSE CODE: STAT 6180
COURSE TITLE: ADVANCED TOPICS IN STATISTICS
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: The Booktrap; The E-M algorithm Markov Chain Monte Carlo Methods; Empirical Bayes Methods.
Assessment:
Coursework 40%
Final Examination: One 3 hour written paper 60%

MSC DEGREE IN MATHEMATICS

OBJECTIVES
To impart a knowledge of Mathematics which would enable graduates to perform more effectively in the workplace and also enhance their research capability.

PROGRAMME CO-ORDINATOR: DR. DONNA COMISSIONG

Entry Requirements
To be admitted to the programme, a candidate should (normally) possess a BSc degree majoring in Mathematics or equivalent (minimum GPA 2.0) 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. All candidates must have passed the following courses (or its equivalent):

<table>
<thead>
<tr>
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<th>Title</th>
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<tbody>
<tr>
<td>MATH 2100</td>
<td>Abstract Algebra</td>
</tr>
<tr>
<td>MATH 2110</td>
<td>Linear Algebra</td>
</tr>
<tr>
<td>MATH 2120</td>
<td>Analysis &amp; Mathematical Methods I</td>
</tr>
<tr>
<td>MATH 2160</td>
<td>Analysis &amp; Mathematical Methods II</td>
</tr>
</tbody>
</table>

Duration of study
The course of study will extend over one year of full-time study or two years of part-time study. Part-time students will normally be required to complete the degree within two years of registration; and must complete it within three years.

Examination
Students will be required to pass both the coursework and the written examination. The pass mark is 50%. The grading scheme for graduate degrees is as follows: A 70 - 100%; B+ 60-69%; B 50-59%. In the case of the Research Project, evaluation will be based on the project report.
Award of Degree
To qualify for the award of the degree, candidates must pass all three Core courses, five/six Elective courses and the Research Project. The degree shall be awarded in two categories - Distinction and Pass. For the award of the degree with distinction, the candidate must have obtained an average mark of 70% or more, across all Core courses and Elective courses as well as 70% or more in the Research Project.

A candidate failing a course shall be ineligible for the award of distinction.

Course of Study
The MSc programme consists of 3 core courses and 5/6 electives
Either
(i) 5 elective courses and an 8-credit Research Project. (MATH 6000)
OR
(ii) 6 elective courses and a 4-credit Research Project. (MATH 6001)

A Research Project must be chosen in collaboration with at least one Lecturer in Mathematics. An 8-credit project is equivalent to two courses. A 4-credit project is equivalent to one course.

CORE COURSES: (4 CREDITS EACH)
Course Code  Title
MATH 6100  Algebra (Group Theory and Applications)
MATH 6110  Real Analysis
MATH 6120  Differential Equations

ELECTIVE COURSES: (4 CREDITS EACH)
Course Code  Title
MATH 6130  Algebra (Group Actions)
MATH 6140  Advanced Mathematical Methods
MATH 6150  Viscous Flows
MATH 6160  An Introduction to Non-Newtonian Fluid Mechanics
MATH 6170  Advanced Discrete Mathematics (F-Polynomials of Graphs)
MATH 6180  Probability
MATH 6190  Numerical Analysis
MATH 6191  Asymptotic & Perturbation Analysis
MATH 6192  Advanced Mathematical Modeling
MATH 6193  Numerical Methods for Partial Differential Equations

COURSE DESCRIPTIONS
SEMESTER: NOT OFFERED IN 2010/2011
COURSE CODE: MATH 6100
COURSE TITLE: ALGEBRA (GROUP THEORY AND APPLICATIONS)
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: Group Theory; Commutators, Centralisers and Nomalisers; The Homomorphism Theorems; The Sylow Theorems; The Class Equation of a Group; Theory of p-groups; Solvable Groups; The Jordan-Holder Theorem; Simple Groups; Direct Product of Groups. Applications Groups and Symmetry; Group Actions on Sets; Stabilisers Symmetry Groups in Two Dimensions; Matrix Groups; Rotations of Regular Solids; Finite Rotation Groups in Three Dimensions; Polya-Burnside Theorem and applications.
Assessment:
Coursework 25%
Final Examination: One 3 hour written paper 75%

