ANY REFERENCE IN THIS BROCHURE TO CXC (CSEC) QUALIFICATIONS SHOULD BE INTERPRETED TO MEAN GENERAL PROFICIENCY GRADES I OR II AND ALSO GRADE III OBTAINED SINCE 1998
INTRODUCTION

Teaching in the Science Faculty commenced at Mona in 1949 with students in the Departments of Botany, Chemistry, Mathematics, Physics, and Zoology. The 1960s saw a period of rapid expansion of the Faculty. At St. Augustine and Cave Hill, teaching commenced in 1963 and 1964 respectively in the then College of Arts and Sciences in Chemistry, Mathematics and Physics. These subjects were incorporated into the Faculty in 1972. Today the Science Faculty is among the largest in the University with teaching in Biochemistry, Biology, Botany, Chemistry, Computer Science, Geography, Geology, Mathematics, Meteorology, Physics and Zoology (some subjects are offered only at one campus). The first eleven graduates appeared in 1952 and by 2000 over 9,000 graduates had been produced. The last academic year (2009/2010) had a student registration (graduate and undergraduate) of 2,415 at Mona, 3,730 at St. Augustine and 1,234 at Cave Hill. Relationships with Tertiary level Colleges are increasing and students at such Colleges in Antigua, The Bahamas and St. Lucia read the Part I courses of our Faculty. Community Colleges in Jamaica offer our Preliminary Courses. In addition to undergraduate teaching, postgraduate teaching and research form an important aspect of the work of the Faculty. In addition to Diploma and MSc programmes, the Faculty offers programmes for the MPhil and PhD degrees in all Departments.
INTRODUCTION

Faculty Officers and Personnel ................................................. 1
Registry Officers and Personnel ........................................... 3

GLOSSARY .............................................................................. 4

OPTIONS

Computer Studies – Option 1 .................................................. 7
Chemistry and Management – Option 2 ................................... 8
Mathematics with Education – Option 3a ................................ 9
Chemistry with Education – Option 3b .................................... 17
Physics with Education – Option 3c ....................................... 19
Biology with Education – Option 3d ...................................... 20
Materials Science – Option 4 .................................................. 22
Actuarial Science – Option 5 .................................................. 23
BSc (Special) Chemistry Degree – Option 6 ......................... 24
Microbiology – Option 7 ....................................................... 25
Science, Media & Communication – Option 8 ....................... 27

Department of Basic Medical Sciences

Biochemistry courses ............................................................ 30

Department of Chemistry

Chemistry courses ................................................................. 45
Occupational and Environmental Safety and Health (OESH) .... 75

Department of Computing

Computing courses ............................................................... 78

Department of Geography and Geology

Geography courses ............................................................... 102
Geology courses ................................................................. 118

Department of Life Sciences

Life Sciences courses ............................................................ 124
Tropical Horticulture ........................................................... 193

Department of Mathematics

Mathematics courses ............................................................ 199

Department of Physics

Physics courses ................................................................. 225
Electronics Engineering ....................................................... 261

SCHOLARSHIPS & AWARDS ................................................. 283
### FACULTY OFFICERS AND PERSONNEL

#### DEAN AT CAVE HILL
- **Mr. Peter Gibbs**
- **Dr. Colin Depradine**
- **Professor Ishenkumba Kahwa**
- **Professor Ralph Robinson**
- **Dr. Novlette Sadler-McKnight**
- **Dr. Roy Porter**
- **Dr. Marcia Roye**

#### DEAN AT MONA
- **Professor Ishenkumba Kahwa**
- **Professor Ralph Robinson**
- **Dr. Novlette Sadler-McKnight**
- **Dr. Roy Porter**
- **Dr. Marcia Roye**

#### DEAN AT ST. AUGUSTINE
- **Professor D. Narinesingh**
- **Dr. Indar Ramnarine**
- **Dr. Reynold Stone**

#### AT MONA

**FACULTY OFFICE**

<table>
<thead>
<tr>
<th>Name</th>
<th>Tel/FAX</th>
<th>Direct Line</th>
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<tbody>
<tr>
<td>Dean, Prof. Ishenkumba Kahwa</td>
<td>927-1566</td>
<td>977-1785</td>
<td>2401</td>
</tr>
<tr>
<td>BSc Tanzania, MSc Dar es Salaam</td>
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<tr>
<td>PhD Louisiana State U</td>
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<tr>
<td>Deputy Dean, Prof. Ralph Robinson</td>
<td>977-1075</td>
<td>927-1202</td>
<td>2291-2</td>
</tr>
<tr>
<td>BSc (Hons), Zoology, PhD Parasitology</td>
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<tr>
<td>The Queen’s University, Belfast</td>
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<tr>
<td>Associate Dean Student Matters, Dr. Roy Porter</td>
<td>977-6029</td>
<td>927-2129</td>
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</tr>
<tr>
<td>BSc, PhD UWI</td>
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<tr>
<td>Administrative Officer, Mrs. Michelle Bryan-Ennis</td>
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<tr>
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**DEPARTMENT OF CHEMISTRY**

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<tr>
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<td>927-1910</td>
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<tr>
<td>Acting Head, Prof. Helen Jacobs*</td>
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<tr>
<td>BSc (Hons) UWI</td>
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<tr>
<td>DPhil. University of Sussex, UK</td>
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<td>Administrative Officer, Mrs. Miriam Lindo</td>
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<td>Senior Secretary, Miss Tracia Johnson</td>
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**DEPARTMENT OF COMPUTING**

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<tr>
<td>Head, Dr. Daniel Coore</td>
<td>702-4455</td>
<td>977-4470</td>
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<tr>
<td>SB, SM, PhD MIT</td>
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<tr>
<td>Administrative Assistant, Mrs. Donna. Burke</td>
<td>702-4455</td>
<td>977-4470</td>
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<td>Senior Secretary: Miss Fiona Porter</td>
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**DEPARTMENT OF GEOGRAPHY AND GEOLOGY**

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<tr>
<td>Head, Prof. David Barker</td>
<td>977-6029</td>
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<tr>
<td>BSc (Econ) University College of the Wales Aberystwyth, Dip of Urban and Regional Studies University of Birmingham, PhD University of Bristol</td>
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<tr>
<td>Senior Secretary, Mrs. Nadine Sherlock-Marshall</td>
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**DEPARTMENT OF LIFE SCIENCES**

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<td>Head, Dr. Mona Webber</td>
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<tr>
<td>BSc, MPhil, PhD UWI</td>
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<tr>
<td>Administrative Assistant Miss Josephine, Parchment</td>
<td>977-1075</td>
<td>927-1202</td>
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<tr>
<td>Senior Secretary, Miss Debbie-Ann Brown</td>
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**DEPARTMENT OF MATHEMATICS**

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<td>Head, Prof. Alexandria Rodkina</td>
<td>927-2464</td>
<td>927-2728</td>
<td>2284</td>
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<tr>
<td>MSc Voronezh State University, USSR</td>
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<tr>
<td>PhD Institute of Mathematics of Ukraine, USSR</td>
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<tr>
<td>Administrative Assistant, TBA</td>
<td>2621</td>
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<tr>
<td>Secretary, Mrs. Greta Everett</td>
<td>2455</td>
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</table>
### DEPARTMENT OF PHYSICS

**Head, Dr Michael Taylor**
MSc Technical University, Bratislava, PhD Technical University Bratislava/University of Toronto
977-1595 927-2480 2278

**Administrative Assistant, Mrs. Rosalee Simmonds**
977-1595 927-2480 2278

**Senior Secretary, Miss Margaret. Little**
977-1595 927-2480 2278

### LIBRARIAN-IN-CHARGE, SCIENCE LIBRARY

BA, Dip LS UWI, MLS Cath Univ Amer
2202/3

### DIRECTOR, BIOTECHNOLOGY CENTRE

TBA
977-3331 977-1828 2518/9

**BSc Bhagal, MSc, PhD IARI**

### DIRECTOR, CENTRE FOR MARINE SCIENCES

Prof. Dale Webber
927-1202 2290

**BSc, PhD UWI**

### ELECTRON MICROSCOPY UNIT

**Dr. Klaus Wolf**
977-1076 2252

**Dip, PhD Biol Erlangen-Nuernberg**

**Mr. Walton. Reid**
977-1076 2252

**MPhil UWI, Engineer**

*Acting Head of Department for 2010/11*

+ Off on Sabbatical Leave for 2010/11
## REGISTRY OFFICERS AND PERSONNEL

<table>
<thead>
<tr>
<th>OFFICE:</th>
<th>Tel/FAX</th>
<th>Direct Line</th>
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<tbody>
<tr>
<td>CAMPUS REGISTRAR</td>
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<tr>
<td>Dr. Camille Bell-Hutchinson</td>
<td>970-4471</td>
<td>971-1202</td>
<td>2542/2600</td>
</tr>
<tr>
<td>BA, PhD</td>
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<tr>
<td>SECRETARIAT</td>
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<tr>
<td>Servicing Faculty Pure &amp; Applied Sciences</td>
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<tr>
<td>Assistant Registrar Mrs. Rodina Reid</td>
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<tr>
<td>BA, MSc</td>
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<tr>
<td>Secretary/Stenographer – Miss Patrice Crossfield</td>
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<tr>
<td>STUDENT AFFAIRS (ADMISSIONS)</td>
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<tr>
<td>Senior Assistant Registrar Mrs. Marsha Morgan-Allen</td>
<td>927-2779</td>
<td>2651</td>
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<tr>
<td>BSc UWI, MBA Nova Southeastern University</td>
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<td>Assistant Registrar, Mrs. Marjorie Bolero-Haughton</td>
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<td>Administrative Secretary, Mrs. Denzie Bethune</td>
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<tr>
<td>Faculty Clerk, Pure &amp; Applied Sciences Mr. Terron Francis</td>
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<td>STUDENT AFFAIRS (EXAMINATIONS)</td>
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<tr>
<td>Acting Senior Assistant Registrar, Mrs. Georgia Chambers-Anderson</td>
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<td>Administrative Assistant, Mr. Joel Shepherd</td>
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<td>Secretary/Stenographer, Miss Beatrice Brown</td>
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<td>STUDENT ADMINISTRATIVE SERVICES SECTION (SASS)</td>
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<tr>
<td>Supervisor – Mrs. Sandra Ebanks</td>
<td>512-3736</td>
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<td>POSTGRADUATE STUDIES</td>
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<tr>
<td>Campus Coordinator, Prof. Yvette Jackson</td>
<td>977-1835</td>
<td>977-1834</td>
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<tr>
<td>BSc, PhD</td>
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<tr>
<td>Acting Assistant Registrar, Mrs. Sandra Mangaroo</td>
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<tr>
<td>STUDENTS RECORDS UNIT</td>
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<tr>
<td>Assistant Registrar, Mrs. Elecif Arthurs</td>
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<td>BSc, MBA</td>
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<tr>
<td>Business Analyst, Miss Ann-Marie Rose</td>
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<tr>
<td>BSc, MIB</td>
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<tr>
<td>Senior Administrative Assistant, Miss Dahlia Saunders</td>
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3
## GLOSSARY

<table>
<thead>
<tr>
<th>TERM</th>
<th>DEFINITION</th>
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<tbody>
<tr>
<td>1. Science – Faculty of Science &amp; Agriculture; does not include Sciences.</td>
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<tr>
<td>2. Discipline – A body of knowledge encapsulated in a set of courses distinguishable from other such bodies on the basis of criteria such as method of enquiry, axioms, areas of application.</td>
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<tr>
<td>3. Subject – An area of study traditionally assigned to the purview of a department.</td>
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<tr>
<td>4. Course – A body of knowledge circumscribed by a syllabus to be imparted to students by sundry teaching methods and usually followed by an examination.</td>
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<tr>
<td>5. Faculty Courses – All approved courses offered by a Faculty of the University for credit towards a degree, except Foundation and Co-curricular courses.</td>
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<tr>
<td>6. In-Faculty – All Faculty courses originating in the Science Faculties. Courses</td>
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<tr>
<td>7. Out-of-Faculty – All Faculty courses originating in Faculties other than the Courses Science Faculties.</td>
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<tr>
<td>8. Programme – A selection of courses (designed to achieve pedagogical goals) the taking of which is governed by certain regulations and the satisfactory completion of which (determined by such regulations) makes a candidate eligible for the award of a degree/diploma/certificate.</td>
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<tr>
<td>9. Level – A measure of the standard of a course, designated at UWI by the first digit in the course number.</td>
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<td>10. Part – A stage of a program</td>
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<tr>
<td>(i) Part I (Introductory Stage) - Level 1 and Preliminary courses</td>
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<tr>
<td>(ii) Part II (Advanced stage) - Level 2 and 3 courses</td>
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<tr>
<td>11. Credit – A measure of the workload required of students in a course. 1 Credit Hour = 1 hour lecture/tutorial/problem class per week OR 2 hours laboratory session per week, for a Semester.</td>
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<tr>
<td>12. Major – 32 credits (45-46 in Agriculture) from prescribed courses at Levels 2 &amp; 3 (Departmental course listings).</td>
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</table>
13. **Minor** – 16 credits (15-16 in Agriculture) including prescribed courses at Levels 2 & 3 (see Departmental course listings).

14. **Option** – A prescribed programme of in-Faculty and, in some cases, Out-of Faculty courses, leading to a specific degree.

15. **Elective** – A course within a programme taken by free choice of the student.

16. **Marginal Failure** – A score for the overall examination of a course which is not more than 5 marks below the minimum pass mark for that course.

17. **Supplemental Examination** – A re-sit of an examination offered on recommendation of Department and Faculty, to candidates who, having passed course work, have registered a marginal failure in a course. *(Not currently offered at Mona).*

18. **Supplementary Oral** – An oral examination offered on recommendation of Department and Faculty, to candidates who have registered a marginal failure in a Level 2 or Level 3 course.

19. **Pre-requisite** – A course which must be passed before another course for which it is required may be pursued.

20. **Anti-requisites** – Two mutually exclusive courses of which credit may be granted for only one.

21. **Co-requisite** – A course which **must** be taken along with another specified course, in order to ensure the attainment of complementary and/or interdependent competencies.

22. **Semester GPA** – Grade point average computed on the basis of all courses done in a semester, without reference to weighting except in terms of credits. *(The terms Grade Point, GPA, Quality Hours and Quality Points are defined in the UWI Grade Point Average Regulations Booklet)*

23. **Cumulative GPA** – Grade Point Average obtained by dividing the total grade points earned by the total quality hours for which the student has registered for any period of time excluding courses taken on a Pass/Fail basis, audited courses, courses taken for Preliminary credit, incomplete and in-progress courses.
24. Programme GPA—Weighted grade point average used to determine the class of degree. This GPA is computed on the basis of all courses done in the advanced Part of the degree programme, weighted with respect to credits and to earned quality hours.
### FACULTY OF PURE AND APPLIED SCIENCES

#### DEPARTMENTAL OPTIONS

### OPTION 1

#### COMPUTER STUDIES

#### Part 1

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<th>Names</th>
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<tr>
<td>CS11Q/COMP1125, Introduction to Computer Science (I)</td>
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<tr>
<td>CS11R/COMP1160, Object-Oriented Programming</td>
<td>6</td>
</tr>
<tr>
<td>M10A/MATH1140, Basic Introductory Mathematics</td>
<td>6</td>
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<tr>
<td>M10B*/MATH1150, Functions of Real Variables</td>
<td>6</td>
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<tr>
<td>EC10C/ECON1001, Introduction to Microeconomics</td>
<td>3</td>
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<tr>
<td>EC10E/ECON1002, Introduction to Macroeconomics</td>
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* A good grade in M10C may substitute

either

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<tr>
<td>MS15D/ACCT1005, Financial Accounting</td>
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<tr>
<td>MS15B/ACCT1003, Introduction to Cost and Management Accounting</td>
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or

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<td>SY14/SOCI1002, Sociology for the Caribbean</td>
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<tr>
<td>PS10C/PSYC1002, Introduction to Industrial and Organizational Psychology</td>
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#### Part II

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<td>CS20R/COMP2111, Analysis of Algorithms</td>
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<tr>
<td>CS20S/COMP2101, Discrete Mathematics for Computer Science</td>
<td>4</td>
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<tr>
<td>CS22Q/COMP2140, Introduction to Software Engineering</td>
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<tr>
<td>CS23Q/COMP2240, Computer Organization</td>
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<tr>
<td>CS31A/COMP3100, Operating Systems</td>
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</tr>
<tr>
<td>CS35A/COMP3160, Database Management Systems</td>
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<tr>
<td>CS35Q/COMP3110, Information Systems in Organizations</td>
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<tr>
<td>CS39Q/COMP3900, Group Project</td>
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### Plus
28 additional credits from Level II or III chosen from Computer Science, Mathematics, Economics or Management Studies.

**OPTION 2**

**CHEMISTRY AND MANAGEMENT**

**Part I**

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<td>C10J/CHEM1901</td>
<td>Introductory Chemistry I Semester I</td>
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<tr>
<td>C10K/CHEM1902</td>
<td>Introductory Chemistry II SII</td>
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<tr>
<td>EC10C/ECON1001</td>
<td>Introduction to Microeconomics SI&amp;II</td>
<td>3</td>
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<tr>
<td>EC10E/ECON1002</td>
<td>Introduction to Macroeconomics SI&amp;II</td>
<td>3</td>
</tr>
<tr>
<td>SY14G/SOCI1002</td>
<td>Sociology for the Caribbean SI</td>
<td>3</td>
</tr>
<tr>
<td>PS10C/PSYC1002</td>
<td>Introduction to Industrial &amp; Organisational Psychology SII</td>
<td>3</td>
</tr>
<tr>
<td>MS15D*/ACCT1005</td>
<td>Financial Accounting</td>
<td>3</td>
</tr>
<tr>
<td>MS15B/ACCT1003</td>
<td>Introduction to Cost and Management Accounting SII</td>
<td>3</td>
</tr>
</tbody>
</table>

* Students entering in 2010/2011 having passed CAPE Accounting Units I & II with Grade IV or better will receive credit exemptions from MS15D/ACCT1005 & MS15B/ACCT1003.