SEMESTER: 2
COURSE CODE: MATH 6110
COURSE TITLE: REAL ANALYSIS
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: Topological spaces [Neighbourhood system, topological subspaces]; Interior closure, Frontier [Including dense and perfect sets]; Compactness; Connectedness; Metric Spaces; Continuity and Homeomorphism; Lesbegue Integral
Assessment:
Coursework 25%
Final Examination: One 3 hour written paper 75%

SEMESTER: 2
COURSE CODE: MATH 6120
COURSE TITLE: DIFFERENTIAL EQUATIONS
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
Assessment:
Coursework 25%
Final Examination: One 3 hour written paper 75%
SEMESTER: NOT OFFERED IN 2010/2011
COURSE CODE: MATH 6130
COURSE TITLE: ALGEBRA (GROUP ACTIONS)
NUMBER OF CREDITS: 4
PREREQUISITE: MATH3430 or MATH6100
COURSE DESCRIPTION: Introduction to Finite Group Theory; Groups and Homomorphism; Group Actions on Sets; Groups of Even orders; Finite p-groups; Normal Series; Direct Products and the Structures of Finitely Generated Abelian Groups; Group Actions on Groups.
Assessment:
Coursework 25%
Final Examination: One 3 hour written paper 75%

SEMESTER: 1
COURSE CODE: MATH 6140
COURSE TITLE: ADVANCED MATHEMATICAL METHODS
NUMBER OF CREDITS: 4
PREREQUISITE: NONE


Cylindrical Eigenfunctions

Spherical Eigenfunctions
Legendre Functions, Eigenfunctions of the Spherical Surface, Eigenfunctions for the Solid Sphere.
Assessment:
Coursework 25%
Final Examination: One 3 hour written paper 75%

SEMESTER: NOT OFFERED IN 2010/2011
COURSE CODE: MATH 6150
COURSE TITLE: VISCOUS FLOWS
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: Equations of Viscous Flow Kinematics and Dynamics of Flow, Energy Considerations, Boundary Conditions, Dimensional Analysis, Reynolds Number.

Exact Solutions
Some Exact Solutions including Flow Generated by an Oscillating Plate, Helical Flow in an Annular Region, Hamell's Problem of Flow in a Wedged-Shape Region, Flow Generated by a Rotating Disc.

Axially Symmetric Rotary Flows

Flow Past a Sphere
Creeping Flow Past a Sphere, Ossen's Criticism, Matching Techniques.

Lubrication Theory
Assessment:
Coursework 25%
Final Examination: One 3 hour written paper 75%

SEMESTER: NOT OFFERED IN 2010/2011
COURSE CODE: MATH 6160
COURSE TITLE: AN INTRODUCTION TO NON-NEWTONIAN FLUID MECHANICS
NUMBER OF CREDITS: 4
PREREQUISITE: MATH 6150

Material Properties Occurring in Steady Shear Flows
Flow Function, Normal Stress Functions.

Processes that are controlled by the Flow Function

Effect of Normal Stress Differences
Assessment:
Coursework 25%
Final Examination: One 3 hour written paper 75%
COURSE CODE: MATH 6170
COURSE TITLE: ADVANCED DISCRETE MATHEMATICS
(F-POLYNOMIALS OF GRAPHS)
NUMBER OF CREDITS: 4
PREREQUISITE: MATH 3290 and MATH 3400
COURSE DESCRIPTION: Review of Generating Functions and Solutions of Recurrence Relations using Generating Functions. General F-polynomials of Graphs, Matching Polynomials, Circuit Polynomials, Tree Polynomials and Sub-graph Polynomials. Relationships with other Graph Polynomials.
Assessment:
Coursework 25%
Final Examination: One 3 hour written paper 75%

COURSE CODE: MATH 6180
COURSE TITLE: PROBABILITY
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: Review of Distribution Theory; Poisson Process; Finite Markov Chains; Continuous time Markov Chains; Renewal Theory; Branching Process; Epidemic Theory
Assessment:
Coursework 25%
Final Examination: One 3 hour written paper 75%

COURSE CODE: MATH 6190
COURSE TITLE: NUMERICAL ANALYSIS
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
Numerical linear Algebra
Approximation of functions
Numerical solution of ordinary differential equations

Introduction to the numerical solution of partial differential equation
Elliptic, parabolic and hyperbolic partial differential equations.
Assessment:
Coursework 25%
Final Examination: One 3 hour written paper 75%

COURSE CODE: MATH 6191
COURSE TITLE: ASYMPTOTIC & PERTURBATION ANALYSIS
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
COURSE DESCRIPTION: Introduction to asymptotic approximations; Regular and singular perturbation methods for ordinary and partial differential equations; Matched asymptotic expansions: Boundary layer theory, outer and inner solutions with matching principles, interior layers, corner layers; Introduction to Multiple Scales: Slowly varying coefficients, forced motion near resonance, Floquet theory, Wittaker’s method; Boundary layers by multiple scales; Nonlinear oscillators; Bifurcation Theory; Hopf bifurcations, weakly non-linear analysis; Two-time and uniform expansions.
Assessment:
Coursework 65%
Midterm Examination 35%
One 3 hour written paper 35%

COURSE CODE: MATH 6192
COURSE TITLE: ADVANCED MATHEMATICAL MODELLING
NUMBER OF CREDITS: 4
PREREQUISITE: NONE
Assessment:
Research Project (written reportand oral presentation) 40%
Final Examination: One 3 hour written paper 60%
COURSE CODE: MATH 6193
COURSE TITLE: NUMERICAL METHODS FOR PARTIAL DIFFERENTIAL EQUATIONS
NUMBER OF CREDITS: 4
PREREQUISITE: NONE

Computer literacy is expected. Prior knowledge of mathematical software packages such as MATLAB would be an asset.

COURSE DESCRIPTION: Preliminaries: classification of partial differential equations; Well-posedness; Spatial differences: central differences; Fourier analysis; Higher order difference approximations; One-sided differing; 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; Leapfrog (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 4th 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.

Assessment:
Coursework 40%
(4 Computer Lab Group Assignments)
Final Examination: One 3 hour written paper 60%
DEPARTMENT OF PHYSICS

The Department of Physics at St. Augustine offers opportunities for postgraduate studies leading to MPhil and PhD degrees by research and thesis.

Normally all students register for an MPhil degree but after a year it is possible to upgrade one’s registration to a PhD degree on the recommendation of the supervisor and the approval of the Board for Higher degrees.

The minimum qualification for admission to the MPhil programme is a BSc General Honours degree in Physics (minimum GPA 3.0) or its equivalent from an approved University.

A candidate admitted for postgraduate studies with a ‘pass’ or a ‘lower second’ Bachelor’s degree or equivalent is normally required to take a qualifying examination by the end of the first year. Passing of the qualifying examination is a pre-requisite for the continuation of postgraduate studies and submission of thesis.

RESEARCH INTERESTS AND FACILITIES

The current research in progress or research areas where activities are planned include:

(1) FUEL CELL AND LITHIUM BATTERY RESEARCH AT PHYSICS DEPARTMENT:

The Fuel Cell and Lithium Battery Research is carried out at Caribbean’s First Fuel Cell Materials Research Lab at Dept. of Physics and broad areas are as follows:

a. Development of Membranes for Fuel Cells:

The main area of research is to develop new and novel electrolyte membranes for applications in Polymer Electrolyte Membrane Fuel Cells (PEMFC) and Direct Methanol Fuel Cells (DMFC’s). Various chemical and physical techniques are used to develop these membranes. The membranes developed are then evaluated using various characterization techniques and later tested in fuel cells. Research on materials for Solid Oxide Fuel Cells (SOFC’s) will be started shortly.

b. Development of Catalysts for Fuel Cells:

New and novel catalysts are under process of development at FCMRL. The goal is to develop new non platinum based catalysts to work with the developed membranes. Research is also carried out on the nano tubular support for the catalysts and their testing in fuel cells.

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Ext. 83124
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c. Modelling of Fuel Cells:
Modelling is very important aspect of fuel cell development and is done to evaluate various parameters related to fuel cell in order to use top to bottom approach in fuel cell development. Various models for different phenomena are developed using various software's like Matlab etc.

d. Development of Dye sensitized Solar Cells:
Materials for application in Dye sensitized solar cells are also synthesized and dyes are made in collaboration with Chemistry Department. Solar cells will be synthesized and tested in future.

e. Development of Electrolytes for Lithium Batteries:
Non-aqueous polymer electrolytes in gel as well film form are developed under this area of research for application in lithium batteries. Various techniques are used including acid-base approach, ternary system approach, polymer-in-salt approach etc. The materials developed are tested for their suitability in lithium batteries using different characterization techniques.