**Part II**

<table>
<thead>
<tr>
<th>Course Codes</th>
<th>Names</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>C20J/CHEM2001</td>
<td>Chemical Analysis I Semester I</td>
<td>4</td>
</tr>
<tr>
<td>C21J/CHEM2101</td>
<td>Inorganic Chemistry SI</td>
<td>4</td>
</tr>
<tr>
<td>C22J/CHEM2201</td>
<td>Spectroscopy, Carbanions etc. SI</td>
<td>4</td>
</tr>
<tr>
<td>C23J/CHEM2301</td>
<td>Physical Chemistry SI</td>
<td>4</td>
</tr>
<tr>
<td>C31J/CHEM3101</td>
<td>Inorganic Chemistry SII</td>
<td>4</td>
</tr>
<tr>
<td>C32J/CHEM3201</td>
<td>Synthesis, Mechanism &amp; Stereochemistry SII</td>
<td>4</td>
</tr>
<tr>
<td>C33J/CHEM3301</td>
<td>Physical Chemistry SII</td>
<td>4</td>
</tr>
<tr>
<td>MS20A/MGMT2001</td>
<td>Principles of Marketing SI</td>
<td>3</td>
</tr>
<tr>
<td>MS21C/MGMT2005</td>
<td>Computer Applications SI&amp;II</td>
<td>3</td>
</tr>
<tr>
<td>MS22A/MGMT2008</td>
<td>Organizational Behaviour SI&amp;II</td>
<td>3</td>
</tr>
<tr>
<td>MS23C/MGMT2012</td>
<td>Quantitative Methods &amp; Research Principles SI&amp;II</td>
<td>3</td>
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<tr>
<td>MS27B/MGMT2021</td>
<td>Business Law SI&amp;II</td>
<td>3</td>
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<tr>
<td>MS28D/MGMT2023</td>
<td>Financial Management I SI&amp;II</td>
<td>3</td>
</tr>
<tr>
<td>MS29P/MGMT2026</td>
<td>Introduction to Production and Operations Management SI&amp;II</td>
<td>3</td>
</tr>
<tr>
<td>MS33D/MGMT3031</td>
<td>Business Strategy and Policy SII</td>
<td>3</td>
</tr>
<tr>
<td>MS34A/MGMT3036</td>
<td>Entrepreneurship and Venture Capital SI&amp;II</td>
<td>3</td>
</tr>
</tbody>
</table>

**Plus**

**Four** additional credits from Level 2 or Level 3 Chemistry Courses approved by the Department, to be taken along with **three** additional credits from Level 2 or 3 Management Studies courses to complete the course of study.
OPTION 3 (a)
MATHEMATICS WITH EDUCATION
with
Initial Teacher Training

YEAR 1

Semester 1
Mathematics Courses

M10A/MATH1140  Basic Introductory Mathematics  6 credits
MATH1180  Engineering Mathematics I  6 credits

Education Courses

ED10T/EDTL1020  Introduction to Teaching and Learning  3 credits
ED10C/EDPS1003  Psychological Issues in the Classroom  3 credits

Core

ED20Y/EDTK2025  Introduction to Computer Technology in Education  3 credits

University Foundation Courses

FD10A/FOUN1001  English for Academic Purposes
or
FD14A/FOUN1401  Writing in the Disciplines
or
FD13A/FOUN1301  Law, Governance, Economy & Society
or
FD11A/FOUN1101  Caribbean Civilization  3 credits

Semester 2

Mathematics Courses

M10B/MATH1150  Functions of Real Variables  6 credits
M10C  Mathematics for Pure and Applied Sciences  6 credits

Education Courses

ED10U/EDTL1021  Planning for Teaching  3 credits
University Foundation Courses

FD10A/FOUN1001 English for Academic Purposes
or
FD14A/FOUN1401 Writing in the Disciplines
or
FD13A/FOUN1301 Law, Governance, Economy & Society
or
FD11A/FOUN1101 Caribbean Civilization 3 credits

YEAR 2

Semester 1

Mathematics Courses

M20B/MATH2110 Linear Algebra 4 credits
M21Q/MATH2125 Introduction to Mathematical Analysis 4 credits

Education Courses

ED22M/EDMC2213 Children Learning Mathematics 3 credits
ED22N/EDMC2214 The Nature and Scope of Mathematics 3 credits
ED20U/EDTL2021 School Based Experience I 3 credits

Core

ED20M/EDCU2013 Introduction to Curriculum Studies
or
ED30D/EDTK3004 Educational Technology 3 credits

University Foundation Courses

FD10A/FOUN1001 English for Academic Purposes
or
FD14A/FOUN1401 Writing in the Disciplines
or
FD13A/FOUN1301 Law, Governance, Economy & Society
or
FD11A/FOUN1101 Caribbean Civilization 3 credits
### Semester 2

#### Mathematics Courses
- M20A/MATH2100: Abstract Algebra (4 credits)
- M21B/MATH2160: Analysis and Mathematical Methods II (4 credits)

#### Education Courses
- ED22P/EDMA2216: Analysis & Teaching of Mathematics (3 credits)

#### University Foundation Courses
- FD10A/FOUN1001: English for Academic Purposes (3 credits)
  - or
- FD14A/FOUN1401: Writing in the Disciplines (3 credits)
  - or
- FD13A/FOUN1301: Law, Governance, Economy & Society (3 credits)
  - or
- FD11A/FOUN1101: Caribbean Civilization (3 credits)

### Year 3

### Semester 1

#### Mathematics Courses
- Two Level II or III Mathematics Courses (8 credits)

#### Education Courses
- ED32F/EDMA3206: Investigations and Problem Solving (3 credits)
- ED32Q/EDMA3217: Pedagogical Issues in the Teaching of Mathematics (3 credits)
- ED30Q/EDTL3017: School Based Experience II (3 credits)

#### University Foundation Courses
- FD10A/FOUN1001: English for Academic Purposes (3 credits)
  - or
- FD14A/FOUN1401: Writing in the Disciplines (3 credits)
  - or
- FD13A/FOUN1301: Law, Governance, Economy & Society (3 credits)
  - or
- FD11A/FOUN1101: Caribbean Civilization (3 credits)
Semester 2

Mathematics Courses

Two Level II or III Mathematics Courses ** 8 credits

Education Courses

ED32E/EDME3205 Teaching Mathematics in Grades 3 credits
ED30S/EDRS3019 Report 3 credits

University Foundation Courses

FD10A/FOUN1001 English for Academic Purposes
or
FD14A/FOUN1401 Writing in the Disciplines
or
FD13A/FOUN1301 Law, Governance, Economy & Society
or
FD11A/FOUN1101 Caribbean Civilization 3 credits

**TWO OF THE FOUR MATHS CONTENT COURSES MUST BE AT LEVEL 3

Summary of credits:

Education Courses 36
Mathematics courses 56
Core 6
University Foundation courses (FD10A and 2 others) 9

TOTAL 107

MATHEMATICS WITH EDUCATION
Teacher Trained

YEAR 1

Semester 1

Mathematics Courses

M10A/MATH1140 Basic Introductory Mathematics 6 credits
MATH1180 Engineering Mathematics I 6 credits
Education Courses
ED22M/EDMC2213  Children Learning Mathematics     3 credits
ED22N/EDMC2214  The Nature and Scope of Mathematics  3 credits

Core
ED20Y/EDTK2025  Introduction to Computer Technology in Education  3 credits

University Foundation Courses
FD10A/FOUN1001  English for Academic Purposes
or
FD14A/FOUN1401  Writing in the Disciplines
or
FD13A/FOUN1301  Law, Governance, Economy & Society
or
FD11A/FOUN1101  Caribbean Civilization  3 credits

Semester 2

Mathematics Courses
M10B/MATH1150  Functions of Real Variables  6 credits
M10C  Mathematics for Pure and Applied Sciences  6 credits

Education Courses
ED22P/EDMA2216  Analysis and Teaching of Mathematics  3 credits

University Foundation Courses
FD10A/FOUN1001  English for Academic Purposes
or
FD14A/FOUN1401  Writing in the Disciplines
or
FD13A/FOUN1301  Law, Governance, Economy & Society
or
FD11A/FOUN1101  Caribbean Civilization  3 credits

YEAR 2

Semester 1

Mathematics Courses
M20B/MATH2110 Linear Algebra 4 credits
M21Q/MATH2125 Introduction to Mathematical Analysis 4 credits

**Education Courses**

ED32F/EDMA3206 Investigations and Problem Solving 3 credits
ED32Q/EDMA3217 Pedagogical Issues in the Teaching of Mathematics 3 credits

**Core**

ED20M/EDCU2013 Introduction to Curriculum Studies

or

ED30D/EDTK3004 Educational Technology 3 credits

**University Foundation Courses**

FD10A/FOUN1001 English for Academic Purposes or
FD14A/FOUN1401 Writing in the Disciplines or
FD13A/FOUN1301 Law, Governance, Economy & Society or
FD11A/FOUN1101 Caribbean Civilization 3 credits

**Semester 2**

**Mathematics Courses**

M20A/MATH2100 Abstract Algebra 4 credits
M21B/MATH2160 Analysis and Mathematical Methods II 4 credits

**Education Courses**

ED32E/EDME3205 Teaching Mathematics in Grades 3 credits

**University Foundation Courses**

FD10A/FOUN1001 English for Academic Purposes or
FD14A/FOUN1401 Writing in the Disciplines or
FD13A/FOUN1301 Law, Governance, Economy & Society or
FD11A/FOUN1101 Caribbean Civilization 3 credits
YEAR 3

Semester 1

Mathematics Courses
Two Level II or III Mathematics Courses ** 8 credits

Education Courses
ED30T/EDTL3020 Pre-Practicum 3 credits
ED30U/EDTL3021 Field Study 3 credits

University Foundation Courses
FD10A/FOUN1001 English for Academic Purposes or
or
FD14A/FOUN1401 Writing in the Disciplines or
or
FD13A/FOUN1301 Law, Governance, Economy & Society or
or
FD11A/FOUN1101 Caribbean Civilization 3 credits

Semester 2

Mathematics Courses
Two Level II or III Mathematics Courses ** 8 credits

Education Courses
ED30S/EDRS3019 Report 3 credits

University Foundation Courses
FD10A/FOUN1001 English for Academic Purposes or
or
FD14A/FOUN1401 Writing in the Disciplines or
or
FD13A/FOUN1301 Law, Governance, Economy & Society or
or
FD11A/FOUN1101 Caribbean Civilization 3 credits

**TWO OF THE FOUR MATHS CONTENT COURSES MUST BE AT LEVEL 3
**Summary of credits:**

<table>
<thead>
<tr>
<th>Courses</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Education Courses</td>
<td>27</td>
</tr>
<tr>
<td>Mathematics Courses</td>
<td>56</td>
</tr>
<tr>
<td>Core</td>
<td>6</td>
</tr>
<tr>
<td>University Foundation courses (FD10A and 2 others)</td>
<td>9</td>
</tr>
</tbody>
</table>

**TOTAL** 98
OPTION 3 (b)

CHEMISTRY WITH EDUCATION

(FOR TRAINED AND PRE-TRAINED TEACHERS)

CHEMISTRY COURSES

LEVEL I

Twenty-four (24) credits from two subject areas in the Pure and Applied Sciences divided equally between the two so as to provide the prerequisite for Level II courses. One of the subject areas must be Chemistry (required courses are C10J/CHEM1901 and C10K/CHEM1902).

Trained Teachers with the New Double Option (since 2004) with chemistry as one of their majors and have a GPA $\geq 2.9$ may be exempt from Level I Chemistry (C10J/CHEM1901 and C10K/CHEM1902).

Trained Teachers Single Option is required to do Preliminary Chemistry.

All students must complete the foundation courses required by the FPAS.

LEVEL II/III

Thirty-two (32) credits from Level II Chemistry courses, which must include:

- C20J/CHEM2001
- C21J/CHEM2101
- C22J/CHEM2201
- C23J/CHEM2301
- C31J/CHEM3101
- C32J/CHEM3201 and
- C33J/CHEM3301

EDUCATION COURSES

Trained teachers with double option and single option science diplomas are required to do the following courses:

**Education specialization**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED24E/EDSC2405</td>
<td>The Psychology of Science Teaching and Learning</td>
<td>3</td>
</tr>
<tr>
<td>ED34C/EDSC3403</td>
<td>Assessment in Science Teaching</td>
<td>3</td>
</tr>
<tr>
<td>EDSC3417/ED34Q</td>
<td>Introduction to Secondary Science</td>
<td>3</td>
</tr>
<tr>
<td>EDSC3411/ED34K</td>
<td>The History of Science and Teaching</td>
<td>3</td>
</tr>
<tr>
<td>or DSC3404/ED34D</td>
<td>Issues and Trends in Science Education and Science Curricula</td>
<td>3</td>
</tr>
<tr>
<td>EDSC3410/ED34J</td>
<td>The Sociology of Science Teaching and Learning</td>
<td>3</td>
</tr>
</tbody>
</table>
### Core education

One of:

- ED20X/EDPH2024 Issues and Perspectives in Education
- ED23E/EDEA2305 Action Research for School and Classroom Managers
- EDSC3408 Environmental Education
- ED30Y/EDCE3025 Integrating Computers in the Curriculum
- EDTO2025/ED20Y Introduction to Computer Technology in Education
- EDTL3020/ED30T Pre-Practicum
- EDTL3021/ED30U Field Study
- EDRS3019/ED30S The Report

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED20X/EDPH2024</td>
<td>Issues and Perspectives in Education</td>
<td></td>
</tr>
<tr>
<td>ED23E/EDEA2305</td>
<td>Action Research for School and Classroom Managers</td>
<td></td>
</tr>
<tr>
<td>EDSC3408</td>
<td>Environmental Education</td>
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</tr>
<tr>
<td>ED30Y/EDCE3025</td>
<td>Integrating Computers in the Curriculum</td>
<td>3</td>
</tr>
<tr>
<td>EDTO2025/ED20Y</td>
<td>Introduction to Computer Technology in Education</td>
<td>3</td>
</tr>
<tr>
<td>EDTL3020/ED30T</td>
<td>Pre-Practicum</td>
<td>3</td>
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<tr>
<td>EDTL3021/ED30U</td>
<td>Field Study</td>
<td>3</td>
</tr>
<tr>
<td>EDRS3019/ED30S</td>
<td>The Report</td>
<td>3</td>
</tr>
</tbody>
</table>

### Pre-trained teachers are required to do the following courses:

#### Education specialization

- **EDSC2407/ED24G** Teaching Methodologies in Science 3 credits
- **EDSC2405/ED24E** The Psychology of Science Teaching and Learning 3 credits
- **EDSC3403/ED34C** Assessment in Science Teaching 3 credits
- **EDSC3410/ED34J** The Sociology of Science Teaching and Learning 3 credits
- **EDSC3417/ED34Q** Introduction to Secondary Science 3 credits

### Core education

- **EDTL1020/ED10T** Introduction to Teaching and Learning 3 credits
- **EDPS1003/ED10C** Psychological Issues in the Classroom 3 credits
- **EDCU2013/ED20M** Introduction to Curriculum Studies 3 credits
- **EDTL1021/ED10U** Planning for Teaching 3 credits
- **EDTK2025/ED20Y** Introduction to Computer Technology in Education 3 credits
- **EDTL2021/ED20U** School Based Experience I 3 credits
- **EDTL3017/ED30Q** School Based Experience II 3 credits
- **EDPS2003/ED20C** Motivation and the Teacher 3 credits
- **EDRS3019/ED30S** The Report 3 credits
OPTION 3 (c)

PHYSICS WITH EDUCATION

PHYSICS COURSES

YEAR I

Twenty-four (24) credits from two subject areas in the Pure and Applied Sciences divided equally between the two so as to provide the prerequisites for Level II courses (Note that CAPE/ A-Level Maths or MATH0100/M08B and MATH0110/M08C are prerequisites for Level II courses). One of the subject areas must be Physics (required courses are PHYS1410/P14A and PHYS1420/P14B).

YEAR II

Thirty-two (32) credits from Level II Physics courses, including:

(i) PHYS2350/P23E,
(ii) PHYS2385/P23I,
(iii) PHYS2395/P23J,
(iv) PHYS3350/P33E and PHYS3385/P33K
(v) Any three of the following: PHYS2560, PHYS2670, PHYS3395, PHYS3399, PHYS3660 and PHYS3670

EDUCATION COURSES

The Education Courses are the same as those listed in Option 3 (b)
OPTION 3(c)

BIOLOGY WITH EDUCATION

BIOLOGY COURSES

YEAR I

Semester 1

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>BL12C/BIOL1016</td>
<td>Cells, Molecular Biology and Genetics</td>
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<tr>
<td>or BIOL1017</td>
<td>Cells, Biology &amp; Genetics</td>
<td>3</td>
</tr>
<tr>
<td>or BIOL1018</td>
<td>Molecular Biology</td>
<td>3</td>
</tr>
</tbody>
</table>

Semester 2

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>FPAS Level I course (BC10M/BIOC1011 highly recommended)</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>BL10L/BIOL1261</td>
<td>Diversity of Organisms</td>
<td>6</td>
</tr>
<tr>
<td>or BIOL1262</td>
<td>Living Organisms I</td>
<td>3</td>
</tr>
<tr>
<td>BIOL1263</td>
<td>Living Organisms II</td>
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</tr>
</tbody>
</table>

YEAR II

A major in Biology (Life Sciences) requires 32 credits consisting of

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BL20J/BIOL2011</td>
<td>General &amp; Molecular Genetics</td>
</tr>
<tr>
<td>BL20P/BIOL2015</td>
<td>Biometry,</td>
</tr>
<tr>
<td>BL20N/BIOL2014</td>
<td>Ecology,</td>
</tr>
<tr>
<td>BL20K/BIOL2012</td>
<td>Evolutionary Biology,</td>
</tr>
<tr>
<td>BT21B/BOTN2011</td>
<td>Seed Plants,</td>
</tr>
<tr>
<td>BT22A/BOTN2012</td>
<td>Plant Physiology and</td>
</tr>
<tr>
<td>Z20G/ZOOL2012</td>
<td>Functional Organisation of Animals I</td>
</tr>
<tr>
<td>Z20H/ZOOL2013</td>
<td>Functional Organisation of Animals II</td>
</tr>
</tbody>
</table>
Semester 1

BL20J/BIOL2011 General & Molecular Genetics (4 credits)
BL20P/BIOL2015 Biometry (4 credits)

Semester 2

BT21B/BOTN2011 Seed Plants (4 credits)
BT22A/BOTN2012 Plant Physiology (4 credits)

YEAR III

Semester 1

BL20K/BIOL2012 Evolutionary Biology (4 credits)
BL20N/BIOL2014 Ecology (4 credits)

Semester 2

Z 20G/ZOOL2012 Functional Organisation of Animals I (Maintenance Systems) (4 credits)
Z 20H/ZOOL2013 Functional Organisation of Animals II (Coordination, Protection & Movement) (4 credits)

EDUCATION COURSES

The Education Courses are the same as those listed in Option 3 (b)
OPTION 4*
(not presently offered)

MATERIALS SCIENCE

**Part I**

<table>
<thead>
<tr>
<th>Code</th>
<th>Names</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>C10J/CHEM1901</td>
<td>Introductory Chemistry I</td>
<td>6</td>
</tr>
<tr>
<td>C10K/CHEM1902</td>
<td>Introductory Chemistry II</td>
<td>6</td>
</tr>
<tr>
<td>P14A/PHYS1410</td>
<td>Introductory Physics A</td>
<td>6</td>
</tr>
<tr>
<td>P14B/PHYS1420</td>
<td>Introductory Physics B</td>
<td>6</td>
</tr>
<tr>
<td>M10A/MATH1140</td>
<td>Basic Introductory Mathematics</td>
<td>6</td>
</tr>
</tbody>
</table>

**Part II**

<table>
<thead>
<tr>
<th>Code</th>
<th>Names</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>C21J/CHEM2101</td>
<td>Inorganic Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>C22J/CHEM2201</td>
<td>Spectroscopy, Carbanions and</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Aromatic Systems</td>
<td></td>
</tr>
<tr>
<td>C23J/CHEM2301</td>
<td>Physical Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>C31J/CHEM3101</td>
<td>Inorganic Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>C32J/CHEM3201</td>
<td>Physical Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>P23B</td>
<td>General Physics I</td>
<td>8</td>
</tr>
<tr>
<td>P24A</td>
<td>Electronics I</td>
<td>8</td>
</tr>
<tr>
<td>P35A</td>
<td>Materials Science</td>
<td>8</td>
</tr>
</tbody>
</table>

**Plus**

Eight (8) additional credits taken from:

<table>
<thead>
<tr>
<th>Code</th>
<th>Names</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>C31N/CHEM3103</td>
<td>Advanced Materials Chemistry</td>
<td>4</td>
</tr>
<tr>
<td>C33K/CHEM3302</td>
<td>Chemistry of Polymers</td>
<td>4</td>
</tr>
<tr>
<td>C33M/CHEM3303</td>
<td>Properties of Matter</td>
<td>4</td>
</tr>
</tbody>
</table>

**Plus**

Eight (8) additional credits taken from:

<table>
<thead>
<tr>
<th>Code</th>
<th>Names</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>P24B</td>
<td>Electronics II</td>
<td>8</td>
</tr>
<tr>
<td>P33A</td>
<td>General Physics II</td>
<td>8</td>
</tr>
<tr>
<td>P33B</td>
<td>General Physics III</td>
<td>8</td>
</tr>
</tbody>
</table>

Students registered for this Option can graduate with a major in Physics or Chemistry if they fail to complete the Option provided they satisfy the requirements for either Major.
## OPTION 5

### ACTUARIAL SCIENCE

#### Part I

<table>
<thead>
<tr>
<th>Code</th>
<th>Names</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>M10A/MATH1140</td>
<td>Basic Introductory Mathematics</td>
<td>6</td>
</tr>
<tr>
<td>M10B/MATH1150</td>
<td>Functions of Real Variables</td>
<td>6</td>
</tr>
<tr>
<td>CS11Q/COMP1110</td>
<td>Introduction to Computer Science (I)</td>
<td>6</td>
</tr>
<tr>
<td>CS11R/COMP1120</td>
<td>Introduction to Computer Science (II)</td>
<td>6</td>
</tr>
<tr>
<td>EC10C/ECON1001</td>
<td>Introduction to Microeconomics</td>
<td>3</td>
</tr>
<tr>
<td>EC10E/ECON1002</td>
<td>Introduction to Macroeconomics</td>
<td>3</td>
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<tr>
<td>MS15D/ACCT1005</td>
<td>Introduction to Financial Accounting</td>
<td>3</td>
</tr>
<tr>
<td>MS15B/ACCT1003</td>
<td>Introduction to Cost &amp; Management Accounting</td>
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</table>

#### Part II Compulsory

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>M20A/MATH2100</td>
<td>Abstract Algebra</td>
<td>4</td>
</tr>
<tr>
<td>M20B/MATH2110</td>
<td>Linear Algebra</td>
<td>4</td>
</tr>
<tr>
<td>M21Q/MATH2125</td>
<td>Introduction to Mathematical Analysis</td>
<td>4</td>
</tr>
<tr>
<td>M21B/MATH2150</td>
<td>Introduction to Ordinary Differential Equations</td>
<td>4</td>
</tr>
<tr>
<td>MS28D/MGMT2023</td>
<td>Financial Management I</td>
<td>3</td>
</tr>
<tr>
<td>MS38H/MGMT3048</td>
<td>Financial Management II</td>
<td>3</td>
</tr>
<tr>
<td>M31E/MATH3341</td>
<td>Applied Statistics</td>
<td>4</td>
</tr>
<tr>
<td>M34Q/MATH3310</td>
<td>Life Contingencies</td>
<td>4</td>
</tr>
<tr>
<td>M34R/MATH3320</td>
<td>Risk Theory</td>
<td>4</td>
</tr>
<tr>
<td>M35R/MATH3321</td>
<td>Principles of Asset/Liability Management</td>
<td>4</td>
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A minimum of eleven (11) additional credits should be selected from:

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<tr>
<td>M30Q/MATH3360</td>
<td>Matrix Theory</td>
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<tr>
<td>M32A/MATH3120</td>
<td>Numerical Analysis</td>
<td>4</td>
</tr>
<tr>
<td>M32B/MATH3130</td>
<td>Optimization Theory</td>
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<tr>
<td>M32C/MATH3370</td>
<td>Topics in Operation Research</td>
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<tr>
<td>M33R/MATH3490</td>
<td>Complex Analysis</td>
<td>4</td>
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<tr>
<td>MATH3700</td>
<td>Introduction to Partial Differential Equations</td>
<td>4</td>
</tr>
<tr>
<td>MATH3701</td>
<td>Probability and Stochastic Modelling</td>
<td>4</td>
</tr>
<tr>
<td>M34T/MATH3311</td>
<td>Survival Models/Construction of Tables</td>
<td>4</td>
</tr>
<tr>
<td>M36Q/MATH3390</td>
<td>Metric Spaces and Topology</td>
<td>4</td>
</tr>
<tr>
<td>CS22Q/COMP2140</td>
<td>Software Engineering</td>
<td>4</td>
</tr>
<tr>
<td>CS35Q/COMP3110</td>
<td>Information Systems</td>
<td>4</td>
</tr>
<tr>
<td>SY35B/SOCI3018</td>
<td>Demography I (Population Trends and Policies)</td>
<td>3</td>
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</table>
OPTION 6

BSc (SPECIAL) CHEMISTRY DEGREE

1. Candidates must satisfy the General Regulations for the degree of Bachelor of Science (except those relating to support courses) in addition to the following regulations.