(2) CERAMICS AND REFRactories
a. Development of ceramics and refractories based on regional materials for a wide range of applications. Current research includes:
   • Chemical and mineralogical characterisation of raw materials, compositional studies, synthesis, high-temperature solid-state reactions,
   • Physical and mechanical testing, x-ray and electron microscopy. Analyses, micro-structure/property relationships.

(3) MEDICAL PHYSICS AND BIOENGINEERING
• Recordings of mass potentials as well as signals from neurons to determine the manner in which the brain interacts with its neural network functions. EEG studies.
• Blood flow studies for photoplethysmography
• Magnetocardiography using superconducting quantum interference device (SQUID).
• Objective assessment of the sciotic spine.
• Anthropometrics and ergonomics.
• Assessment of human movement, fitness testing.

(4) ASTRONOMY
a. Theoretical Astronomy
   • The area of focus in theoretical astronomy is with statistical analyses on the large scale structure of the Universe as well as quasars.

b. Observational Astronomy
   • Observational astronomy offers opportunities to study variable stars and other objects such as quasars and BL lac objects. This is done with the 16 L x 200 Meade Telescope equipped with CCD camera.

c. Astrobiology
   • Mud volcanoes and the pitch lake are studied as analog sites for Mars and Titan respectively as conditions for extremophiles.

(5) SOLAR ENERGY STUDIES
The design, construction and testing of low and high temperature flat plate collectors for use with
(i) Solar crop dryers and
(ii) Solar air conditioners, refrigerators and solar powered heat engines,
(iii) Solar timber dryers.
(iv) Solar water decontamination methods for rural areas.
(v) Solar Distillation
(vi) Materials for Photovoltaics
This area of research may be done as a joint effort with other departments.

(6) GEOTHERMAL ENERGY STUDIES
• Geophysical surveys - Resistivity and Seismic
• Methods of identification of fractured reservoirs
• Geothermal Heat Pumps

(7) EARTH MATERIALS STUDIES
• Various aspects of Mineralogy and Petrology of Trinidad and Tobago, including resources of the continental shelf.

(8) ENVIRONMENTAL PHYSICS
• Environmental monitoring with respect to sound and aerosols in certain work environment.
• Implications of sea surface temperatures for the Caribbean region in environmental studies.
• Climate change studies/modeling.
• Air pollution modeling (with respect to the regional industries).
• Solar water decontamination methods for rural areas.
• Lava flow problems (in collaboration with the Department of Mathematics and Seismic Research Unit).
• Wind potential assessments for Trinidad and Tobago.
• Rain erosivity determination.

(9) QUANTUM OPTICS
Quantum physics and solar energy technologies and medical technologies.

(10) FIBRE-OPTICS, OPTOELECTRONICS
Optoelectronics, fibre-optics and solar energy technologies and medical technologies.

(11) ELECTRONICS
• VLSI (Very Large Scale Integration) Implementation of Digital Signal Processing (DSP) Algorithms.
• Simulation and Design of Communication Systems.
• Design of Speech Recognition Systems.
• Design of Spectrum Analyzer
• Digital system Design using FPGA (Field Programmable Gate Array)
MSC COURSES IN PHYSICS

SEMESTER: 2 (NOT OFFERED IN 2011-2012)
COURSE CODE: PHYS6294
COURSE TITLE: NOVEL MATERIALS
NUMBER OF CREDITS: 3
PREREQUISITE: B.SC (PHYSICS, CHEMISTRY, CHEMICAL ENGINEERING AND/OR PERMISSION OF HOD, PHYSICS)

COURSE DESCRIPTION: Superconductivity phenomenon, magnetic properties of superconductors, theories of high Tc superconductors, preparation techniques and composition features, applications of high Tc superconductors.

Fundamentals of nanotechnology, Nanotechnology in materials, ceramic nanomaterials, metal nanomaterials, polymeric nanomaterials, composite nanomaterials, synthesis of nanomaterials, nanotechnology in biomaterials, soft biomaterials, nanotubes, nanowires, applications of nanomaterials

Geometry of Nanoscale Carbon; Bonding, Dimensionality, Topology, Energetics, Fullerenes; Single and double walled Carbon Nanotubes, Synthesis of Single Wall Carbon Nanotubes; Diameter and Orientation Control and growth mechanisms, Selective Covalent Chemistry, applications of carbon nanotubes


ASSESSMENT:
Coursework: 30%
Research Project: 70%

SEMESTER: 2
COURSE CODE: PHYS 6492
COURSE TITLE: DIGITAL SYSTEM DESIGN
NUMBER OF CREDITS: 3
PREREQUISITE: B. SC. PHYSICS WITH MINORS IN ELECTRONICS/MEDICAL PHYSICS AND BIOENGINEERING, B. SC. IN ELECTRICAL AND COMPUTER ENGINEERING, B. SC. IN COMPUTER SCIENCE / MATH WITH PHYS2291 / PHYS3391 OR PERMISSION OF HEAD OF DEPARTMENT.


VHDL modeling and simulation of basic and advance combinational & sequential circuits. Design of Microcomputer: Basic components of a Microcomputer, Specifications, Architecture of a simple Microcomputer system, Design of a simple Microcomputer system using VHDL. Synthesis and optimization for cost, speed, power and chip recourse utilization tradeoffs.

Programmable logic devices: PROM (Programmable Read Only Memory), PAL (Programmable Array Logic), PLA (Programmable Logic Array), CPLD (Complex Programmable Logic Device) and FPGA (Field Programmable Gate Array). Xilinx’s FPGA Design Flow. Digital system implementations using CPLDs and FPGAs. FPGA based implementation of various digital signal processing algorithms.

COURSE ASSESSMENT:
Theory Coursework: 30%
Four Laboratory reports (equal weighting): 20%
One Major Design Project: 50%
SEMESTER: 2  
COURSE CODE: PHYS 6295  
COURSE TITLE: SOLAR ENERGY CONVERSION  
NUMBER OF CREDIT: 3  
PREREQUISITES: B.S.C. PHYSICS OR PERMISSION FROM HEAD OF DEPARTMENT. 

RENEWABLE ENERGY 
Solar Energy; Photovoltaics; Wind Energy; Hydroelectricity; Geothermal Energy; Ocean Thermal Energy Conversion; Wave Energy; Hydrogen; Fuel Cells; Biomass. 

SOLAR ENERGY 
Solar energy utilization; Solar radiation basic concepts, Geometric effects, Atmospheric effects, Solar spectrum, Solar insolation, Air mass; Solar; spectra, Spectral Energy distribution, Planck’s formula, Spectral distribution of the solar constant, Wien's law, Stefan Boltzmann law; Flat plate collectors, selective surfaces; Design, construction and operating principles of a solar collector; Optical characteristics - Optics of collectors, Fresnel equations, Overall transmittance and reflectance for two polarization states, multiple glazings; Heat transfer across building walls; Heat transfer;characteristics; Efficiency of glazing/absorber system; Angular dependence of Solar Absorptance; Transmittance-Absorptance product; Radiation; exchange between surfaces; Mathematical analysis of a solar collector as applied to a selected unit; Concentrating Solar Power (CSP); Solar Cooling 

PHOTOVOLTAICS (PV) 
Photoelectric effect; Semi-conductor Physics; Materials used for PV cells; Photovoltaic cell, module, array; PV characteristics, characteristic curves; Factors influencing performance of PV cells; PV energy systems: components generator, charge controller, battery and inverter; PV design, including Electrical and Mechanical design; Categories of PV modules: Cell types, Encapsulation materials, Substrate and Frame structure; Thin Films; Quantum Dot Nanotechnology; PV Grid connection; Modeling techniques: RETScreen Analysis; Economic analysis and applications; Socio-economic impacts of renewable energy education, dissemination and applications. 

Course Assessment: 

POSTGRADUATE COURSE IN “SCIENTIFIC PRESENTATION AND CRITIQUE” 

COURSE DESCRIPTIONS 

MPhil 
GRSM 7004 – Scientific Presentation and Critique 1 
GRSM 7005 - Scientific Presentation and Critique 2 
GRSM 7006 - Scientific Presentation and Critique 3 

PhD 
GRSM 8004 - Scientific Presentation and Critique 1 
GRSM 8005 - Scientific Presentation and Critique 2 
GRSM 8006 - Scientific Presentation and Critique 3 

TITLE: SCIENTIFIC PRESENTATION & CRITIQUE 1 (GRSM 7004 OR 8004) 
This year long 1-credit course will be conducted within the context of departmental seminars presented once a week by academic staff and graduate students and visitors. Students will be assessed on (1) presentation and critique of recently published scientific papers (2) presentation of their own work in progress (3) critique of seminars presented by other graduate students, academic staff and invited external speakers to the Faculty / UWI and (4) attendance at these seminars. There are no pre-requisites. This course is recommended for all MPhil. and PhD. students in the Faculty of Science and Agriculture. 