2. The minimum standards for admission to the programme are as follows:

   Completion of Part I of the BSc degree programme, including passes in –

   (i) Introductory Chemistry (C10J/CHEM1901 and C10K/CHEM1902) at the prescribed level.

   (ii) Introductory Mathematics (M10A/MATH1140 and M10B/MATH1150).

   Consideration will be given to those applicants with an appropriate grade in Preliminary Mathematics (M08B/MATH0100 and M08C/MATH0110) or A-Level Mathematics or its equivalent.

   (iii) Preliminary Physics (P04A/PHYS0410 and P04B/PHYS0420) or the equivalent.

3. Admission to this programme is limited and candidates with good grades in C10J/CHEM1901 and C10K/CHEM1902 will be given preference.

4. To be eligible for the award of the BSc (Special) Chemistry degree, candidates must obtain:

   (a) A total of 56 credits by successfully completing the following –

       Part II courses:


       (ii) an additional twenty credits from Chemistry courses

       (iii) A research project C37J/CHEM3701.

   (b) An additional eight credits selected from Part II courses in any Science subjects in the BSc degree programme approved by the Department.
OPTION 7
MICROBIOLOGY

Aim: To provide a comprehensive knowledge of the biology, phylogeny, ecology, and diversity of microorganisms, and to develop laboratory skills and familiarity with the basic microbiological methods. This Option is taught jointly between the Department of Life Sciences and the Biochemistry Section, Department of Basic Medical Sciences.

Part I

Level I credits as follows:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC10M/BIOC1011</td>
<td>Introductory Biochemistry</td>
<td>6</td>
</tr>
<tr>
<td>Either BL12C/BIOL1016</td>
<td>Cells, Molecular Biology and Genetics</td>
<td>6</td>
</tr>
<tr>
<td>Or BIOL1017</td>
<td>Cells Biology and Genetics</td>
<td>3</td>
</tr>
<tr>
<td>And BIOL1018</td>
<td>Molecular Biology</td>
<td>3</td>
</tr>
<tr>
<td>Either BL12B/BIOL1261</td>
<td>Diversity of Organisms</td>
<td>6</td>
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<tr>
<td>Or BIOL1262</td>
<td>Living Organisms I</td>
<td>3</td>
</tr>
<tr>
<td>And BIOL1263</td>
<td>Living Organisms II</td>
<td>3</td>
</tr>
<tr>
<td>C10J/CHEM1901</td>
<td>Introductory Chemistry A</td>
<td>6</td>
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<tr>
<td>C10K/CHEM1902</td>
<td>Introductory Chemistry B</td>
<td>6</td>
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</table>

Part II

Sixty four (64) credits as follows:

Forty (40) core credits:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit</th>
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</thead>
<tbody>
<tr>
<td>BC21C/BIOC2312</td>
<td>Molecular Biology I</td>
<td>4</td>
</tr>
<tr>
<td>BC21D/BIOC2014</td>
<td>Bioenergetics &amp; Cell Metabolism</td>
<td>8</td>
</tr>
<tr>
<td>BC21M/MICR2211</td>
<td>Microbiology</td>
<td>4</td>
</tr>
<tr>
<td>BL20J/BIOL2011</td>
<td>General &amp; Molecular Genetics</td>
<td>4</td>
</tr>
<tr>
<td>BL38A/BIOL3017</td>
<td>Virology</td>
<td>4</td>
</tr>
<tr>
<td>BL30M/BIOL3011</td>
<td>Mycology</td>
<td>4</td>
</tr>
<tr>
<td>BC31M/MICR3213</td>
<td>Applied &amp; Environmental Microbiology</td>
<td>4</td>
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<tr>
<td><strong>BT31A/BOTN3011</strong></td>
<td>Phycology</td>
<td>4</td>
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<tr>
<td>Either BL39C/BIOL3018</td>
<td>Project</td>
<td>4</td>
</tr>
<tr>
<td>Or BC36A/BIOC3413</td>
<td>Laboratory Project</td>
<td>4</td>
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* Students should take EITHER BL30M/BIOL3011 OR BL23D/MICR2252. NOT BOTH

** Not offered in 2010/11 academic year- replaced with BC34M/MICR3214 Molecular Microbiology
Plus Twenty four (24) credits from courses listed below:

- BC34C/BIOL3312 Molecular Biology II (4 credits)
- BC35C/BIOT3113 Biotechnology I (4 credits)
- BC35D/BIOT3114 Biotechnology II (4 credits)
- BL20P/BIOL2015 Biometry (4 credits)
- Z 30G/ZOOL3015 General Parasitology (4 credits)
- Z 30M/ZOOL3017 Immunology (4 credits)
- *BL30K/BIOL3012 Soil Biology (4 credits)
- BT37Q/BIOL3016 Plant Health (4 credits)
- BT38B/BOTN3016 Plant Biotechnology (4 credits)
- *Z 30H/ZOOL3016 Applied Parasitology (4 credits)
- MICR3215 Food Microbiology (4 credits)

* Not offered in 2010/11 academic year

Not all elective courses are available every year, and certain combinations of courses are limited by from timetable constraints.
OPTION 8
SCIENCE, MEDIA AND COMMUNICATION

This BSc contains a named Science major AND a Media and Communication major (i.e. double major)

The Option will be taught jointly by The Caribbean Institute of Media and Communication (Faculty of Arts and Education) and Departments in The Faculty of Pure and Applied Sciences, including the Biochemistry Section (Department of Basic Medical Sciences).

It is designed to produce a science graduate with expertise in Media and Communication.

On successful completion of the Option, the student will have acquired sufficient scientific, intellectual and practical foundation such that can be used to produce popular programs with scientific themes using a range of communications media.

Entry requirements

(a) Satisfy the University requirements for normal matriculation and have obtained passes at CXC Secondary Education General Proficiency Level (or equivalent) in Mathematics, and two approved science subjects at GCE Advanced Level (or equivalent);

(b) Obtain a pass in the CARIMAC Entry Examination;

(c) Undergo mandatory academic counselling

LEVEL 1

At least one (1) FPAS subject must be followed over two semesters

Semester I

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC10A/COMM1110</td>
<td>Communication, Culture &amp; Caribbean Society</td>
<td>3 credits</td>
</tr>
<tr>
<td>MC11U/COMM1410</td>
<td>Understanding the Media</td>
<td>3 credits</td>
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<tr>
<td>FPAS course</td>
<td></td>
<td>6 credits</td>
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<tr>
<td>FPAS course</td>
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<td>6 credits</td>
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Semester II

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC10B/COMM1210</td>
<td>Interviewing &amp; Information Gathering</td>
<td>3 credits</td>
</tr>
<tr>
<td>MC11B/COMM1310</td>
<td>Mediating Communication</td>
<td>3 credits</td>
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<tr>
<td>FPAS course</td>
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<td>6 credits</td>
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<tr>
<td>FPAS course</td>
<td></td>
<td>6 credits</td>
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</table>

Total 36 credits
LEVEL 2

*One (1) FPAS subject should be followed over two semesters*

### Semester I

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>MC20M/COMM2110</td>
<td>Media Ethics &amp; Legal Issues</td>
<td>3</td>
</tr>
<tr>
<td>MC22A/COMM2310</td>
<td>Introduction to Communication Research Methods</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Media Specialisation Course</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>FPAS course</td>
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**Total 34 credits**

### Semester II

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<th>Course Title</th>
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</thead>
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<tr>
<td>MC20C/COMM2210</td>
<td>Communication, Analysis &amp; Planning I</td>
<td>3</td>
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<tr>
<td></td>
<td>Media Specialisation Course</td>
<td>3</td>
</tr>
<tr>
<td>MC29S/COMM2248</td>
<td>Science, Society and Media</td>
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<td>FPAS course</td>
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<td>FPAS course</td>
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**Total 34 credits**

LEVEL 3

*One (1) subject chosen at Level 2 should be followed over two semesters, leading to a major*

### Semester I

<table>
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<th>Credits</th>
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<tbody>
<tr>
<td>MC31O/COMM3910</td>
<td>Communication Analysis &amp; Planning II (year long)</td>
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<tr>
<td>or</td>
<td>Research-based course</td>
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<tr>
<td></td>
<td>Communication Elective</td>
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<tr>
<td></td>
<td>Media Specialisation Course</td>
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<tr>
<td></td>
<td>FPAS course</td>
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<td></td>
<td>FPAS course</td>
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### Semester II

<table>
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<th>Course Title</th>
<th>Credits</th>
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<tr>
<td>MC31O/COMM3910</td>
<td>Communication Analysis &amp; Planning II (year long)</td>
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<tr>
<td>or</td>
<td>Research-based course</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Media Specialisation Course</td>
<td>3</td>
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<tr>
<td></td>
<td>FPAS course</td>
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<td>FPAS course</td>
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**Total 31 credits**

101 credits
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<th>Credits</th>
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<tr>
<td>FD 10A/FOUN1001</td>
<td>English for Academic Purposes</td>
<td>3 credits</td>
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<tr>
<td>FD 11A/FOUN1101</td>
<td>Caribbean Civilisation</td>
<td>3 credits</td>
</tr>
<tr>
<td>FD 13A/FOUN1301</td>
<td>Law, Governance, Economy and Society</td>
<td>3 credits</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>110 credits</strong></td>
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## DEPARTMENT OF BASIC MEDICAL SCIENCES
### BIOCHEMISTRY SECTION

**LIST OF UNDERGRADUATE COURSES**

### BIOCHEMISTRY COURSES

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<thead>
<tr>
<th>CODES</th>
<th>TITLES</th>
<th>CREDIT</th>
<th>SEMESTER OFFERED</th>
<th>Level</th>
<th>PREREQUISITES</th>
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</thead>
<tbody>
<tr>
<td><strong>LEVEL I</strong></td>
<td></td>
<td></td>
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<tr>
<td>BC10M/ BIOC1011</td>
<td>INTRODUCTORY BIOCHEMISTRY</td>
<td>6 Credits</td>
<td>Semester 2</td>
<td>1</td>
<td>Passes in both units of Chemistry and Biology/Zoology at CAPE (or equivalent)</td>
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<tr>
<td><strong>LEVEL II</strong></td>
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<tr>
<td>BC21C/ BIOL2312</td>
<td>MOLECULAR BIOLOGY I</td>
<td>4 Credits</td>
<td>Semester 2</td>
<td>2</td>
<td>C10J/CHEM 1901, C10K/CHEM 1902, BC10M/BIOC1011</td>
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<td>Co-requisite:</td>
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<td>BC21D/BIOC2014</td>
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<td>BC21D/ BIOC2014</td>
<td>BIOENERGETICS AND CELL METABOLISM</td>
<td>8 Credits</td>
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<td>2</td>
<td>C10J/CHEM1901, C10K/CHEM 1902, BC10M/BIOC1011</td>
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<td>Co-requisite:</td>
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<td>BC21D/BIOC2014</td>
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<tr>
<td>BC21M/ MICR2211</td>
<td>MICROBIOLOGY</td>
<td>4 Credits</td>
<td>Semester 2</td>
<td>2</td>
<td>C10J/CHEM1901, C10K/CHEM1902, BC10M/BIOC1011</td>
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<td></td>
<td>Co-requisite:</td>
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<td>BC21D/BIOC2014</td>
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<td><strong>LEVEL III</strong></td>
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<tr>
<td>BC31M/ MICR3213</td>
<td>APPLIED AND ENVIRONMENTAL MICROBIOLOGY</td>
<td>4 Credits</td>
<td>Semester 1</td>
<td>3</td>
<td>BC21M/MICR2211</td>
</tr>
<tr>
<td>CODES</td>
<td>TITLES</td>
<td>CREDIT</td>
<td>SEMESTER OFFERED</td>
<td>Level</td>
<td>PREREQUISITES</td>
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<td>--------------------------------------------------</td>
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<tr>
<td>BC34B/ BIOC 3011</td>
<td>ADVANCED BIOCHEMISTRY</td>
<td>4 Credits</td>
<td>Semester 2</td>
<td>3</td>
<td>BC21D/BIOC2014</td>
</tr>
<tr>
<td>BC34C/ BIOC 3312</td>
<td>MOLECULAR BIOLOGY II</td>
<td>4 Credits</td>
<td>Semester 1</td>
<td>3</td>
<td>BC21C/BIOC2312 and BC21D/BIOC2014</td>
</tr>
<tr>
<td>BC34D/ BIOC3313</td>
<td>HUMAN MOLECULAR BIOLOGY</td>
<td>4 Credits</td>
<td>Semester 2</td>
<td>3</td>
<td>BC21C/BIOC2312 and BC21D/BIOC2014 Pre/Co-requisite: BC34C/BIOC3312</td>
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<tr>
<td>BC34M/ MICR3214</td>
<td>MOLECULAR MICROBIOLOGY</td>
<td>4 Credits</td>
<td>Semester 1</td>
<td>3</td>
<td>BC21C/BIOC2312 and BC21M/MICR2211</td>
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<tr>
<td>BC35A/ BIOC 3013</td>
<td>BIOCHEMICAL PHYSIOLOGY</td>
<td>4 Credits</td>
<td>Semester 1</td>
<td>3</td>
<td>BC21C/BIOC2312 and BC21D/BIOC2014</td>
</tr>
<tr>
<td>BC35C/ BIOT 3113</td>
<td>BIOTECHNOLOGY I</td>
<td>4 Credits</td>
<td>Semester 1</td>
<td>3</td>
<td>BC21C/BIOC2312 and BC21D/BIOC2014</td>
</tr>
<tr>
<td>BC35D/ BIOT 3114</td>
<td>BIOTECHNOLOGY II</td>
<td>4 Credits</td>
<td>Semester 1</td>
<td>3</td>
<td>BC21C/BIOC2312 and BC21D/BIOC2014 Pre/Co-requisites: BC35C/BIOT3113</td>
</tr>
<tr>
<td>BC35F/ BIOT 3116</td>
<td>THE BIOTECHNOLOGY OF INDUSTRIAL ETHANOL PRODUCTION</td>
<td>4 Credits</td>
<td>Semester 2</td>
<td>3</td>
<td>BC21D/BIOC2014 and BC21M/MICR2211</td>
</tr>
<tr>
<td>BC39P/ BIOC 3014</td>
<td>PLANT BIOCHEMISTRY</td>
<td>4 Credits</td>
<td>Semester 2</td>
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<td>BC21D/BIOC2014</td>
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</table>
Biochemistry, Biotechnology, Microbiology and Molecular Biology are taught in Level II of the undergraduate program. In order to proceed to Level II courses candidates must have successfully completed C10J/CHEM1901, C10K/CHEM1902, and BC10M/BIOC1011.

**Level II and III courses include:**

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>BC21C/BIOL2312</td>
<td>Molecular Biology I</td>
</tr>
<tr>
<td>BC21D/BIOC2014</td>
<td>Bioenergetics and Cell Metabolism</td>
</tr>
<tr>
<td>BC21M/MICR2211</td>
<td>Microbiology</td>
</tr>
<tr>
<td>BC31M/MICR3213</td>
<td>Applied and Environmental Microbiology</td>
</tr>
<tr>
<td>BC34B/BIOC3011</td>
<td>Advanced Biochemistry</td>
</tr>
<tr>
<td>BC34C/BIOL3312</td>
<td>Molecular Biology II</td>
</tr>
<tr>
<td>BC34D/BIOL3313</td>
<td>Human Molecular Biology</td>
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<tr>
<td>BC34M/MICR3214</td>
<td>Molecular Microbiology</td>
</tr>
<tr>
<td>BC35A/BIOC3013</td>
<td>Biochemical Physiology</td>
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<tr>
<td>BC35C/BIOT3113</td>
<td>Biotechnology I</td>
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<tr>
<td>BC35D/BIOT3114</td>
<td>Biotechnology II</td>
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<td>BC35F/BIOT3116</td>
<td>The Biotechnology of Industrial Ethanol Production</td>
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<tr>
<td>BC36A/BIOC3413</td>
<td>Project</td>
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<td>BC39P/BIOC3014</td>
<td>Plant Biochemistry</td>
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</tbody>
</table>

A major in **Biochemistry** requires a total of thirty-two (32) credits from Level II and must include:

- BC21C/BIOL2312 (Molecular Biology I)
- BC21D/BIOC2014 (Bioenergetics and Cell Metabolism)
- BC21M/MICR2211 (Microbiology)
- BC34B/BIOC3011 (Advanced Biochemistry)
- BC34C/BIOL3312 (Molecular Biology II)
- BC35A/BIOC3013 (Biochemical Physiology)

and

- BC34D/BIOL3313 (Human Molecular Biology)

or

- BC39P/BIOC3014 (Plant Biochemistry).

A major in **Biotechnology** requires a total of thirty-two (32) credits from Level II and must include:

- BC21C/BIOL2312 (Molecular Biology I)
- BC21D/BIOC2014 (Bioenergetics and Cell Metabolism)
- BC21M/MICR2211 (Microbiology)
- BC35C/BIOT3113 (Biotechnology I)
- BC35D/BIOT3114 (Biotechnology II)
BC35F/BIOT3116  (The Biotechnology of Industrial Ethanol Production)

and  

BC31M/MICR3213  (Applied and Environmental Microbiology)

or

BT38B/BOTN3016  (Plant Biotechnology).

A major in Molecular Biology requires a total of thirty-two (32) credits from Level II and must include:

BC21C/BIOL2312  (Molecular Biology I)
BC21D/BIOC2014  (Bioenergetics and Cell Metabolism)
BC21M/MICR2211  (Microbiology)
BC34C/BIOL3312  (Molecular Biology II)
BC34D/BIOL3313  (Human Molecular Biology)
BC34M/MICR3214  (Molecular Microbiology)

or

BC35C/BIOT3113  (Biotechnology I)

and

BC35D/BIOT3114  (Biotechnology II)

or

BL38A/BIOL3017  (Virology).

All courses include laboratory sessions. Attendance at, and the submission of the relevant report pertaining to all laboratory sessions mounted for each course by the Biochemistry Section of the Department of Basic Medical Sciences are required.

Admission to some courses may be limited. Students are advised that some courses in different departments may clash. It is the responsibility of the student to identify any clash early and withdraw from such course(s) by the date stipulated in the Faculty regulations.

COURSE DESCRIPTION

LEVEL I COURSES

BC10M/BIOC1011  INTRODUCTORY BIOCHEMISTRY
(6 credits)  Semester 2  Level I

Aim:  This course is to prepare students from a Chemistry background to enter programmes leading to majors in Biochemistry, Biotechnology, and Molecular Biology, and to introduce Microbiology.

Pre-requisites:  Passes in both units of Chemistry and Biology/Zoology at CAPE (or equivalent).
Syllabus: 1. The structures and biochemical properties of the common biomolecules:
   Mono-di-olio- and polysaccharides
   Amino acids peptides and proteins
   Nucleotides and nucleic acids
   Fatty acids acyl glycerols and phosphatidates
   Sterols and other polyisoprenoids

2. Simple enzyme kinetics:
   Chemical reaction kinetics
   The Michaelis-Menten rate equation
   Reversible enzyme inhibition, the Linewear-Burke plot
   Reversible enzyme: allosteric and covalently modified

3. The homolactic fermentation pathway reactions, other pathways and metabolic regulation in general.

4. Simple biochemical thermodynamics; Gibbs Free Energy
   Electron transport chains; proton gradients and chemiosmosis.

5. Introductory molecular biology

6. The molecular basis of microbial growth, relatedness and diversity

7. Introductory applied and environmental microbiology

8. Microbial biotechnology

A practical course of 72 hours

Evaluation: Practical reports 20%
Two in-course tests 20%
Two 2 hour written final examination papers 60%

LEVEL II COURSES

BC21C/BIOL2312 MOLECULAR BIOLOGY I
(4 credits) Semester 2 Level II

Pre-requisites: C10J/CHEM1901, C10K/CHEM1902, BC10M/BIOC1011

Co-requisite: BC21D/BIOC2014

Syllabus: Nucleic acid structure and function; Genome organization in Eukaryotes, Bacteria, Yeast and Viruses. Methods of studying nucleic acids: DNA sequencing, DNA hybridization, cloning and analysis, restriction mapping, PCR. Recombinant DNA technology. Replication of DNA. Biology and genetics of
bacteriophage lambda. RNA and protein synthesis. Protein trafficking.