Title: Scientific Presentation & Critique 2 (GRSM 7005 or 8005) 
Students will be expected to have already completed GRSM 7004 OR GRSM 8004 or received credit for the course before registering for this course. This year long 1-credit course will be conducted as for GRSM 7005 or 8005 but the assessment will require a higher standard of performance from the students in the areas (1) to (3) above. This course is recommended for all MPhil. and PhD students in the Faculty. 

Title: Scientific Presentation & Critique 3 (GRSM 7006 or 8006) 
Students may register for a third course, GRSM 7006 or 8006, after completing both GRSM 7004 or 8004 and GRSM 7005 or 8005 or receiving credit for them. This year long 1-credit course will be conducted as for the two previous courses above but assessment will require a higher level of performance than for GRSM 7005 or 8005. This course is recommended for all PhD students in the Faculty.
Purpose of the Courses
These courses are designed for MPhil and PhD students. Its purpose is to:
- Immerse graduate students into a culture of reading and critical analysis of research in their field and related disciplines.
- Expose students to a broad range of research topics in and related to their discipline.
- Involve students in regular scientific discourse involving their own work and the work of others.
- Develop students’ analytical and critical thinking skills as well as their oral presentation and writing skills.

NOTE: Current School of Graduate Studies state that MPhil students are required to present two assessed seminars and PhD students must present three. This course may be used as a forum for these presentations which will be assessed in the manner prescribed for such assessed seminars.

Instructor Information
Name of instructor(s): Faculty co-ordinator (course co-ordinator;)
Departmental co-ordinators.

NOTE: Course co-ordinator is the first examiner and has overall responsibility for the course. Department co-ordinators will be responsible for scheduling of their department’s seminars and journal club sessions, recording student attendance and for assessment and evaluation of students attending their sessions.

Office Hours: To be advised
Communication policy: Email is the preferred method of contact.

Content
The course will consist of research seminars presented once a week by academic staff and graduate students. Students will also meet at least every other week in groups in which by schedule there will be a presentation by a student of a journal article for discussion.

Students will be assessed by a panel of staff chosen from the department involved on (1) presentation and critique of recent scientific papers (2) presentation and defence of their own work in progress and (3) critique of seminars presented by other graduate students, academic staff and invited external speakers to the faculty/UWI. Students will also be required to attend library workshops covering topics including general library skills, effective use of online resources, academic writing styles, critique of scientific papers.

Format: Each research seminar/group meeting session will last about 1 hr including a question and answer period at the end of the presentation. In general, presentations will be approximately 30 minutes followed by questions/discussion. For student presentations, the last 15 minutes may be used for further questioning by assessing panel, for targeted discussion, feedback on performance and past assignments from the assessors.

Assignments
Paper Summaries: In the group seminars when students are presenting a journal article for discussion, the paper should have appeared in (or have been accepted to) a peer-reviewed journal and should be technically rigorous for the field. Thus papers published in magazines will generally be inappropriate. The selected paper will be circulated amongst students one week in advance of the presentation and students will be asked to read it and prepare a paper summary as outlined below. Paper summaries can also be prepared on publications by invited speakers prior to the seminar, in which case each student will be responsible for selecting a paper by the relevant speaker.

To receive credit for a paper summary, it must be submitted before the relevant presentation starts. Each paper summary will receive a grade of 1, 2 or 3. Grades of 2 or 3 are required to receive credit for it towards the 5 required summaries (see assessment below). The paper summary should be 1 - 2 pages in length and should include the labeled sections listed below:

- Paper Bibliography Information: title, author(s), where and when published, etc.
- Problem Statement: Identify the research question in the paper and why it is significant.
- Hypothesis / Hypotheses: State the main hypothesis/hypotheses being tested.
- Scientific Approach: Describe the methods used or the analyses completed by the author(s).

GOALS / AIMS
The aim of the course is to broaden graduate students knowledge base while developing their analytical, critical thinking and presentation skills. It also aims to encourage students to reflect on their own research work, and to engage in peer review and scientific discourse.

Topic or Unit Objectives
At the end of this course students will be able to:
- Effectively present their own research and the work of other scientists,
- Accurately identify, summarise and critically assess the research question(s), hypotheses, methodology, results, analysis of results and conclusions arrived at from both written and orally presented research work, respond appropriately to questions raised about their own work.

Students will be encouraged to attend as many seminars as possible, even when the topic may seem unrelated to their research as exposure to current research in areas that are not directly related to their own research is an excellent means of broadening their knowledge base. Students may attend seminars in departments other than their own but must make prior arrangements with the relevant facilitator to ensure that their attendance is recorded and they are appropriately assessed.
• Results: Summarize the major results of the paper.

• Critique: Comment on the elements above, on the analysis of the results, the validity of the conclusions reached, whether the results support the hypothesis or not and whether there are alternative hypotheses that might account for the results. Also note aspects that could be improved (and note how), identify open issues that relate to the problem area but are not addressed in the paper, etc.

The goal of the one-page summaries is to allow students to become familiar with the topic of the presentation prior to the presentation. This will enable them to better understand the talk and will give them time to formulate questions. It also develops their analytical and critical thinking skills. Students will be encouraged to discuss a given paper with other students in the course for better understanding of the paper content; each student, however, will be required to write an independent paper summary.

Seminar reports:
To receive credit for attending a seminar based on on-going research by graduate students, academic staff or visiting lecturers (as opposed to the journal club format described above), students will be required to complete a seminar report on a form that will be available at the beginning of the seminar. The forms may vary from one session to the next but will generally include questions designed to confirm whether students were actively engaged in the sessions (e.g., the student might be asked to state the objectives of the work presented, to state the main hypothesis, or to comment on the methodological approach used). The completed forms will be due at the conclusion of the seminar (after the question and answer session).

If a student misses a seminar for a valid reason they may be allowed to submit a make-up report e.g. a 2-page paper on the topic of the seminar missed. However this is entirely at the discretion of the departmental co-ordinator.

Assessment
Assessment will be Pass / Fail. To receive credit for this course students will have to satisfy all of the following requirements:

a. A minimum of 75% attendance at seminars (incl. group meetings). Students will have to stay for the full hour or until the discussion is completed (which ever is shorter) in order to be credited with attendance. They are also expected to refrain from activities such as doing other work, reading or sleeping during sessions. Those exhibiting such behavior will not receive credit for attending that seminar. Seminar reports (see below) will be used as evidence of attendance, so students must complete one for each seminar attended.

b. Pass grades for at least 5 seminar reports. Each seminar report will receive a grade of 1, 2 or 3. Only those with grades of 2 or 3 will count towards the required reports.

c. Pass grades for at least 5 paper summaries. Each paper summary will receive a grade of 1, 2 or 3. Only summaries that receive grades of 2 or 3 will count towards the 5 required summaries.

d. Satisfactory presentation of at least one seminar and one published research paper
One seminar should be on their research proposal / the progress of their own work / thesis outline (depending on the stage of their work) and the other should be a presentation of a paper from a peer-reviewed journal. Student presentations will receive a grades of 1, 2 or 3 and only grades 2 and 3 will be credited.

Evaluation
Evaluation is on the basis of continuous assessment (as described above). There is no final examination associated with this course.

Teaching strategies
Seminars, Group discussion, Self-directed learning, Individual consultation.

Resources
Articles from peer-reviewed scientific journals in the chemistry or related fields. Although these will primarily be journals to which the UWI subscribes, pay-per-view purchase of some articles will occasionally be required.

Readings
The readings will be articles from peer-reviewed scientific journals and will vary depending on the seminar topics. Students may also need to consult relevant textbooks.

Course Calendar
• The courses will be year-long (2 semesters) with sessions held every week (alternating journal club and research seminars). Seminar topics and relevant papers will be circulated at least a week in advance.
• Paper summaries will be due on the day of the relevant journal club prior to the beginning of the session.
• Seminar reports will be due on the day of the relevant seminar at the end of the question and answer session.

NOTE: Students are responsible for checking the seminar schedule and their email for up to date information including on the scheduled date for the seminar as sometimes seminars will be announced / cancelled at the last moment.