A practical course of 36 hours.

Evaluation: One 2-hour written paper 60%
Two in-course tests 20%
Laboratory reports 20%

BC21D/BIOC2014  BIOENERGETICS AND CELL METABOLISM
(8 credits) Semester 1 Level II

Pre-requisites: C10J/CHEM1901, C10K/CHEM1902, BC10M/BIOC1011


A practical course of 72 hours.

Evaluation: One 2-hour written paper 60%
Two in-course tests 20%
Laboratory reports 20%

BC21M/MICR2211  MICROBIOLOGY
(4 credits) Semester 2 Level II

Pre-requisites: C10J/CHEM1901, C10K/CHEM1902, BC10M/BIOC1011

Co-requisite: BC21D/BIOC2014

Syllabus: The purpose and methods of microbial taxonomy and molecular systematics, the identification of organisms obtained in culture and the construction of phylogenetic trees. The major phylotypes of Bacteria and Archaea will each be discussed with respect to their habitats, physiology and cellular structures. Roles in natural ecosystems, applications and other outstanding features will be discussed in instances where particular
organisms provide useful examples, some of which are noted below.


Cyanobacteria and the transition to the oxygen cycle; roles in aquatic and terrestrial environments. The chloroplast and prochlorophytes. Gram-positive bacteria. Phylogenetic significance of cell wall structures and endospores.

The actinomycetes; structural diversity and antibiotic production. Lactic acid bacteria in food fermentations. The phylogeny of bacterial photosynthesis. Crenarchaeota, hyperthermophiles and hydrothermal vents. Methanogens; biochemical diversity at the level of co-enzymes, anaerobic digesters. Extreme halophiles; the limits of microbial adaptation; purple membranes. Protists and yeast.

Identification and quantification of microorganisms in natural habitats. Direct viable counts, epifluorescence microscopy, and nucleic acid probes. Direct analysis of nucleic acids from natural microbial communities. Extraction of nucleic acids, PCR amplification, cloning and sequencing. The phylogenetic structure of natural microbial communities.

*A practical course of 36 hours.*

**Evaluation:**
- One 2-hour written paper 60%
- Two in-course tests 20%
- Laboratory reports 20%

**LEVEL III COURSES**

**BC31M/MICR3213 APPLIED AND ENVIRONMENTAL MICROBIOLOGY**

(4 credits) Semester I Level III

**Pre-requisites:** BC21M/MICR2211

**Syllabus:**
- Microbial growth kinetics. Effects of chemical bactericides; bacteriolytic and bacteriostatic agents. Antiseptics and disinfection.
- Microbial adaptation to extreme environments and the use of extreme environments to control microbial growth. The relationship between temperature and growth rate. Life at low temperatures; molecular adaptations and natural distribution of
psychrophiles and psychrotrophs; spoilage in cold processed and stored foods. Thermotolerant bacteria, pasteurization and sterilization with heat. The influence of high concentrations of salts and sugars on microorganisms; osmotic adaptation and compatible solutes; halophiles and osmophiles. Salts and sugar as preservatives. Microbial adaptation to extremes of pH. Organic acids in food processing and storage. Toxic derivatives of oxygen and cellular defenses. Anaerobic bacteria, anaerobic cell structure and vacuum packing of foods.


Food and waterborne pathogens: their occurrence in nature, factors influencing their presence in food and water supplies and means of control. Food borne infections and intoxication. Staphylococcal food poisoning, *Clostridium perfringens* and *C. botulinum*, salmonellosis, *E. coli*, *Campylobacter*, *Salmonella typhi* and *Vibrio cholerae*; *Cryptosporidium*.

*A practical course of 36 hours*

**Evaluation:**
- One 2-hour written paper 60%
- Two in-course tests 20%
- Laboratory reports 20%

**BC34B/BIOC3011 ADVANCED BIOCHEMISTRY**
(4 credits) Semester 2 Level III

**Pre-requisites:** BC21D/BIOC2014

**Syllabus:**

*A practical course of 36 hours*

**Evaluation:**
- One 2-hour written paper 60%
- Two in-course tests 20%
- Laboratory reports 20%
**BC34C/BIOL3312  MOLECULAR BIOLOGY II**  
(4 credits) Semester 1 Level III

Pre-requisites: BC21C/BIOL2312 and BC21D/BIOC2014


* A practical course of 36 hours

Evaluation:  
One 2-hour written paper 60%  
Two in-course tests 20%  
Laboratory reports 20%

**BC34D/BIOL3313  HUMAN MOLECULAR BIOLOGY**  
(4 credits) Semester 2 Level III

Pre-requisites: BC21C/BIOL2312 and BC21D/BIOC2014  
Pre/Co-requisite: BC34C/BIOL3312

Syllabus: The molecular basis of the immune response. The biological basis of the HIV-AIDS epidemic. The molecular basis of cancer. Mutations and the role of genetic predisposition in the etiology of both monogenic and multifactorial diseases. Haemoglobinopathies; in-born errors of metabolism. How these genes are inherited and their frequencies among different populations. The concept of ‘nature vs. nurture.’ The Human Genome Project, the data generated and the practical and ethical implications of this knowledge. The projected role of gene therapy in treatment of genetic diseases. Pharmacogenomics.

* A practical course of 36 hours

Evaluation:  
One 2-hour written paper 60%  
Two in-course tests 20%  
Laboratory reports 20%
**BC34M/MICR3214: MOLECULAR MICROBIOLOGY**  
(4 credits)  Semester I  Level III

Prerequisites:  
BC21C/BIOL2312 and BC21M/MICR2211

Syllabus:  

*A practical course of 36 hours*

Evaluation:  
One 2-hr written paper  60%  
Two in-course tests  20%  
Laboratory and reports  20%  

**BC35A/BIOC3013 BIOCHEMICAL PHYSIOLOGY**  
(4 credits)  Semester I  Level III

Pre-requisites:  
BC21C/BIOL2312 and BC21D/BIOC2014

Syllabus:  
Cellular signaling, endocrinology, the regulation and integration of the metabolic pathways for carbohydrate, lipid and protein metabolism. Organ specialization, macro-nutrient and micro-nutrient nutrition, digestion and absorption. Sugar and fat substitutes; vitamin and mineral utilization by the body; energy expenditure and requirements during feasting, fasting, exercise; nutrient deficiencies; malnutrition and its sequelae; obesity, free radical formation, antioxidants. Clinical chemistry tests.

*A practical course of 36 hours*

Evaluation:  
One 2-hour written paper  65%  
Two in-course tests  20%  
Laboratory reports  20%  

**BC35C/BIOT 3113 BIOTECHNOLOGY I**  
(4 credits)  Semester I  Level III

Pre-requisites:  
BC21C/BIOL2312 and BC21D/BIOC2014

Syllabus:  
expression in prokaryotes. Protein production in eukaryotic cells. Site-directed mutagenesis. Protein engineering. Fermentation Technology.

A practical course of 36 hours

Evaluation:
- One 2-hour written paper: 60%
- Two in-course tests: 20%
- Laboratory reports: 20%

BC35D/BIOT3114  BIOTECHNOLOGY II  
(4 credits)  Semester 2  Level III

Pre-requisites: BC21C/BIOL2312 and BC21D/BIOC2014
Pre/Co-requisites: BC35C/BIOT3113

Syllabus:  


**Current issues:** Regulation and patenting of biotechnology products. Biotechnology as a Business – current market trends.

A practical course of 36 hours

Evaluation:
- One 2-hour written paper: 60%
- Two in-course tests: 20%
- Laboratory reports: 20%

BC35F/BIOT3116  THE BIOTECHNOLOGY OF INDUSTRIAL ETHANOL PRODUCTION  
(4 credits)  Semester: 2  Level III

Pre-requisites: BC21D/BIOC2014 and BC21M/MICR2211

Syllabus: The theory and practice of industrial ethanol production: beers, wines, potable spirits and industrial grade ethanol. Preparation of fermentation feed stocks and media: batch & continuous fermentation systems; fermentor design, instrumentation & control. Biochemical aspects of nutrient utilization. Elementary

*The practical component of the course* will be fulfilled by site visits to local industrial fermenteries: a brewery, a winery and a distillery; and reports will be submitted thereof, including analysis of specific data supplied on site.

**Evaluation:**
- One 2-hour written paper 60%
- Two 1-hour in-course tests 20%
- Site-visit reports 20%

**BC36A/BIOC3413 PROJECT**
(4 credits) Semester 1 & 2 Level III

**Pre-requisites:**
BC21C/BIOL2312 and BC21D/BIOC2014 and BC21M/MICR2211

**Co-requisites:**
BC31M/MICR3213, BC34B/BIOC3011, BC34C/BIOL3312, BC34D/BIOL3313, BC34M/MICR3214, BC35A/BIOC3013, BC35C/BIOT3113, BC35D/BIOT3114, BC35F/BIOT3116 or BC39P/BIOC3014

*This course is available only to final year students majoring in Biochemistry, Biotechnology, Microbiology or Molecular Biology. Entry will be dependent on the student’s academic performance to date and available space.*

**Syllabus:**
Practical research on an approved topic.

**Evaluation:**
- Project Report 60%
- Seminar presentation 40%

**BC39P/BIOC3014 PLANT BIOCHEMISTRY**
(4 credits) Semester 2 Level III

**Pre-requisites:**
BC21D/B10C2014

**Syllabus:**
The course will consider the chemical constituents of plants, their synthesis, their contribution to key metabolic processes and the regulation of their biosynthesis. Topics will include the biosynthesis and mode of action of phytohormones and their role in development and plant defence; the role of ethylene in fruit ripening; carbohydrates, lipids and nitrogen fixation; plant secondary metabolites, anti-nutritional factors; storage organs and tuberization; and the regulation of gene expression in plants. The course will also provide tools for understanding fundamental features of plant-based research, such as modification of fruit-ripening using controlled atmospheres. Secondary metabolites and their uses.
A practical course of 36 hours

Evaluation:  
One 2-hour written paper  60%
Two in-course tests   20%
Laboratory reports   20%

MICR3215:  FOOD MICROBIOLOGY AND BIOTECHNOLOGY  
(4 credits)  Semester 2  Level III

Pre-requisites:  BC21D/BIOC2014 and BC21M/MICR2211
Other qualified students may be admitted by the Head of Department

Syllabus:  
1. Microbial ecology of foods  
   a. Importance of microbes in foods  
   b. Intrinsic factors affecting microbial growth  
   c. Microbial growth, death and survival in foods: meat, poultry, seafoods, dairy, fruits, vegetable and grains

2. Microbial examination of foods  
   a. Indicator organisms  
   b. Rapid methods for identification of microbes or GMOs in foods

3. Overview of food-borne pathogens  
   a. Bacteria, yeasts and moulds, parasites, viruses and prions  
   b. Recent and potential food-borne pathogens

4. Food technology  
   a. Chemical, physical and biological preservation  
   b. Sanitation  
   c. HACCP/ISO standards

5. Introduction to Food Biotechnology  
   a. Importance, advances and trends  
   b. Starter cultures  
   c. Ethical perspectives of food biotechnology: Environmental impact, safety, intellectual property rights, animal welfare, risk analysis, consumer perceptions, industry perspectives; DNA-based methods for food authentication

6. Microbial Synthesis and Production
7. **Enzyme Biotechnology**
   a. Applications of Enzymes in Food Industry: dairy, baking, meat and meat processing
   b. Enzymic processing of fruit juices
   c. Enzymes in Organic Solvents, e.g. Lipases
   d. Enzyme Generation of Flavour and Aroma Compounds
   e. Phytase in animal feeds
   f. Impact of enzyme technology (bioethanol, protein hydrolysates, bioactive peptides)

8. **Biotechnology Applied to Fats and Oils**
   a. Nutritional Value
   b. Flavour
   c. Lipid Modifications

**Laboratory work:**

1. Microbiology of fresh fruits and vegetables, and pastry and canned foods
   a. Aerobic counts

2. Bacillus
   a. Dilutions and plating
   b. Isolation from cereals and custards

3. Salmonella and Campylobacter
   a. Selective enrichment
   b. Direct plating
   c. Antibiotic sensitivity and motility

4. Visit(s) to Food Microbiology lab(s)
   a. Rapid methods
   b. Sanitation
   c. HACCP

5. Phytase production by Mucor spp./Phytase in animal feeds

6. Determination of soluble protein in foods (beer)

7. Biotransformation of L-citronellal to L-citronellol

**Course Summary:**

This course will consider how biotechnology exploits microorganisms in the production of foods. The course will review both traditional as well as modern biotechnological inputs in the food processing industry. The biotechnology of enzymes, fats, oils, flavour and recombinant DNA technology used in production of novel food ingredients or new food products will be explored.
The course will also cover the main characteristics, diagnosis and control of commonly encountered food-borne pathogens, and the significance of currently important and emerging pathogens. Current issues related to genetically modified foods will also be discussed.

* A practical course of 36 hours

Evaluation:

- One 2-hr written paper: 60%
- Ten Laboratory reports: 20% (equally weighted)
- Two in-course tests: 20% (equally weighted)

This course will be offered adjacent to BC35F/BIOT3116 Biotechnology of Ethanol Fermentation, therefore students will have to choose between BIOT3116 and MICR3215.
## DEPARTMENT OF CHEMISTRY

### CHEMISTRY COURSES

### LIST OF UNDERGRADUATE COURSES

<table>
<thead>
<tr>
<th>CODES</th>
<th>TITLES</th>
<th>CREDIT</th>
<th>SEMESTER OFFERED</th>
<th>Level</th>
<th>PREREQUISITES</th>
</tr>
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<td></td>
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<td>SPECTROSCOPY, MECHANISM AND AROMATIC SYSTEMS</td>
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<td>2</td>
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<td>SEMESTER OFFERED</td>
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<td>TITLES</td>
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<td>SEMESTER OFFERED</td>
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| C34J/ CHEM3401 | PROJECT EVALUATION AND MANAGEMENT FOR SCIENCE BASED INDUSTRIES      | 4 Credits | Semester 1       | 3     | This course is only available to students majoring in Applied Chemistry and Food Chemistry but students who do not have any overlapping Management Studies courses and are majoring in areas which have an industrial direction and have the approval of the Department within which they are majoring may be allowed to take this course.  
Co-requisite:  
C26Q/ CHEM2601 or C25P/ CHEM2502 or approved courses from departments other than Chemistry. |
| C34M/ CHEM3402 | THE CHEMICAL INDUSTRIES                                              | 4 Credits | Semester 2       | 3     | Any two of C20J/ CHEM2001, C21J/ CHEM2101, C22J/ CHEM2201 or C23J/ CHEM2301 (Pass or Fail but not Fail Absent) and Permission of HOD. |
| C34Q/ CHEM3403 | CHEMICAL PROCESSING PRINCIPLES                                       | 8 credits | Semester 2      | 3     | C23J/ CHEM2301 or C33J/ CHEM3301 and Permission of HOD.  
| C35Q/ CHEM3501 | FOOD AND FLAVOUR CHEMISTRY                                           | 8 Credits | Semester 2       | 3     | C22J/ CHEM2201 and Permission of HOD.  
<p>| C37J/ CHEM3701 | RESEARCH PROJECT                                                      | 4 Credits | Semester 1, 2 &amp; 3 | 3     | Majoring in Chemistry, 16 Advanced credits in Chemistry and Permission of HOD. |</p>
<table>
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<tr>
<th>CODES</th>
<th>TITLES</th>
<th>CREDIT</th>
<th>SEMESTER OFFERED</th>
<th>Level</th>
<th>PREREQUISITES</th>
</tr>
</thead>
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<td>ADVANCED RESEARCH PROJECT</td>
<td>4 Credits</td>
<td>Semester 1, 2 &amp; 3</td>
<td>3</td>
<td>C37J/ CHEM3701 and Permission of HOD.</td>
</tr>
<tr>
<td>C37Q/ CHEM3703</td>
<td>COMPREHENSIVE RESEARCH PROJECT</td>
<td>8 Credits</td>
<td>Semester 1, 2 &amp; 3 or across two semesters</td>
<td>3</td>
<td>Majoring in Chemistry, 16 Advanced credits in Chemistry and Permission of HOD.</td>
</tr>
</tbody>
</table>
DEGREE OFFERINGS

A major in Pure Chemistry requires a total of 32 credits from Level II Chemistry courses which must include:

C20J/CHEM2001
C21J/CHEM2101
C22J/CHEM2201
C23J/CHEM2301
C31J/CHEM3101
C32J/CHEM3201 and
C33J/CHEM3301

A major in Applied Chemistry requires 32 credits in approved courses which must include:

C26Q/CHEM2601
C30J/CHEM3001
C34J/CHEM3401
C34M/CHEM3402 and
C34Q/CHEM3403.

A major in Food Chemistry requires 32 credits in approved courses which must include:

C25J/CHEM2501
C25P/CHEM2502
C30J/CHEM3001
C34J/CHEM3401 and
C35Q/CHEM3501.

TYPICAL SCHEDULE OF COURSES FOR DEGREES INCLUDING A GENERAL CHEMISTRY MAJOR

1. When no other Chemistry Major is involved (i.e no Food or Applied Chemistry Major):

<table>
<thead>
<tr>
<th>YEAR</th>
<th>COURSES/Semester I</th>
<th>COURSES/Semester II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introductory</td>
<td>CHEM1901</td>
<td>CHEM1902</td>
</tr>
<tr>
<td></td>
<td>+ 12 other level I credits</td>
<td>+ 12 other level I credits</td>
</tr>
<tr>
<td>1st Advanced Year</td>
<td>CHEM2101, CHEM2201</td>
<td>CHEM3101, CHEM3201</td>
</tr>
<tr>
<td></td>
<td>+ 8 other level II credits</td>
<td>+ 8 other level II credits</td>
</tr>
<tr>
<td>2nd Advanced Year</td>
<td>CHEM2001, CHEM2301</td>
<td>CHEM3301, Chem. Elective</td>
</tr>
<tr>
<td></td>
<td>+ 8 other level II or III credits</td>
<td>+ 8 other level II or III credits</td>
</tr>
</tbody>
</table>

Chem. Elective may include any Advanced Chemistry Course.
2. When it is a Double Major with Applied Chemistry:

<table>
<thead>
<tr>
<th>YEAR</th>
<th>COURSES/Semester I</th>
<th>COURSES/Semester II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introductory</td>
<td>CHEM1901 + 12 other level I credits</td>
<td>CHEM1902 + 12 other level I credits</td>
</tr>
<tr>
<td>1&lt;sup&gt;st&lt;/sup&gt; Advanced Year</td>
<td>CHEM2001, CHEM2301 CHEM 2201, CHEM2101</td>
<td>CHEM3001, CHEM3402 + two of CHEM3101, CHEM3201 &amp; CHEM3301.</td>
</tr>
<tr>
<td>2&lt;sup&gt;nd&lt;/sup&gt; Advanced Year</td>
<td>CHEM2601, CHEM3401 + 4 other level II or III chemistry credits</td>
<td>CHEM3403, the remaining course from CHEM3101, CHEM3201 &amp; CHEM3301, + 4 other level II or III Chemistry credits.</td>
</tr>
</tbody>
</table>

Note that CHEM2001 and CHEM2301 are prerequisites for Applied Chemistry Courses

3. When it is a Double Major with Food Chemistry:

<table>
<thead>
<tr>
<th>YEAR</th>
<th>COURSES/Semester I</th>
<th>COURSES/Semester II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introductory</td>
<td>CHEM1901 + 12 other level I credits</td>
<td>CHEM1902 + 12 other level I credits</td>
</tr>
<tr>
<td>1&lt;sup&gt;st&lt;/sup&gt; Advanced Year</td>
<td>CHEM2001, CHEM2201, CHEM2502</td>
<td>CHEM3001, CHEM3201 + 8 other level II or III Chemistry credits</td>
</tr>
<tr>
<td>2&lt;sup&gt;nd&lt;/sup&gt; Advanced Year</td>
<td>CHEM2101, CHEM2301, CHEM2501, CHEM3401</td>
<td>CHEM3501 + 8 other level III Chemistry credits</td>
</tr>
</tbody>
</table>

Note that CHEM2001 and CHEM2201 are prerequisites for Food Chemistry Courses

**TYPICAL SCHEDULE OF COURSES FOR DEGREES INCLUDING AN APPLIED CHEMISTRY MAJOR**

<table>
<thead>
<tr>
<th>YEAR</th>
<th>COURSES/Semester I</th>
<th>COURSES/Semester II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introductory</td>
<td>CHEM1901 + 12 other level I credits</td>
<td>CHEM1902 + 12 other level I credits</td>
</tr>
<tr>
<td>1&lt;sup&gt;st&lt;/sup&gt; Advanced Year</td>
<td>CHEM2001, CHEM2301 + 8 elective credits</td>
<td>CHEM3001, CHEM3402 + 8 elective credits</td>
</tr>
<tr>
<td>2&lt;sup&gt;nd&lt;/sup&gt; Advanced Year</td>
<td>CHEM2601, CHEM3401 + 4 elective credits</td>
<td>CHEM3403 + 8 elective credits</td>
</tr>
</tbody>
</table>
TYPICAL SCHEDULE OF COURSES FOR DEGREES INCLUDING A FOOD CHEMISTRY MAJOR

<table>
<thead>
<tr>
<th>YEAR</th>
<th>COURSES/Semester I</th>
<th>COURSES/Semester II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introductory</td>
<td>CHEM1901 + 12 other level I credits</td>
<td>CHEM1902 + 12 other level I credits</td>
</tr>
<tr>
<td>1st Advanced Year</td>
<td>CHEM2001, CHEM2502 + CHEM2201 or 4 elective credits</td>
<td>CHEM3001+ 12 elective credits</td>
</tr>
<tr>
<td>2nd Advanced Year</td>
<td>CHEM2501, CHEM3401 + the remaining course from CHEM2201 or 4 elective credits</td>
<td>CHEM3501 + 8 elective credits</td>
</tr>
</tbody>
</table>

A **minor in Chemistry** requires a total of 16 credits from Level II Chemistry courses which must include:

- C20J/CHEM2001
- C22J/CHEM2201
- *and either*
  - C21J/CHEM2101
  - or
  - C31J/CHEM3101
- *and either*
  - C23J/CHEM2301
  - or
  - C33J/CHEM3301

A **minor in Environmental Chemistry** requires 16 credits which must include:

- C26Q/CHEM2601
- *and 8 credits from*
  - C20J/CHEM2001
  - C30J/CHEM3001
  - C34M/CHEM3402

A **minor in Food Chemistry** requires 16 credits which must include:

- C35Q/CHEM3501
- *and 8 credits from*
  - C20J/CHEM2001
  - C22J/CHEM2201
  - C25J/CHEM2501
  - C30J/CHEM3001
  - C22J/CHEM2201
  - C32J/CHEM3201
A minor in Food Processing requires 16 credits which must include:

C25P/CHEM2502
and 8 credits from
C25J/CHEM2501
C34J/CHEM3401
C34M/CHEM3402
C34Q/CHEM3403

A minor in Industrial Chemistry requires all of:

C34J/CHEM3401
C34M/CHEM3402
and C34Q/CHEM3403.

DEPARTMENTAL OPTIONS

Three options involving Chemistry are offered: Chemistry and Management (Option 2), and Chemistry with Education (Option 3b) and Special Chemistry (Option 6). These are described at the end of the Chemistry Section.

CHEMISTRY AND MANAGEMENT

Part I

<table>
<thead>
<tr>
<th>Titles</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>C10J/CHEM1901 Introductory Chemistry I Semester I</td>
<td>6</td>
</tr>
<tr>
<td>C10K/CHEM1902 Introductory Chemistry II SII</td>
<td>6</td>
</tr>
<tr>
<td>EC10C/ECON1001 Introduction to Microeconomics SI&amp;II</td>
<td>3</td>
</tr>
<tr>
<td>EC10E/ECON1002 Introduction to Macroeconomics SI&amp;II</td>
<td>3</td>
</tr>
<tr>
<td>SY14G/SOCI1002 Sociology for the Caribbean SI</td>
<td>3</td>
</tr>
<tr>
<td>PS10C/PSYC1002 Introduction to Industrial &amp; Organisational Psychology SII</td>
<td>3</td>
</tr>
<tr>
<td>MS15D*/ACCT1005 Financial Accounting</td>
<td>3</td>
</tr>
<tr>
<td>MS15B/ACCT1003 Introduction to Cost and Management Accounting SII</td>
<td>3</td>
</tr>
</tbody>
</table>

* Students entering in 2010/2011 having passed CAPE Accounting Units I & II with Grade IV or better will receive credit exemptions from MS15B/ACCT1003 and MS15D/ACCT1005.

Part II

<table>
<thead>
<tr>
<th>Titles</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>C20J/CHEM2001 Chemical Analysis I Semester I</td>
<td>4</td>
</tr>
<tr>
<td>C21J/CHEM2101 Inorganic Chemistry SI</td>
<td>4</td>
</tr>
<tr>
<td>C22J/CHEM2201 Spectroscopy, Carbanions etc. SI</td>
<td>4</td>
</tr>
<tr>
<td>C23J/CHEM2301 Physical Chemistry SI</td>
<td>4</td>
</tr>
<tr>
<td>C31J/CHEM3101 Inorganic Chemistry SII</td>
<td>4</td>
</tr>
<tr>
<td>C32J/CHEM3201 Synthesis, Mechanism &amp; Stereochemistry SII</td>
<td>4</td>
</tr>
</tbody>
</table>
C33J/CHEM3301  Physical Chemistry SII  4
MS20A/MGMT2001  Principles of Marketing SI  3
MS21C/MGMT2005  Computer Applications SI&II  3
MS22A/MGMT2008  Organizational Behaviour SI&II  3
MS23C/MGMT2012  Quantitative Methods & Research Principles SI&II  3
MS27B/MGMT2021  Business Law SI&II  3
MS28D/MGMT2023  Financial Management I SI&II  3
MS29P/MGMT2026  Introduction to Production and Operations Management SI&II  3
MS33D/MGMT3031  Business Strategy and Policy SII  3
MS34A/MGMT3036  Entrepreneurship and Venture Capital SI&II  3

Plus
Four additional credits from Level II or Level III Chemistry Courses approved by the Department, to be taken along with three additional credits from Level II or III Management Studies courses to complete the course of study.

CHEMISTRY WITH EDUCATION

(FOR TRAINED AND PRE-TRAINED TEACHERS)

CHEMISTRY COURSES

LEVEL I

Twenty-four (24) credits from two subject areas in the Pure and Applied Sciences divided equally between the two so as to provide the prerequisite for Level II courses. One of the subject areas must be Chemistry (required courses are C10J/CHEM1901 and C10K/CHEM1902).

Trained Teachers with the New Double Option (since 2004) with chemistry as one of their majors and have a GPA ≥ 2.9 may be exempt from Level I requirements.

Trained Teachers with Single Option science are required to do Preliminary Chemistry.

All students must complete the foundation courses required by the FPAS.

LEVEL II/III

Thirty-two (32) credits from Level II Chemistry courses, which must include:

C20J/CHEM2001
C21J/CHEM2101
C22J/CHEM2201
C23J/CHEM2301
C31J/CHEM3101
C32J/CHEM3201 and
C33J/CHEM3301
EDUCATION COURSES

Trained teachers with double option and single option science diploma are required to do the following courses:

**Education specialization**
- ED24E/EDSC2405 The Psychology of Science Teaching and Learning 3 credits
- ED34C/EDSC3403 Assessment in Science Teaching 3 credits
- EDSC3417/ED34Q Introduction to Secondary Science 3 credits
- EDSC3411/ED34K The History of Science and Teaching
  - or
- DSC3404/ED34D Issues and Trends in Science Education and Science Curricula 3 credits
- EDSC3410/ED34J The Sociology of Science Teaching and Learning 3 credits

**Core education**
- One of:
  - ED20X/EDPH2024 Issues and Perspectives in Education
  - ED23E/EDEA2305 Action Research for School and Classroom Managers
  - or
  - EDSC3408 Environmental Education
  - or
  - ED30Y/EDCE3025 Integrating Computers in the Curriculum 3 credits
- EDTK2025/ED20Y Introduction to Computer Technology in Education 3 credits
- EDTL3020/ED30T Pre-Practicum 3 credits
- EDTL3021/ED30U Field Study 3 credits
- EDRS3019/ED30S The Report 3 credits

Pre-trained teachers are required to do the following courses:

**Education specialization**
- EDSC2407/ED24G Teaching Methodologies in Science 3 credits
- EDSC2405/ED24E The Psychology of Science Teaching and Learning 3 credits
- EDSC3403/ED34C Assessment in Science Teaching 3 credits
- EDSC3410/ED34J The Sociology of Science Teaching and Learning 3 credits
- EDSC3417/ED34Q Introduction to Secondary Science 3 credits

**Core education**
- EDTL1020/ED10T Introduction to Teaching and Learning 3 credits
- EDPS1003/ED10C Psychological Issues in the Classroom 3 credits
EDCU2013/ED20M Introduction to Curriculum Studies 3 credits
EDTL1021/ED10U Planning for Teaching 3 credits
EDTK2025/ED20Y Introduction to Computer Technology in Education 3 credits
EDTL2021/ED20U School Based Experience I 3 credits
EDTL3017/ED30Q School Based Experience II 3 credits
EDPS2003/ED20C Motivation and the Teacher 3 credits
EDRS3019/ED30S The Report 3 credits

BSc (SPECIAL) CHEMISTRY DEGREE

1. Candidates must satisfy the General Regulations for the degree of Bachelor of Science (except those relating to support courses) in addition to the following regulations.

2. The minimum standards for admission to the programme are as follows:

   Completion of Level I of the BSc degree programme, including passes in:

   (i) Introductory Chemistry (C10J/CHEM1901 and C10K/CHEM1902) at the prescribed level.

   (ii) Introductory Mathematics (M10A/MATH1140 and M10B/MATH1150).

   Consideration will be given to those applicants with an appropriate grade in Preliminary Mathematics (M08B/MATH0100 and M08C/MATH0110) or A-Level Mathematics or its equivalent.

   (iii) Preliminary Physics (P04A/PHYS0410 and P04B/PHYS0420) or the equivalent.

3. Admission to this programme is limited and candidates with good grades in C10J/CHEM1901 and C10K/CHEM1902 will be given preference.

4. To be eligible for the award of the BSc (Special) Chemistry degree, candidates must obtain:

   (a) A total of 56 credits by successfully completing the following
Level II courses:

(i)  
- C20J/CHEM2001
- C30J/CHEM3001
- C21J/CHEM2101
- C31J/CHEM3101
- C22J/CHEM2201
- C32J/CHEM3201
- C23J/CHEM2301
- C33J/CHEM3301

(ii) an additional twenty credits from Chemistry courses

(iii) A research project C37J/CHEM3701.

(b) An additional eight credits selected from Level II courses in any Science subjects in the BSc degree programme approved by the Department.

COURSE DESCRIPTIONS

PRELIMINARY COURSES

C06J/CHEM0901  PRELIMINARY CHEMISTRY A
(6 P-Credits) Semester 1 Level 0

Prerequisite: CXC (CSEC) Chemistry Grade III or better


The characteristics and properties of matter. Properties of solutions. Chemical Energetics, the First Law of Thermodynamics; Enthalpy and its calculation.

The chemistry of aliphatic hydrocarbons.

A practical course of 72 hours.

Evaluation: Two 2-hour written papers 70%
Course work 15%
Practical work 15%
Practical work is assessed throughout the duration of the course. Students whose practical work is considered to be unsatisfactory are required to sit a practical examination of not more than six hours duration. Candidates must provide the ORIGINAL worksheets of their laboratory work at the practical examination. These must be certified by the laboratory course Supervisor and may be taken into consideration by the Examiners.

**C06K/CHEM0902  PRELIMINARY CHEMISTRY B**  
(6 P-Credits)  
Semester 2  
Level 0

Pre-requisite:  
CXC (CSEC) Chemistry Grade III or better.

Syllabus:  
Properties and Reactivity of Main Group Elements and their compounds. Transition Elements and their compounds. Coordination compounds.

*A practical course of 72 hours.*

Evaluation:  
Two 2-hour written papers  
70%  
Course work  
15%  
Practical work  
15%

Practical work is assessed throughout the duration of the course. Students whose practical work is considered to be unsatisfactory are required to sit a practical examination of not more than six hours duration. Candidates must provide the ORIGINAL worksheets of their laboratory work at the practical examination. These must be certified by the laboratory course Supervisor and may be taken into consideration by the Examiners.

**LEVEL I COURSES**

**C10J/CHEM1901  INTRODUCTORY CHEMISTRY A**  
(6 credits)  
Semester 1  
Level I

Pre-requisites:  
C06J/CHEM0901 and C06K/CHEM0902, or GCE A-level Chemistry, or CAPE Chemistry.
Syllabus: Introductory analytical chemistry, theory of neutralization titrations, titration curves, spectrophotometry.


Energetics and Molecular Structure, heat capacity variation with temperature, wave behaviour in molecules, Boltzmann distribution, origin of molecular spectra.

A mechanistic approach to the chemistry of alkanes, alkenes and alkynes. An introduction to the stereochemistry of organic molecules.

*A practical course of 72 hours.*

Evaluation:

- Two 2-hour written papers 75%
- In-course test 10%
- Practical work 15%

Practical work is assessed throughout the duration of the course. Students whose practical work is considered to be unsatisfactory are required to sit a practical examination of not more than six hours duration. Candidates must provide the ORIGINAL worksheets of their laboratory work at the practical examination. These must be certified by the laboratory course Supervisor and may be taken into consideration by the Examiners.

C10K/ CHEM1902  INTRODUCTORY CHEMISTRY B
(6 credits)  Semester 2  Level I

Pre-requisites: C06J/ CHEM0901 and C06K/ CHEM0902, or GCE A-level Chemistry or CAPE Chemistry.

Syllabus: A detailed study of Main Group elements based on their position in the Periodic Table. The properties of oxygen and its compounds. Coordination compounds of First Row Transition Elements and their stereochemical features. Introduction to Crystal Field Theory. Stability of metal complexes. Isomerism.

Synthesis and Reactions of functionalised organic compounds. Introduction to Aromatic Chemistry.

*An practical course of 72 hours.*

**Evaluation:**
- Two 2-hour written papers 75%
- In-course test 10%
- Practical Work 15%

Practical work is assessed throughout the duration of the course. Students whose practical work is considered to be unsatisfactory are required to sit a practical examination of not more than six hours duration. Candidates must provide the ORIGINAL worksheets of their laboratory work at the practical examination. These must be certified by the laboratory course Supervisor and may be taken into consideration by the Examiners.

*Both C10J/CHEM1901 and C10K/CHEM1902 must be successfully completed before students can proceed to Part II courses in Chemistry.*

**LEVEL II COURSES**

**C20J/CHEM2001 CHEMICAL ANALYSIS I**

(4 credits)  Semester I  Level II

**Pre-requisites:**
C10J/CHEM1901 and C10K/CHEM1902

**Syllabus:**
Statistical methods and their use in laboratory management. Types of errors, rejection of data, means and standard deviations and their use in testing analytical results and methods, quality control charts.

Oxidation-reduction titrations and an introduction to the use of electrodes in analytical chemistry as illustrated by the pH electrode. Other ion selective electrodes. An introduction to spectroscopic methods as illustrated by Molecular Spectroscopy, including fluorescence in the UV/VIS region of the electromagnetic spectrum. The components of Spectrometers. Applications of such methods.


*An practical course of 36 hours.*

**Evaluation:**
- One 2-hour written paper 60%
In-course test and report 20%
Practical work 20%

Practical work is assessed throughout the duration of the course. Students whose practical work is considered to be unsatisfactory are required to sit a practical examination of not more than 6 hours duration. Candidates must provide the ORIGINAL worksheets and reports of their laboratory work at the practical examination. These must be certified by the laboratory course supervisor and may be taken into consideration by the examiners.

**C21J/CHEM2101 INORGANIC CHEMISTRY**
(4 credits) Semester I Level II
Pre-requisites: C10J/CHEM1901 and C10K/CHEM1902

* A practical course of 36 hours.

Evaluation: One 2-hour written paper 60%
In-course test 20%
Practical Work 20%

Practical work is assessed throughout the duration of the course. Students whose practical work is considered to be unsatisfactory are required to sit a practical examination of not more than six hours duration. Candidates must provide the ORIGINAL worksheets of their laboratory work at the practical examination. These must be certified by the laboratory course Supervisor and may be taken into consideration by the Examiners.

**C22J/CHEM2201 SPECTROSCOPY, MECHANISMS AND AROMATIC SYSTEMS**
(4 credits) Semester I Level II
Pre-requisites: C10J/CHEM1901 and C10K/CHEM1902
Syllabus: The application of spectroscopic techniques in organic chemistry: electronic, infrared, proton and carbon-13 magnetic
resonance spectroscopy, mass spectrometry. Their utility in elucidating the structure of organic compounds.


_A practical course of 36 hours._

**Evaluation:**

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>One 2-hour written paper</td>
<td>60%</td>
</tr>
<tr>
<td>In-course tests</td>
<td>20%</td>
</tr>
<tr>
<td>Practical work</td>
<td>20%</td>
</tr>
</tbody>
</table>

**C23J/CHEM2301 PHYSICAL CHEMISTRY**

(4 credits) Semester 1 Level II

**Pre-requisites:** C10J/CHEM1901 and C10K/CHEM1902

**Syllabus:**

Kinetic factors influencing the rates of chemical change in complex reacting systems. Theories of reaction rates. Methods of determining the rates of fast reactions.

Quantum Mechanics: treatment of translational, rotational and vibrational energy of molecules based on Schroedinger wave equation, implications for molecular spectra.


_A practical course of 36 hours._

**Evaluation:**

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>One 2-hour written paper</td>
<td>60%</td>
</tr>
<tr>
<td>In-course test</td>
<td>20%</td>
</tr>
<tr>
<td>Practical Work</td>
<td>20%</td>
</tr>
</tbody>
</table>
Practical work is assessed throughout the duration of the course. Students whose practical work is considered to be unsatisfactory are required to sit a practical examination of not more than six hours duration. Candidates must provide the ORIGINAL worksheets of their laboratory work at the practical examination. These must be certified by the laboratory course Supervisor and may be taken into consideration by the Examiners.

C25J/CHEM2501  BIOTECHNOLOGY IN THE CHEMICAL AND FOOD INDUSTRIES
(4 credits)  Semester I  Level II

This course is not available to students intending to major in Biotechnology nor students reading the following courses BIOT3113, BIOT3114, BIOT3116.

Pre-requisites:  C10J/CHEM1901 and C10K/CHEM1902 and Permission of HOD.


A practical course of 36 hours.

Evaluation:  One 2-hour written paper  60%
In-course test  20%
Practical work  20%

Practical work is assessed throughout the duration of the course. Students whose practical work is considered to be unsatisfactory are required to sit a practical examination of not more than six hours duration. Candidates must provide the ORIGINAL notebooks of their laboratory work at the practical examination. These must be certified by the laboratory course Supervisor and may be taken into consideration by the Examiners.

C25P/CHEM2502  FOOD PROCESSING TECHNIQUES
(8 credits)  Semester I  Level II

Pre-requisites:  C10J/CHEM1901 and C10K/CHEM1902 and Permission of HOD.

Preference will be given to students majoring in Food Chemistry.
Syllabus: Unit operations of the food industry. HACCP. Technologies for processing meat, fish and poultry, fruit and vegetables and dairy. Thermal processing, freezing, juices and concentrates, jams and jellies, irradiation, curing and smoking of meats, preservatives. Water relations in food processing, drying and dehydration. Enzymes in food processing. Packaging. New technologies.

* A practical course of 72 hours.

Evaluation: Two 2-hour written papers 60%
In-course test and report 20%
Practical work 20%

Practical work is assessed throughout the duration of the courses. Students whose practical work is considered to be unsatisfactory are required to sit a practical examination of not more than six hours duration. Candidates must provide the ORIGINAL worksheets and reports of their laboratory work at the practical examination. These must be certified by the laboratory course supervisor and may be taken into consideration by the examiners.

C26Q/CHEM2601  ENVIRONMENTAL CHEMISTRY
(8 credits)  Semester I  Level II

It is strongly recommended that students read C20J/CHEM2001 and C30J/CHEM3001 before entering this course.

Pre-requisites: C10J/CHEM1901 and C10K/CHEM1902 and Permission of HOD.

Syllabus: A study of the important processes and reactions in the environment by a consideration of:

(a) the biogeochemical cycles of the major, minor and trace elements showing sources and dispersion processes;

(b) the divisions into lithosphere, hydrosphere, atmosphere and biosphere; and

(c) the interactions between man and the environment (including pollution control).

A study of corrosion by a consideration of:

(a) metallic corrosion (i) in gaseous environments, and (ii) in aqueous environments;

(b) degradation of materials other than metals;
A practical course of 72 hours.

Evaluation:

Two 2-hour written papers  60%
In-course test and report  20%
Practical work  20%

Practical work is assessed throughout the duration of the courses. Students whose practical work is considered to be unsatisfactory are required to sit a practical examination of not more than 6 hours duration. Candidates must provide the ORIGINAL notebooks and reports of their laboratory work at the practical examination. These must be certified by the laboratory course supervisor and may be taken into consideration by the examiners.

C30J/CHEM3001  CHEMICAL ANALYSIS II
(4 credits)  Semester 2  Level III

Pre-requisite:  C20J/CHEM2001 (Pass or Fail, but not Failed Absent)

Syllabus:
The analysis of real samples. The analysis of trace vs major components. Sampling theory, contamination, and errors associated with sampling. Inter-laboratory calibration/testing exercises. The Professional Analyst.

A practical course of 36 hours.
Evaluation:  
One 2-hour written paper 60%  
In-course test and report 20%  
Practical work 20%  

Practical work is assessed throughout the duration of the course. Students whose practical work is considered to be unsatisfactory are required to sit a practical examination of not more than 6 hours duration. Candidates must provide the ORIGINAL notebooks and reports of their laboratory work at the practical examination. These must be certified by the laboratory course supervisor and may be taken into consideration by the examiners.

C31J/CHEM3101  INORGANIC CHEMISTRY  
(4 credits)  Semester 2  Level III  
Pre-requisites:  
C10J/CHEM1901 and C10K/CHEM1902  

Syllabus:  

A practical course of 36 hours.

Evaluation:  
One 2-hour written paper 60%  
In-course test 20%  
Practical Work 20%  

Practical work is assessed throughout the duration of the course. Students whose practical work is considered to be unsatisfactory are required to sit a practical examination of not more than six hours duration. Candidates must provide the ORIGINAL notebooks of their laboratory work at the practical examination. These must be certified by the laboratory course Supervisor and may be taken into consideration by the Examiners.

C31L/CHEM3104  THE INORGANIC CHEMISTRY OF BIOLOGICAL SYSTEMS  
(4 credits)  Semester 2  Level III  
Pre-requisite:  
C21J/CHEM2101 and Permission of HOD.

A practical course of 36 hours.

Evaluation: One 2-hour written paper 60%
In-course tests 20%
Practical work 20%

Practical work is assessed throughout the duration of the course. Students whose practical work is considered to be unsatisfactory are required to sit a practical examination of not more than six hours duration. Candidates must provide the ORIGINAL notebooks of their laboratory work at the practical examination. These must be duly certified by the laboratory course Supervisor and may be taken into consideration by the Examiners.

C31M/CHEM3102: METAL IONS IN SOLUTION
(4 credits) Semester 2 Level III

Pre-requisite: C21J/CHEM2101 and Permission of HOD


A practical course of 36 hours

Evaluation: One 2-hr written paper 60%
In-course tests 20%
Practical work 20%

Practical work is assessed throughout the duration of the course. Students whose practical work is considered to be unsatisfactory are required to sit a practical examination of not more than six hour duration. Candidates must provide the ORIGINAL notebooks of their laboratory work at the practical examination. These must be duly certified by the laboratory course Supervisor and may be taken into
consideration by the Examiners

C31N/CHEM3103 ADVANCED MATERIALS CHEMISTRY
(4 credits) Semester 1 Level III

Pre-requisites: C21J/CHEM2101 and C31J/CHEM3101


A practical course of 36 hours.

Evaluation:

One 2-hour written paper 60%
In-course tests 20%
Practical work 20%

Practical work is assessed throughout the duration of the course. Students whose practical work is considered to be unsatisfactory are required to sit a practical examination of not more than six hours duration. Candidates must provide the ORIGINAL notebooks of their laboratory work at the practical examination. These must be duly certified by the laboratory course Supervisor and may be taken into consideration by the Examiners.

C32J/CHEM3201 ORGANIC SYNTHESIS, BIOMOLECULES AND STEREOCHEMISTRY
(4 credits) Semester 2 Level III

Pre-requisites: C22J/CHEM2201 (Pass or Fail but not Fail Absent)

aspects. The chemistry of carbohydrates— the synthesis and properties of mono- and disaccharides. The chemistry of amino acids, peptides and proteins.

*A practical course of 36 hours.*

Evaluation: One 2-hour written paper 60%
In-course test 20%
Practical Work 20%

Practical work is assessed throughout the duration of the course. Students whose practical work is considered to be unsatisfactory are required to sit a practical examination of not more than six hours duration. Candidates must provide the ORIGINAL notebooks of their laboratory work at the practical examination. These must be certified by the laboratory course Supervisor and may be taken into consideration by the Examiners.

**C32K/CHEM3202  THE CHEMISTRY OF ORGANIC NATURAL PRODUCTS**
(4 credits) Semester 2 Level III

Pre-requisite: C22J/CHEM2201 and C32J/CHEM3201

Syllabus: Diversity, classification, biosynthesis and biological activity of natural compounds of commercial, pharmaceutical and agricultural interest (polyketide and macrolide antibiotics, terpenes, steroids, alkaloids). Structure determination by spectral analysis. C-13 nuclear magnetic resonance spectroscopy and mass spectrometry. Natural products of biological importance as synthetic targets synthetic strategy and methodology.

*A practical course of 36 hours.*

Evaluation: One 2-hour written paper 60%
In-course tests 20%
Practical work 20%

Practical work is assessed throughout the duration of the course. Students whose practical work is considered to be unsatisfactory are required to sit a practical examination of not more than six hours duration. Candidates must provide the ORIGINAL notebooks of their laboratory work at the practical examination. These must be duly certified by the laboratory course Supervisor and may be taken into consideration by the Examiners.
C32N/CHEM3203  ORGANIC CHEMISTRY IN MEDICINE AND AGRICULTURE  
(4 credits)  Semester 1  Level III

Pre-requisites:  C22J/CHEM2201 and C32J/CHEM3201

Syllabus:  The synthesis of organic compounds of medicinal and agricultural interest. General principles of drug action; Structure-Activity Relationships; Principles of drug design. Synthetic approaches to selected pharmaco-logically active compounds, e.g. sulfonamides, pyrimidines, penicillins; central nervous system drugs: tranquillizers, anti-depressants, hallucinogens. Insecticides, fungicides, herbicides, growth regulators. Natural products used in medicine and agriculture.

A practical course of 36 hours.

Evaluation:  One 2-hour written paper  60%
In-course tests  20%
Practical work  20%

Practical work is assessed throughout the duration of the course. Students whose practical work is considered to be unsatisfactory are required to sit a practical examination of not more than six hours duration. Candidates must provide the ORIGINAL notebooks of their laboratory work at the practical examination. These must be duly certified by the laboratory course Supervisor and may be taken into consideration by the Examiners.

C33J/CHEM3301  PHYSICAL CHEMISTRY 
(4 credits)  Semester 2  Level III

Pre-requisites:  C10J/CHEM1901 and C10K/CHEM1902

UV/visible spectra for diatomic molecules electronic transitions; dissociation energies, Franck-Condon principle. Collisional processes and energy changes in electronically excited atoms and molecules.

*A practical course of 36 hours.*

**Evaluation:**
- One 2-hour written paper 60%
- In-course test 20%
- Practical Work 20%

Practical work is assessed throughout the duration of the course. Students whose practical work is considered to be unsatisfactory are required to sit a practical examination of not more than six hours duration. Candidates must provide the ORIGINAL notebooks of their laboratory work at the practical examination. These must be certified by the laboratory course Supervisor and may be taken into consideration by the Examiners.

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**C33K/CHEM3302 CHEMISTRY OF POLYMERS**

(4 credits) Semester 1 Level III

**Pre-requisites:** C23J/CHEM2301 and C33J/CHEM3301


* A practical course of 36 hours.

**Evaluation:**
- One 2-hour written paper 60%
- In-course tests 20%
- Practical work 20%

Practical work is assessed throughout the duration of the course. Students whose practical work is considered to be unsatisfactory are required to sit a practical examination of not more than six hours duration. Candidates must provide the ORIGINAL notebooks of their laboratory work at the practical examination.
examination. These must be duly certified by the laboratory course Supervisor and may be taken into consideration by the Examiners.

C33M/CHEM3303  PROPERTIES OF MATTER
(4 credits) Semester 2 Level III

Pre-requisites: C23J/CHEM2301 and C33J/CHEM3301


A practical course of 36 hours.

Evaluation: One 2-hour written paper 60%
In-course tests 20%
Practical work 20%

Practical work is assessed throughout the duration of the course. Students whose practical work is considered to be unsatisfactory are required to sit a practical examination of not more than six hours duration. Candidates must provide the ORIGINAL notebooks of their laboratory work at the practical examination. These must be duly certified by the laboratory course Supervisor and may be taken into consideration by the Examiners.

C34J/CHEM3401  PROJECT EVALUATION AND MANAGEMENT FOR SCIENCE BASED INDUSTRIES
(4 credits) Semester I Level III

This course is only available to students majoring in Applied Chemistry and Food Chemistry but students who do not have any overlapping Management Studies courses and are majoring in areas which have an industrial direction and have the approval of the Department within which they are majoring may be allowed to take this course.

Co-requisite: C26Q/CHEM2601 or C25P/CHEM2502 or approved courses from departments other than Chemistry and Permission of HOD.

Evaluation: One 2-hour written paper 75%
Project 25%

C34M/CHEM3402 THE CHEMICAL INDUSTRIES (4 credits) Semester 2 Level III

Pre-requisites: Any two of C20J/CHEM2001, C21J/CHEM2101, C22J/CHEM2201 or C23J/CHEM2301 (Pass or Fail but not Failed Absent) and Permission of HOD.

Syllabus: One of the Bauxite to Alumina, Cement or Glass industries AND one of the Sugar, Petroleum or Forestry Industries: raw materials, major unit operations and the flow of materials through and chemical changes within them, products and possible alternatives, product quality assurance methods, possible future and developments, local and global relevance, environment issues. The Global and Caribbean Chemical Industries.

Practical work comprises satisfactory participation in an approved work-study programme.

Evaluation: One 2-hour written paper 50%
Work-Study Placement 25%
Project 25%

Students will be required to satisfy the examiners in both the written paper and the practical work separately.

C34Q/CHEM3403 CHEMICAL PROCESS PRINCIPLES (8 credits) Semester 2 Level III

This course is available to Applied Chemistry majors (as a requirement) and Food Chemistry majors (as an elective). It is also available to students doing minors in Food Processing and Industrial Chemistry.

Pre-requisite: C23J/CHEM2301 and Permission of HOD.
Co-requisite: C34M/CHEM3402 or C35Q/CHEM3501


* A practical course of 72 hours.

Evaluation: Two 2-hour written papers 60%
In-course test 15%
Practical work 25%

Practical work is assessed throughout the duration of the courses. Students whose practical work is considered to be unsatisfactory are required to sit a practical examination of not more than six (6) hours duration. Candidates must provide the ORIGINAL notebooks and reports of their laboratory work at the practical examination. These must be certified by the laboratory course supervisor and may be taken into consideration by the examiners.

C35Q/CHEM3501 FOOD AND FLAVOUR CHEMISTRY
(8 credits) Semester 2 Level III

Pre-requisite: C22J/CHEM2201 and Permission of HOD.


* A practical course of 72 hours.

Evaluation: Two 2-hour written papers 60%
In-course test and report 20%
Practical work 20%

C37J/CHEM3701 RESEARCH PROJECT
(4 credits) Semesters 1, 2, and 3 Level III

Pre-requisites: Majoring in Chemistry, 16 credits from Advanced Chemistry and Permission of HOD. It is recommended that in the semester prior to enrolling in this course candidates discuss suitable topics with potential academic supervisors.

Syllabus: Research methods and Ethics. Use of chemical literature. Experiment design. Advanced instrumental and chemical investigation techniques. Preparation of scientific reports.
Investigation of an approved topic with oral and written reporting of results.
Students are expected to spend about 100-120 hours in the laboratory.

Course Evaluation:  
- Written Report 40%  
- Assessment of course work 40%  
- Oral presentation 20%  

C37K/CHEM3702 ADVANCED RESEARCH PROJECT  
(4 credits) Semesters 1, 2, and 3  Level III

Pre-requisites:  C 37J/CHEM3701 and Permission of HOD.

Syllabus:  Advanced instrumental and chemical investigation techniques.  
In-depth investigation of an approved topic with oral and written reporting of results.

Course Evaluation:  
- Written Report 40%  
- Assessment of course work 40%  
- Oral presentation 20%  

C37Q/CHEM3703 COMPREHENSIVE RESEARCH PROJECT  
(8 credits) Semesters 1, 2, and 3, or any two semesters  
Level III

Pre-requisites:  Majoring in Chemistry, 16 credits from Advanced Chemistry and Permission of HOD. It is recommended that in the semester prior to enrolling in this course candidates discuss suitable topics with potential academic supervisors.

Syllabus:  Research methods and Ethics. Use of chemical literature. Advanced instrumental and chemical investigation techniques; experiment design. Preparation of scientific reports. In-depth investigation of an approved research question with oral and written reporting of results. 
Students are expected to spend about 200-240 hours in the laboratory.

Course Evaluation:  
- Written Report 40%  
- Assessment of course work 40%  
- Oral presentation 20%
Bachelor of Science

The Bachelors programme delivers the knowledge and skills to apply OESH competencies in business enterprises and government agencies. These generalists are able to develop, implement and manage basic programmes and to assist in the provision of training and consultancy services.

Entry Requirements

In order to be admitted into the Bachelor’s programme, candidates must have satisfied the general Faculty entry requirements and have passed two units of Chemistry, Biology or Physics at CAPE (or equivalent).

Graduates of this programme will form a core of professionals who will be competent in:

- The recognition, evaluation and provision of basic control options for workplace hazards;
- The development, implementation and management of basic OESH programmes;
- The provision of OESH training;
- Assisting in the provision of OESH consultancy services.

Programme Structure

The programme runs for three (3) years full-time and is divided into two (2) levels. Level I consists of seven (7) courses which must be completed in year one, while Level II consists of twenty (2) courses plus a practicum, which are completed in years 2 and 3. Most year three courses focus on professional development in OESH. The part-time option runs over six (6) years.

The BSc. OESH Programme requires 122 credits.

Course Outline

Year 1 (39 Credits)

Semester I

- SH10J/OESH1000: Introduction to OESH (6 credits)
- BIOL1017: Cells Biology and Genetics (3 credits)
- BIOL1018: Molecular Biology (3 credits)
- CHEM1901: Introduction to Chemistry A (6 credits)
### Semester 2

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<tr>
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<th>Course Title</th>
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<tr>
<td>CHEM1902</td>
<td>Introduction to Chemistry B</td>
<td>6 credits</td>
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<tr>
<td>BIOL1262</td>
<td>Living Organisms I</td>
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<td>BIOL1263</td>
<td>Living Organisms II</td>
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<td>GEOG1201</td>
<td>Introduction to Physical Geography</td>
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**Summer**

This period may be used to do any make-up courses

### Year 2

(41 credits)

#### Semester 1

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<td>CHEM2001</td>
<td>Chemical Analysis I</td>
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<td>OESH2000</td>
<td>Environmental Contaminants and Control</td>
<td>8 credits</td>
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<td>MC29Z</td>
<td>Organizational Communication (Dept. of Media and Communication)</td>
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<td>BIOL2014</td>
<td>Ecology (Level II)</td>
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#### Semester 2

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<td>CHEM3001</td>
<td>Chemical Analysis II</td>
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<td>PM35B</td>
<td>Toxicology (Department of Basic Medical Sciences)</td>
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<td>MICR2252</td>
<td>Eukaryotic Microorganisms</td>
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**Summer**

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<td>PS10C</td>
<td>Introduction to Industrial/Organizational Psychology</td>
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<tr>
<td>MDSC3200</td>
<td>Understanding Research</td>
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### Year 3

(42 credits)

#### Semester 1

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<td>SH32J/OESH3200</td>
<td>Occupational Safety Assessment and Measurement</td>
<td>4 credits</td>
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<tr>
<td>SH31J/OESH3100</td>
<td>Environment Hazard Assessment and Risk Management and Control</td>
<td>4 credits</td>
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<td>SH30L/OESH3030</td>
<td>Workplace Survey and Evaluation</td>
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<td>SH32M/OESH3220</td>
<td>Occupational Hygiene</td>
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<tr>
<td>M32F</td>
<td>Labour and Employment (and Environment) Laws</td>
<td>3 credits</td>
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Semester 2

SH30J/OESH3010 Occupational and Environmental Health Disorders (4 credits)
SH30K/OESH3020 OESH Measurement Methods (4 credits)
SH30M/OESH3040 Disaster and Emergency Management (4 credits)
SH32K/OESH3210 Ergonomics (4 credits)
Foundation Course (3 credits)

Summer

SH34J/OESH3430 Practicum (4 credits)

Scholarships & Awards

THE CHEMISTRY DEPARTMENT PRIZE
THE CEDRIC HASSALL PRIZE
THE WILFRED CHAN AWARD
THE GARFIELD SADLER AWARD
THE BERT FRASER-REID PRIZE
THE LEORNARD J. HAYNES AWARD
THE PAVELICH/HONKAN PRIZE
THE GERALD LALOR SCHOLARSHIP
THE KENNETH MAGNUS SCHOLARSHIP
THE EARLE ROBERTS SCHOLARSHIP
THE TARA DASGUPTA SCHOLARSHIP
# DEPARTMENT OF COMPUTING

## LIST OF UNDERGRADUATE COURSES

<table>
<thead>
<tr>
<th>CODES</th>
<th>TITLES</th>
<th>CREDIT</th>
<th>SEMESTER OFFERED</th>
<th>Level</th>
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<td><strong>LEVEL I</strong></td>
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<tr>
<td>CS11Q/COMP1125</td>
<td>INTRODUCTION TO COMPUTER SCIENCE I</td>
<td>6 Credits</td>
<td>Semester 1</td>
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<td>One of the Following: A-level Mathematics or M08B and M08C or EC14C or A certificate/diploma in Mathematics at the Associate level degree (e.g. from a teacher's college) or O-level (or CXC CSEC) Mathematics and A-level Computer Science</td>
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<td>CS11R/COMP1160</td>
<td>INTRODUCTION TO COMPUTER SCIENCE II</td>
<td>6 Credits</td>
<td>Semester 2</td>
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<td>ANALYSIS OF ALGORITHMS</td>
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<td>DISCRETE MATHEMATICS FOR COMPUTER SCIENCE</td>
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<td>COMPUTER ARCHITECTURE &amp; ORGANIZATION</td>
<td>4 Credits</td>
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<td>CS21Q/2120 – Digital Systems</td>
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<td>DIGITAL LOGIC DESIGN</td>
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<td>SOFTWARE ENGINEERING</td>
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<td>CS24W/COMP2180</td>
<td>WEB PROGRAMMING I</td>
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<td>CS11Q/COMP1125 and CS11R/COMP1160</td>
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<td>CS27Q/COMP2160</td>
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<td>CS28Q/COMP2170</td>
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<td>OPERATING SYSTEMS</td>
<td>4 Credits</td>
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<td>CS32Q/COMP3150</td>
<td>COMPUTER NETWORKING AND COMMUNICATION</td>
<td>4 Credits</td>
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<td>COMPUTER NETWORK &amp; SECURITY</td>
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<td>4 Credits</td>
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<td>LANGUAGE PROCESSORS</td>
<td>4 Credits</td>
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<td>WEB DESIGN &amp; PROGRAMMING II</td>
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<td>CS35A/COMP3160</td>
<td>DATABASE MANAGEMENT SYSTEMS</td>
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Overview of B.Sc. Computer Science Major

Core courses:

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<tr>
<td>CS11R/COMP1160</td>
<td></td>
</tr>
<tr>
<td>CS20S/COMP2101</td>
<td>Pre-requisites for most advanced courses</td>
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<tr>
<td>CS20R/COMP2111</td>
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<tr>
<td>CS22Q/COMP2140</td>
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<tr>
<td>CS21R/COMP2230 or</td>
<td>CS21R/COMP2230 requires CS21S/COMP2120 (or</td>
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<tr>
<td>CS23Q/COMP2240</td>
<td>P24K/ELET2430)</td>
</tr>
<tr>
<td>CS39Q/COMP3900</td>
<td>Offered in all semesters</td>
</tr>
</tbody>
</table>

Note: Credit may be given for only one of CS21R/COMP2230 or CS23Q/COMP2240.

*MS386 cannot be credited with any Computer Science courses.*

Electives:

Any additional 12 credits at Level 3. Students must have at least 16 Level 3 credits in all (including CS39Q) in order to satisfy the requirements of the major.

For each Computer Science course, students must pass the exam and course-work components separately, in order to pass the course.

Students who wish for a more in-depth treatment of computer hardware are encouraged to take CS21R/COMP2230 instead of CS23Q/COMP2240. *Note that P24K/ELET2430 is equivalent to CS21S/COMP2220, so students double majoring with Electronics are particularly well positioned to take CS21R/COMP2230.*

A minor in Computer Science requires sixteen (16) credits from Part II Computer Science courses. These must include:

- CS20R/COMP2111
- CS20S/COMP2101
- CS22Q/COMP2140
  and
- CS23Q/COMP2240 or
- CS21R/COMP2230.
COURSE DESCRIPTIONS

LEVEL I COURSES

CS11Q/COMP1125  INTRODUCTION TO COMPUTER SCIENCE
(6 credits)  Semester 1 & 2  Level I

Pre-requisites:  Any one of the following:
•  CAPE (or A-level) Mathematics
  Both of:
  •  CAPE (or A-Level) Computer Science
  •  CSEC Mathematics

  Both of:
  •  M08B
  •  M08C

  •  EC14C
  •  Assoc. Degree in Mathematics

Syllabus:
1. Building Abstractions
   a. Computational Processes
      •  Primitive Operations
      •  Special Forms for naming, conditional execution
      •  Procedures as sequences of operations
      •  Recursion and Iteration
      •  Lexical scoping and Nested Procedures
   b. Higher-order procedures
      •  Customising Procedures with procedural arguments
      •  Creating new functions at run-time
   c. Compound Data: Pairs, Lists, and Trees
   d. Abstract Data Types

2. Controlling Interactions
   •  Generic operations
   •  Self-Describing Data
   •  Message Passing
   •  Streams and Infinite Data Structures
   •  Object-oriented Programming

3. Meta-linguistic Abstraction
   •  Interpretation of programming languages
   •  Machine model
   •  Compilation
   •  Embedded Languages.
Assessment: One 2-hour written paper 60%
Coursework 40%
- 1 In-course Test
- 5 Assignments
- Weekly labs

Students are required to pass the coursework and the final examination separately in order to pass the course. Attendance at tutorials and lab sessions is mandatory.

CS11R/COMP1160  INTRODUCTION TO OBJECT-ORIENTED PROGRAMMING
(6 credits) Semester 1 & 2 Level I

Pre-requisite: CS11Q/COMP1125

Syllabus:

Object-Oriented Programming

Comparison of programming paradigms at the conceptual level.
Objects and classes. Methods, message passing.
Instance and class variables.
Encapsulation and information-hiding, data and control abstraction.
Imperative control structures, assignment/state, parameter passing models. Primitive types.
classes.
Multiple inheritance, interfaces. Templates/Generics.
Using APIs, class libraries. Modules/packages. Name space resolution mechanisms.
Array and string processing. I/O processing.
Concept of pointers and references. Simple linked structures.
Collection classes and Iterators.
OO Testing. Debugging tools.

Object-Oriented Design Methods
Introductory object-oriented analysis and design using simple CRC cards, UML class diagrams.
Relationship of OOD and top-down/bottom-up design.
Introduction to the concept of simple design patterns, e.g. Iterator, Listener.
Introduction to the concept of frameworks and design reuse.
Graphics and GUI Programming, Web Concepts and Objects
Introduction to GUI programming. Event-driven programming. Exception handling.
Use of simple graphical libraries, and simple animation programming.
Basic web architecture concepts and HTML.
Simple embedded client-side objects such as applets and scripts.

Assessment: One 2-hour written paper 50%
Coursework: 50%
- 5 Quizzes (5%)
- In-course test (10%)
- 10 Labs, 4 Projects (35%)

Students are required to pass the coursework and the final examination separately in order to pass the course.

LEVEL II COURSES

CS20R/COMP2111 ANALYSIS OF ALGORITHMS
(4 credits) Semester 2 Level II
Pre-requisites: CS11Q/COMP1125 and CS11R/COMP1160

Syllabus:
- Recursive Data structures (lists and trees) and recursion as a Problem-solving tool.
- Divide and conquer algorithm.
- Solving recurrence equations, the Master Theorem.
- Heaps as implementations for priority queues.
- Sorting.
- Binary search trees, Red-Black trees.
- Dynamic programming (matrix multiplication, longest substring)
- Graphs.
Selected algorithms from:
- Fast exponentiation, Euclid's algorithm, Discrete logarithm
RSA cryptography.
- Matrix computations.
- Representation of and computation with polynomials.
- NP-completeness.
Assessment: 
One 2-hour written paper 60%
Coursework 40%
Mid-term (5%)
3 Assignments (15%)
2 Projects (20%)

CS20S/COMP2101 DISCRETE MATHEMATICS FOR COMPUTER SCIENCE
(4 credits) Semester 1 Level II

Pre-requisites: CS11Q/COMP1125 and CS11R/COMP1160

Syllabus: 
Background
- Asymptotic Analysis
- Limits
- Orders of Growth
Counting
- Permutations
- Combinations
- Inclusion-exclusion principle
Elementary Probability Theory
- Counting in event space
- Bernoulli distribution
- Geometric distribution
- Binomial distribution
- Poison distribution
Elementary Number Theory
- Modular Arithmetic
- Chinese Remainder Theorem
- Groups formed from Z modulo a prime
Generating Functions and their Applications
- Convergence Properties
- Convolution
- Applications to:
  - signal processing
  - image compression
  - solving linear recurrences
  - probability theory
  - error detection and correction
Graph Theory
- Trees
- Planarity
- Spanning Trees
- Eulerian and Hamiltonian Cycles
- Colouring
- Matching
Assessment: One 2-hour written paper 60%
Course work 40%
- (In-course test and assignments)

CS21R/COMP2230 COMPUTER ARCHITECTURE AND ORGANIZATION
(4 credits) Semester 2 Level II

Pre-requisites: CS21S/COMP2101

Syllabus: Tour of computer systems
Representation and manipulation of information:
- Computer arithmetic
- Instruction set architecture design and machine-level representation of programs
- Basic processor organization
- Single cycle data path and control unit
- Multicycle processor design
- Microprogramming
- Exceptions, Interrupts and traps
- Pipelining
- Memory hierarchy and Virtual memory
- RISC Architectures
- Instruction-level parallelism, superscalar, multithreaded and EPIC architectures
- Case Studies: MMIX, Itanium, and PowerPC
- Optimizing Program Performance
- Measuring a program execution time

Assessment: One 2-hour written paper 60%
Coursework 40%

CS21S/COMP2120 DIGITAL LOGIC DESIGN
(4 credits) Semester 1 Level II

Note: This course is the same as P24K/ELET2430. Students will not receive credit for both courses.

Pre-requisites: CS11Q/COMP1125 and CS11R/COMP1160

Syllabus: Transistors; analogue vs. digital signals
Number Systems and Codes
- Binary, decimal, octal and hexadecimal systems and their conversion
- Binary-Coded-Decimal (BCD) code.
- Alphanumeric codes. ASCII.
- Fixed and floating point representations
Combinational Logic Circuits
- Sum-of-products expression used in designing logic circuits.
- Boolean Algebra and the Karnaugh Map used to simplify and design logic circuits.
- Parity generation and checking. Enable-disable circuits.

Flip-Flops and their Applications
- RS flip-flops, JK flip-flops, D flip-flops
- Timing waveforms.
- Synchronous and Asynchronous systems.
- Counters and Registers and their uses.

Memory and Programmable Devices
- ROM architecture and timing.
- Programmable ROM.
- Flash Memory.
- Programmable logic devices.
- RAM architecture and timing
- Finite State Machines

Assessment:
- One 2-hour written paper 60%
- Coursework 40%

CS22Q/COMP2140 SOFTWARE ENGINEERING
(4 credits) Semester 1 Level II

Pre-requisites: CS11Q/COMP1125 and CS11R/COMP1160

Syllabus:
- Introduction to Software Engineering
- Overview and relevance of Software Engineering.
- Professional and ethical responsibility.
- Process Models
- Sequential, iterative/incremental and rescue-based paradigms.
- Process activities.
- Project Management
- Project planning
- Project scheduling
- Risk Analysis
- Identification, analysis and planning
- Software Requirements
- Preparing software requirements document
- Requirement elicitation, analysis and management
- System models
- Object Oriented Software Design
System modeling using UML
CRC cards
Verification and Validation
Static and dynamic models
Testing
System and dynamic methods
Test case design
Software Evolution
Software maintenance
Evolution process

Assessment:
One 2-hour written paper 60%
Coursework 40%
- In-course test (5%)
- Project (25%)
- Presentations and quizzes (10%)

CS23Q/COMP2240 COMPUTER ORGANISATION
(4 credits) Semester 2 Level II

Pre-requisites: CS11Q/COMP1125 and CS11R/COMP1160

Syllabus: Electronic Bits: Transistors; Logic Gates as combination of transistors: Universal Gates

Basic Components: Adders and ALUs; Flip-flops; Registers and Register Files; Memory (ROM, SRAM and DRAM); Counters

Achieving Computation: Separating Datapath and Controller; Controlling the feedback: Status bits; the Controller as hardware

Processor Architecture: Single cycle instruction architecture;
Microcoded instructions architecture

Flavours of Parallelism (Briefly): Pipelining; Super-scalar architecture; Very Long Instruction Word architecture; Vector processors; MIMD architecture

Data Representation: + Simple Data: Fixed Point Representation; Floating Point Representation; Characters and Pointer;
+ Compound Data; Arrays; Strings; Records and Objects

Exceptions: Interrupts; Traps; Faults
Caching: Direct Mapped Caches; Set-associative caches; multi-level caches

Virtual Memory: Page Tables; Address Translation; Multi-level page tables

Multi-tasking: Threads and Processes; Context Switching; Concurrent access to shared memory; Thrashing

Peripherals: Video Displays; Disk I/O; Serial Devices; Network Devices and Protocols

Assessment: One 2-hour written paper 60%
Coursework 40%
Mid-term (10%) 3 Assignments (30%)

CS24W/COMP2180 WEB DESIGN & PROGRAMMING 1
(4 credits) Semester 1 Level II

Pre-requisites: CS11Q/COMP1125 and CS11R/COMP1160

Syllabus: Networking concepts, Internet protocols - TCP/IP. DNS, MIME types.
XHTML, dynamic XHTML, CSS, DOM.
Overview of website design principles: requirements, concept design, implementation, testing.
Overview of website UI design: low-fidelity prototyping, layout, use of colour, fonts, controls.
Server-side frameworks and languages, client-side languages. Basic session tracking.
Introduction to three-tier architecture.
Fundamental web frameworks and design patterns for the web.
Overview of web server architecture and web services standards.
Web database connectivity.
Overview of principles, design and frameworks for e-commerce.
Overview of network security issues, ethical and social issues.
Introduction to multimedia for the web.
Introduction to mobile and wireless web platforms.

Assessment: One 2-hour written paper 50%
Coursework 50%
- 10 Labs, 5 Projects (45%)
- In-course test (5%)
Students are required to pass the coursework and final examination separately in order to pass the course.

**CS28Q/COMP2170**  
**OBJECT TECHNOLOGY**  
(4 credits)  
Semester 2  
Level II

Pre-requisites:  
CS11Q/COMP1125 and CS11R/COMP1160

Co-requisites:  
CS22Q

Syllabus:  
Basic concepts of Object Technology:  
- Encapsulation, information hiding, inheritance, composition, polymorphism.

Phases of an Object-Oriented software development process:  
- Object-oriented analysis with Use-Cases;  
- Object-oriented design with the Unified Modelling Language (UML) notation;  
- Object-oriented programming with Java;  
- Object-oriented testing.

Reuse of software designs and architectures:  
- Design patterns  
- Reference software architectures

Assessment:  
One 2-hour written paper  60%  
Course work  40%

**LEVEL III COURSES**

**CS31A/COMP3100**  
**OPERATING SYSTEMS**  
(4 credits)  
Semester 1  
Level III

Pre-requisites:  
CS20R/COMP2111 and (CS21R/COMP2230 or CS23Q/COMP2240)

Syllabus:  
Overview  
- Role and purpose of operating systems  
- Functionality of a typical operating system  
- Design issues (efficiency, robustness, flexibility, portability, security

Basic Principles  
- Structuring methods  
- Abstractions, processes and resources
- Design of application programming interfaces (APIs)
- Device organization; interrupts
- User/system state transitions

Concurrent
- The idea of concurrent execution
- States and state diagrams
- Implementation structures (ready lists, process control blocks, etc.)
- Dispatching and context switching
- Interrupt handling in a concurrent environment

Mutual exclusion
- Definition of the "mutual exclusion" problem
- Deadlock detection and prevention
- Solution strategies
- Models and mechanisms (semaphores, monitors, condition variables, rendezvous)
- Producer-consumer problems; synchronization
- Multiprocessor issues

Scheduling
- Pre-emptive and non-pre-emptive scheduling
- Scheduling policies
- Processes and threads
- Real-time issues

Memory management
- Review of physical memory and memory management
- Overlays, swapping and partitions
- Paging and segmentation
- Virtual memory
- Page placement and replacement policies; working sets and thrashing
- Caching

Device management
- Characteristics of serial and parallel devices
- Abstracting device differences
- Buffering strategies
- Direct memory access
- Recovery from failures

File systems
- Fundamental concepts (data, metadata, operations, organization, buffering, sequential vs. non-sequential files)
- Content and structure of directories
- File system techniques (partitioning, mounting and un-mounting, virtual file systems)
- Memory-mapped files
- Special-purpose file systems
- Naming, searching and access
- Backup strategies

Security and protection
- Overview of system security
- Policy/mechanism separation
- Security methods and devices
- Protection, access and authentication
- Models of protection
- Memory protection
- Encryption

Assessment:
One 2-hour written paper 60%
Coursework 40%
In-course test (10%)
2 Projects (30%)

CS3Q/COMP3150 COMPUTER NETWORKING AND COMMUNICATIONS
(4 credits) Semester 1 Level III

Pre-requisites:
CS20R/COMP2111 and (CS21R/COMP2230 or CS23Q/COMP2240)

Syllabus:
Computer Networks and the Internet
- The network edge and network core
- Access networks and physical media
- ISPs and backbones
- Delays and loss in packet-switched networks
- Protocol layers and service models
- History of networking

Application Layer
- Principles of network applications
- Web and HTTP
- FTP
- SMTP and electronic mail
- DNS
- Peer-to-peer file sharing (P2P)
- Socket programming in TCP and UDP

Transport Layer
- Transport layer services
- Connectionless transport: UDP
- Principles of reliable data transfer
- Connection-oriented transport: TCP
Network Layer
- Virtual circuits and datagram networks
- Routers
- IP protocol
- Routing algorithms

Link Layer
- Error detection and correction
- Multiple access protocols
- Link layer addressing
- Ethernet
- Hubs and switches

Special Topics (selected from)
- Computer security
- Wireless communication and mobile networks
- Multimedia networking
- Network management

Assessment:
One 2-hour written paper  60%
Coursework  40%
- In-course test
- 2 or 3 Practical programming assignments

CS32R/COMP3160  COMPUTER & NETWORK SECURITY
(4 credits)  Semester 2  Level III

Pre-requisite:  CS32Q/COMP3150

Syllabus:
Confidentiality, integrity and availability: the pillars of security. The ethics issues facing the security professional.

Physical access to information resources: secure sites, security policies, backups, disaster recovery

The human factor: social engineering

Malware: viruses, worms, Trojan horses, mailers etc
Penetration testing: threat discovery, assessment and system hardening.
Confidentiality, integrity and non-repudiation: the use of cryptography in security (hash functions, message digests, public/private key cryptography)
Tools for securing systems and preventing and detecting attacks: firewalls, IDSes, anti-malware (antivirus, anti-spyware, anti-rootkit)

Assessment: One 2-hour written paper 60%
Coursework 40%
- Assignments (10%)
- In-course test (10%)
- Project (20%)

Students are required to pass the coursework and the final examination separately in order to pass the course.

CS33Q/COMP3120 INTRODUCTION TO ARTIFICIAL INTELLIGENCE
(4 credits) Semester 1 Level III
Pre-requisites: CS20R/COMP2111 and CS20S/COMP2101
Syllabus:
1. Introduction to AI: Overview and history of AI; Philosophical issues
2. Introduction to Prolog
3. Search: Search in Prolog
4. Game Playing
5. Knowledge representation and reasoning: Logic; Production rules structured objects
6. Planning
7. Introduction to Expert Systems
8. Knowledge Acquisition in Expert Systems
9. Elective topics: Neural networks; Machine Learning; Reasoning under uncertainty; Natural Language Processing; Speech recognition; Robotics; Fuzzy logic; Virtual reality

Assessment: One 2-hour written paper 60%
Coursework 40%
- In-course test
- 3 Homework assignments

CS34Q/3651 LANGUAGE PROCESSORS
(4 credits) Semester 1 Level III
Pre-requisites: CS20R/COMP2111
Syllabus: Syntactic Processing:
- Context Free Grammars: Definition, BNF notation, ambiguity parse trees and derivations
- Regular Expressions: Definition, JLex (a lexing tool)
- Parsing: top down (recursive descent and LL(k))
- Parsing: bottom up (LR(k), LALR(1) and SLR parsers)

Semantic Representation and Processing:
- Operational vs. Denotational semantics
- Postfix: an example of a stack-based programming language
- Syntax-directed translation
- Design of Intermediate Representations (IR)
- Interpretation by IR traversal

Features of Programming Languages:
- Typing: static vs. dynamic
- Scoping: static vs. dynamic
- Evaluation: lazy vs. eager
- Parameter passing conventions
- Data allocation strategies
- First class citizens (objects)
- Tail recursion
- Garbage collection

Assessment:
- One 2-hour written paper 40%
- Coursework 60%
- 4 Assignments (40%)
- Group Projects (20%)

CS34W/COMP3180 WEB DESIGN & PROGRAMMING II
(4 credits) Semester 2 Level III

Pre-requisite: CS24W/COMP2180

Syllabus:
DOM, XML, XSLT, AJAX.
Web application design principles: requirements, concept design, implementation, testing.
Web application UI design: low-fidelity prototyping, layout, use of colour, fonts, controls.
Further server-side frameworks and languages, client-side languages. Session tracking.
n-tier architecture for the web.
Service-oriented architectures.
Web frameworks and design patterns for the web.
Web server architecture and web services standards.
Principles, design and frameworks for e-commerce.
Web security issues: cross-site scripting, SQL injection, phishing

94
Web network security issues, ethical and social issues.
Multimedia for the web.
Mobile and wireless web platforms.

Assessment:

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<th>Component</th>
<th>Weightage</th>
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<tbody>
<tr>
<td>One 2-hour written paper</td>
<td>40%</td>
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<tr>
<td>Coursework</td>
<td>60%</td>
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<tr>
<td>- 5 Projects (60%)</td>
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</table>

Students must pass the coursework and the final examination separately in order to pass the course.

CS35A/COMP3160 DATABASE MANAGEMENT SYSTEMS
(4 credits) Semester 2 Level III

Pre-requisites: CS20S/COMP2101

Syllabus:

1. Introduction to database concepts: Goals of Database Management Systems
   - Logical and physical organizations
   - Schema and subschema, trade-offs between utilization of data
   - Control of data.
2. Database Design
   - Overview of the design process
   - Database design and the Entity-Relationship model
   - ER diagrams
   - Constraints
   - Reduction to relational schema
3. Data Normalization
   - Features of a good relational design
   - Functional Dependency Theory
   - Decomposition using functional dependencies
   - Normal Forms: First; Second; Third; Boyce Codd Normal Form (BCNF); Fourth Normal Form
4. Description/Manipulation Languages:
   - Relational algebra
   - Relational calculus
   - Structured Query Languages - SQL
   - Query Optimization
5. Application Design and Development
   - User Interface and Tools
   - Web Interface to a database
   - Authorization in SQL
   - Application Security
6. Current trends
   - Distributed systems
• Object-oriented systems
• Knowledge-based systems

Assessment:
One 2-hour written paper 60%
Coursework 40%
- In-course test
- Project

CS35Q/COMP3110 INFORMATION SYSTEMS IN ORGANISATION
(4 credits) Semester 2 Level III

Pre-requisites: CS22Q/COMP2140

Syllabus:
1. Organization Characteristics
   • Business Functions
   • Management Hierarchy
   • Business Process
2. Information Systems
   • Types of applications
   • Enterprise systems
   • Supply Chain Management Systems
   • Customer Relationship Management Systems
   • Knowledge Management Systems
3. Information Systems and Business Strategy
   • Corporate strategy
   • Information Systems strategy
   • Strategic information
4. Information Technology Infrastructure
   • Computer hardware
   • System software
   • Data management
   • Telecommunication networks
5. IT for business intelligence gathering
   • Data mining
   • Artificial Intelligence
   • Environment Scanning
6. Internet and Other IT Innovations
   • E-Commerce
   • E-Business
   • Collaborative Commerce
7. Information Systems Delivery
   • Concepts
   • Evaluation and selection
   • Alternative Approaches
   • Process and Project Management
8. Managing Information Systems
   • Information system staff
• Information systems security and control
• Disaster planning and recovery
• Ethics and social issues

Assessment:  
One 2-hour written paper  60%
Coursework  40%
- In-course test
- 3 or 4 Homework assignments

**CS35R/COMP3170  USER INTERFACE DESIGN**  
(4 credits) Semester 1 Level III

Pre-requisites:  
CS22Q/COMP2140 or CS27Q/COMP2160 or CS24W/COMP2180

Syllabus:  
Overview of HCI
• The role of user interfaces in computer applications.
• History of human-computer interaction (HCI) and user interface (UI) systems.
• Human Factors: perception, movement, and cognition. Ergonomics.
• Contextual issues in HCI: culture, communication, and organizations.
• HCI models. UI paradigms: command, graphical user interface (GUI), etc. UI Guidelines.

UI Environments
• Overview of graphics systems, display devices, input devices.
• GUI system architecture, event driven interaction model. UI toolkits.
• Collaborative Systems. Embedded Systems.

UI Development Methods
• UI development cycle: investigation, design, prototyping, evaluation, implementation.
• Developing UI requirements: inquiry methods, developing task and workflow models.
• Information collection and analysis methods.
• Prototyping: storyboarding, implementation.
• Evaluation methods: heuristic, observational, empirical.

Assessment:  
One 2-hour written paper  60%
Coursework  40%
-1 or 2 In-course test (10%)
- Group laboratory/project reports (20%)
- Individual projects/reports/presentations (10%)

*CS36R/COMP3660  COMPILER OPTIMIZATION
(4 credits)  Semester 2  Level III

Pre-requisites:  CS21R/COMP2230 or CS23Q/COMP2240 and
CS34Q/COMP3651

Syllabus:  Semantic Representation and Processing
• Design of Intermediate Representation (IR)
• Semantic checking: parity, bounds, type
• Type Interfacing

Intermediate Languages
• Register Transfer Language
• A reference Intermediate Language (IL)

Code Generation
• Program organization: Code and Data segments
• Storage allocation
• Conditionals
• Procedure calls

Creating an Executable
• Binary formats
• Linking and Loading
• Shared object libraries

Optimization
• Register allocation and assignment
• Control-flow graphs
• Optimizing transformations (e.g. common subexpression elimination (CSE), constant folding and propagation, code motion)

Assessment:  One 2-hour written paper  40%
Coursework  60%
- Individual Project (10%)
- Group project (20%)
- Written homework assignments (30%)

*CS36R/COMP3660 is not offered for the 2010/2011 academic year.

CS37R/COMP3701  THEORY OF COMPUTATION
(4 credits)  Semester 2  Level III
Pre-requisites: CS20S/COMP2101

Syllabus:

1. Computability
   - Regular languages (DFA, NFA, Regular Expressions)
   - Context Free Languages (CFGs, PDAs)
   - Decidable languages (Turing Machines)
   - Church-Turing thesis (Lambda calculus, Register Machines, Logic)
   - Turing reducibility and Mapping reducibility
   - Undecidability

2. Complexity Theory
   - Distinction between time and space complexity
   - Definitions of complexity classes: L, P, NP, PSPACE, EXPTIME
   - Effect of non-determinism on Space and Time complexity
   - Polynomial time reducibility
   - Hardness and completeness relative to various complexity classes (e.g. NP-hardness, NP-completeness)
   - Example NP-complete problems

Assessment:

One 2-hour written paper 60%
Coursework 40%
- In-course test (5%)
- 5 Written homework assignments (35%)

CS38Q/COMP3800 REAL-TIME EMBEDDED SYSTEMS (Software + HW)
(4 credits) Semester 1 Level III

Pre-requisites: CS21S/COMP2220 and CS21R/COMP2230

Syllabus:

Overview of Embedded Systems
Models of computation used in designing Embedded Systems: State Machines, State Charts, UML
Specification of Embedded Systems
Hardware/Software Co-design Concepts
Organization of Embedded Systems
Embedded Inputs/Outputs: Characterization and Methods
Embedded Volatile and Non-Volatile memory devices
Fundamentals of Real-time theory
Scheduling executions of tasks
Real-time Synchronization and Implementation
Challenges
HW/SW Architectures for real-time services
CPU architectural effects on Real-time performances
Architecture of existing embedded real-time OS:
ucLinux, uCOS, VxWorks, RT-EMS, Windows CE.net,
and ecos.
Embedded Internet
Case studies: Applications of Embedded Systems in
robotics, medicine and telecommunications.
Development of software tools for Embedded Systems
Fault-tolerant Embedded Systems

Organization:
- Lectures
- Tutorials
- Labs and project

Assessment:
- One 2-hour written paper 40%
- Coursework 60%
- In-course test (20%)
- Labs (10%)
- Final Project (30%)

CS39Q/COMP3900 GROUP PROJECT
(4 credits) Semesters 1, 2 & 3 Level III

Pre-requisites: CS20R/COMP2111 and CS22Q/COMP2140 and 8
other credits from CS courses at Levels 2 or 3.

Syllabus/Content: Groups of 2-4 students implement a substantive
software system under the supervision of a staff
member. The software may address a problem in any
domain, but must meet minimum standards of design
and functionality, appropriate for a capstone course of a
B.Sc. degree.

Assessment: The final mark for each project depends on the
following:

- Mid-term presentation 10%
- Final presentation 15%
- Demonstration 15%
- Report 50%
- Web Page 10%
Students will be asked to assess their peers and themselves on different aspects of the project. Those assessments are combined with a peer assessment weighting from the supervisor to determine, for each student, an adjustment to the base score of the group.
**DEPARTMENT OF GEOGRAPHY AND GEOLOGY**

**LIST OF UNDERGRADUATE COURSES**

**GEOGRAPHY COURSES**

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<th>SEMESTER OFFERED</th>
<th>Level</th>
<th>PREREQUISITES</th>
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<td>GEOG1101</td>
<td>INTRODUCTION TO HUMAN GEOGRAPHY</td>
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<td>GEOGRAPHICAL THOUGHT &amp; RESEARCH METHODS</td>
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<td>GEOSPHERE &amp; HYDROSPHERE</td>
<td>4 Credits</td>
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<td>GEOG2202</td>
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<td>GEOG3301</td>
<td>GEOGRAPHY OF THE CARIBBEAN</td>
<td>4 Credits</td>
<td>Semester 1</td>
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<td>Three of [GEOG2101, GEOG2102, GEOG2201, GEOG2202]</td>
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<tr>
<td>GEOG3401</td>
<td>GEOGRAPHY RESEARCH PROJECT</td>
<td>4 Credits</td>
<td>Semester 2</td>
<td>3</td>
<td>GEOG2301 and any three from [GEOG2101, GEOG2102, GEOG2201, GEOG2202]</td>
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<td>GEOG3103</td>
<td>TROPICAL AGRICULTURAL SYSTEMS &amp; DEVELOPMENT</td>
<td>4 Credits</td>
<td>Semester 1</td>
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<td>GEOG2101 or GEOG2102</td>
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<tr>
<td>GEOG3106</td>
<td>GEOGRAPHIES OF TOURISM</td>
<td>4 Credits</td>
<td>Semester 2</td>
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<td>GEOG2101 or GEOG2102 or HOD permission</td>
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<td>GGE03201</td>
<td>GEOMORPHIC PROCESSES &amp; LANDFORMS</td>
<td>4 Credits</td>
<td>Semester 2</td>
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<td>GEOG2201 or GEOL2003</td>
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<td>GGE03203</td>
<td>CLIMATE CHANGE IN THE TROPICS</td>
<td>4 Credits</td>
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<td>3</td>
<td>GEOG2202 or GEOL2003 or GEOL2004 or HOD permission</td>
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<td>GEOG3302</td>
<td>URBAN &amp; REGIONAL PLANNING</td>
<td>4 Credits</td>
<td>Semester 2</td>
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<td>GEOG2101 or GEOG2102</td>
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<td>GGE03301</td>
<td>INTRODUCTION TO GEOGRAPHICAL INFORMATION SYSTEMS &amp; REMOTE SENSING</td>
<td>4 Credits</td>
<td>Semester 1</td>
<td>3</td>
<td>Any two from [GEOG2101, GEOG2102, GEOG2201, GEOG2202, or any two from [GEOL2001, GEOL2002, GEOL2003, GEOL2004], or HOD permission</td>
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<td>CODES</td>
<td>TITLES</td>
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<td>GGEO3302</td>
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</table>
DEPARTMENT OF GEOGRAPHY AND GEOLOGY

The Department of Geography and Geology currently offers 2 BSc Majors (Geography, Geology), a BSc Double Major in Geography and Geology, and 2 BSc Minors (Geography, Geology).

A BSc (Geography or Geology) degree requires a minimum of 44 credits of Geography or Geology, of which at least 32 should be from Level II and Level III courses. The entry requirements for a BSc degree in Geography include a pass in Geography at CSEC and two CAPE passes in approved science subjects. The entry requirements for a BSc degree in Geology are two CAPE passes in approved science subjects.

In addition, the Department offers BA and BEd degrees in Geography to students in the Faculty of Humanities and Education. The entry requirements for the BA degree are a pass in Geography at CSEC and two CAPE passes. For the BEd programme, the entry requirements are a pass in Geography at CSEC and two CAPE passes in approved science subjects.

Students are advised that compulsory field work in the Department of Geography and Geology is carried out on Saturdays.

A Major in Geography requires a minimum of 32 credits from Part II GEOG or G GEO courses, which must include the following:

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEOG2301</td>
<td>Geog. Thought &amp; Research Methods</td>
<td>4</td>
</tr>
<tr>
<td>GEOG3301</td>
<td>Geography of the Caribbean</td>
<td>4</td>
</tr>
<tr>
<td>GEOG3401</td>
<td>Geography Research Project</td>
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<tr>
<td>plus</td>
<td>at least three of the following:</td>
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<tr>
<td>GEOG2101</td>
<td>Urban Geography</td>
<td>4</td>
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<tr>
<td>GEOG2102</td>
<td>Geography &amp; Development</td>
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<td>GEOG2201</td>
<td>Geosphere &amp; Hydrosphere</td>
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</tr>
<tr>
<td>GEOG2202</td>
<td>Atmosphere &amp; Biosphere</td>
<td>4</td>
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</tbody>
</table>

plus at least two other Level III GEOG/GGEO courses, selected from different groups.

A Major in Geology requires a minimum of 32 credits from Part II GEOL or GGEO courses, which must include the following:

<table>
<thead>
<tr>
<th>Course code</th>
<th>Course Name</th>
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<tr>
<td>GEOL2001</td>
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<td>GEOL2002</td>
<td>Sedimentology</td>
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<tr>
<td>GEOL2003</td>
<td>Igneous &amp; Metamorphic Petrology</td>
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</tr>
<tr>
<td>GEOL2004</td>
<td>Structural Geology &amp; Geological Mapping</td>
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<td>GEOL3011</td>
<td>Research Project in Field Geology</td>
<td>4</td>
</tr>
<tr>
<td>GEOL3002</td>
<td>Caribbean Geology</td>
<td>4</td>
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</table>

plus at least two other Level III GEOL or GGEO courses.
TYPICAL CURRICULUM FOR THE B.Sc. GEOGRAPHY MAJOR

Level I
Semester 1
GEOG1101 Introduction to Human Geography 6 credits
One other Level 1 Science course 6 credits
One other Level 1 Science course 6 credits
FD10A or FD14A 3 credits
Semester 2
GEOG1201 Introduction to Physical Geography 6 credits
One other Level 1 Science course 6 credits
One other Level 1 Science course 6 credits
(F10A or FD14A, if not done in Semester 1)

Total credits for 2 semesters 39

Level II
Semester 1
GEOG2101 Urban Geography 4 credits
GEOG2202 Atmosphere & Biosphere 4 credits
One other Level 2 Science course 4 credits
One other Level 2 Science course 4 credits
FD11A or FD13A 3 credits
Semester 2
GEOG2102 Geography & Development 4 credits
GEOG2201 Geosphere & Hydrosphere 4 credits
GEOG2301 Geographical Thought & Research Methods 4 credits
One other Level 2 Science course 4 credits
(FD11A or FD13A, if not done in Semester 1)

Total credits for 2 semesters 35

Level III
Semester 1
GEOG3301 Geography of the Caribbean 4 credits
One other Level 3 GEOL/GGEO course 4 credits
Two other Level 3 Science courses, which may include GEOL/GGEO courses 8 credits
FD11A or FD13A 3 credits
Semester 2
GEOG3401 Geography Research Project 4 credits
One other Level 3 GEOL/GGEO course* 4 credits
Two other Level 3 Science courses, which may include GEOL/GGEO courses 8 credits
(FD11A or FD13A, if not done in Semester 1)

Total credits for 2 semesters 35
NOTE

The total number of credits required for the B.Sc. degree is 101, including the 9 credits from the FD courses. Sixty of these credits must be from Levels 2 and 3 of the discipline of a single major, and 64 for a double major. The programme outlined here gives a total of 109 credits, so for a single GEOG major there is some flexibility in the non-GEOG/GGEO courses which do not need to be included for the minimum of 101 credits.

For a Geography Minor, the selection is of any two Level 2 GEOG courses and any two Level 3 GEOG/GGEO courses, subject to the satisfaction of prerequisites for these courses.
**TYPICAL CURRICULUM FOR THE BSc GEOLOGY MAJOR**

### Level I

#### Semester 1
- **GEOL1001** Introduction to Earth Sciences I  
  6 credits
- One other Level I Science course  
  6 credits
- One other Level I Science course  
  6 credits
- FD10A or FD14A  
  3 credits

#### Semester 2
- **GEOL1002** Introduction to Earth Sciences II  
  6 credits
- One other Level I Science course  
  6 credits
- One other Level I Science course  
  6 credits
- (FD10A or FD14A, if not done in Semester 1)

**Total credits for 2 semesters** 39

### Level II

#### Semester 1
- **GEOL2002** Sedimentology  
  4 credits
- **GEOL2003** Igneous & Metamorphic Petrology  
  4 credits
- One other Level II Science course  
  4 credits
- One other Level II Science course  
  4 credits
- FD11A or FD13A  
  3 credits

#### Semester 2
- **GEOL2001** Palaeontology  
  4 credits
- **GEOL2004** Structural Geology & Geological Mapping  
  4 credits
- One other Level II Science course  
  4 credits
- One other Level II Science course  
  4 credits
- (FD11A or FD13A, if not done in Semester 1)

**Total credits for 2 semesters** 35

### Level III

#### Semester 1
- **GEOL3002** Caribbean Geology  
  4 credits
- One other Level III GL course  
  4 credits
- Two other Level III courses, which may include GL courses  
  8 credits
- FD11A or FD13A  
  3 credits

#### Semester 2
- **GEOL3001** Research Project in Field Geology  
  4 credits
- One other Level III GL course  
  4 credits
- Two other Level III courses, which may include GL courses  
  8 credits
- (FD11A or FD13A, if not done in Semester 1)

**Total credits for 2 semesters** 35
The total number of credits required for the BSc degree is 101, including the 9 credits from the FD courses. Sixty of these credits must be from Levels II and III of the discipline of a single major, and 64 for a double major. The programme outlined here gives a total of 109 credits, so for a single GEOL major there is some flexibility in the non-GEOL courses which do not need to be included for the minimum of 101 credits.

For a Geology Minor, the selection of GEOL courses is of any two Level II GEOL courses and any two Level III GEOL/GGEO courses, subject to the satisfaction of prerequisites for these courses.

A Minor in Geography requires a minimum of 16 credits from Part II GEOG or GGEO courses, which must include the following: two Level II GEOG courses and two Level III GEOG or GGEO courses (selected from different groups).

A Minor in Geology requires a minimum of 16 credits of Part II GEOL or GGEO courses, which must include the following: two Level II GEOL courses and two Level III GEOL or GGEO courses.

Please note:

- Students must have at least one CAPE pass or equivalent to register for a Level I course in Geography or Geology.
- Not all elective courses are available every year.
- Certain combinations of courses are limited by time-table constraints.
- Students intending to read any course(s) in Geography and Geology are advised that it will be necessary to conduct fieldwork on Saturdays. Non-attendance will debar them from final examinations. All fieldwork in Geography and Geology is mandatory.
- Where an examination has a practical or coursework component as well as a final examination, candidates must satisfy the examiners in both parts.
- Both GEOG1101 and GEOG1201 must be successfully completed before the student can proceed to Part II courses in Geography.
- Both GEOL1001 and GEOL1002 must be successfully completed before the student can proceed to Part II courses in Geology.
# DEPARTMENT OF GEOGRAPHY & GEOLOGY

## Courses Available, 2010/2011

### SEMESTER 1

#### Geography

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<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tr>
<td>GEOG1101</td>
<td>Introduction to Human Geography</td>
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<td>GEOG2101</td>
<td>Urban Geography</td>
<td>4</td>
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<tr>
<td>GEOG2202</td>
<td>Atmosphere &amp; Biosphere</td>
<td>4</td>
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<td>GEOG3301</td>
<td>Geography of the Caribbean</td>
<td>4</td>
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<tr>
<td>GEOG3103</td>
<td>Tropical Agricultural Systems &amp; Development</td>
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<td>GGEIO201</td>
<td>Geomorphic Processes &amp; Landforms</td>
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<tr>
<td>GGEIO3301</td>
<td>Introduction to Geographical Information</td>
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<td>Systems &amp; Remote Sensing</td>
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#### Geology

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<td>GEOL2002</td>
<td>Sedimentology</td>
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<td>Caribbean Geology</td>
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<td>GEOL3010</td>
<td>Hydrogeology</td>
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### SEMESTER 2

#### Geography

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<tr>
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<td>Introduction to Physical Geography</td>
<td>6</td>
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<tr>
<td>GEOG2301</td>
<td>Geographical Thought &amp; Research Methods</td>
<td>4</td>
</tr>
<tr>
<td>GEOG2102</td>
<td>Geography &amp; Development</td>
<td>4</td>
</tr>
<tr>
<td>GEOG2201</td>
<td>Geosphere &amp; Hydrosphere</td>
<td>4</td>
</tr>
<tr>
<td>GEOG3106</td>
<td>Geographies of Tourism</td>
<td>4</td>
</tr>
<tr>
<td>GGEIO3203</td>
<td>Climate Change in the Tropics</td>
<td>4</td>
</tr>
<tr>
<td>GGEIO3302</td>
<td>Disaster Management</td>
<td>4</td>
</tr>
<tr>
<td>GGEIO3401</td>
<td>Geography Research Project</td>
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#### Geology

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<td>GEOL2003</td>
<td>Igneous &amp; Metamorphic Petrology</td>
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<td>GEOL2004</td>
<td>Structural Geology &amp; Geological Mapping</td>
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<td>GEOL3001</td>
<td>Research Project in Field Geology</td>
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<tr>
<td>GEOL3004</td>
<td>Applied Sedimentology &amp; Petroleum Geology</td>
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<tr>
<td>GEOL3005</td>
<td>Marine Geology &amp; Geophysics</td>
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<td>GGEIO3203</td>
<td>Climate Change in the Tropics</td>
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</tr>
<tr>
<td>GGEIO3302</td>
<td>Disaster Management</td>
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Please note:
- GEOG refers to Geography courses, GEOL to Geology courses, and G GEO to courses available to both Geography & Geology students in Level III.
LEVEL I

GEOG1101  INTRODUCTION TO HUMAN GEOGRAPHY
(6 credits)  Semester 1  Level 1

Prerequisites: FPAS Matriculation Requirements and Geography at CSEC or its equivalent


Evaluation: One 3-hour written paper 75%
Practical work and tutorials (graded weekly) 25%

GEOG1201  INTRODUCTION TO PHYSICAL GEOGRAPHY
(6 credits)  Semester 2  Level 1

Prerequisites: As for GEOG1101


Evaluation: One 3-hour written paper 75%
Practical work and tutorials (graded weekly) 25%

PART II LEVEL II

GEOG2301  GEOGRAPHICAL THOUGHT & RESEARCH METHODS
(4 credits)  Semester 2  Level II

Prerequisites: GEOG1101 and GEOG1201

Syllabus: Defining a research problem. Theoretical frameworks and geographic thought. Formulation of the research design: methods and data. Methods of data analysis: qualitative and quantitative. Producing the report.
Laboratory course of 36 hours and tutorials.

Evaluation: One 2-hour written paper 40%
Coursework (lab exercises and projects) 60%

**GEOG2101  URBAN GEOGRAPHY**
(4 credits)  Semester 1  Level II

Prerequisites: GEOG1101 and GEOG1201

Syllabus: An introduction to the key areas of urban geography, with a particular focus on urban land use and the planning of urban systems. Much of this theoretical framework of urban geography is based on studies of cities in developed countries, especially in North America.

Evaluation: One 2-hour written paper 60%
Coursework (lab exercises and field project) 40%

**GEOG2102  GEOGRAPHY & DEVELOPMENT**
(4 credits)  Semester 2  Level II

Prerequisites: GEOG1101 and GEOG1201

Syllabus: An examination of global patterns of development and global processes of polarization and marginalization which lead to disparities and deprivation. The course focuses on location theory models, especially those of von Thünen and Weber.

Evaluation: One 2-hour written paper 60%
Coursework (lab exercises and field project) 40%

**GEOG2201  GEOSPHERE & HYDROSPHERE**
(4 credits)  Semester 1  Level II

Prerequisites: GEOG1101 and GEOG1201

Syllabus: An introduction to hillslope processes and movement on slopes, the work of rivers within a fluvial system; the work of waves, tides and currents in coastal zones, and beach and shoreline processes and landforms. An introduction to hydrology; components of the hydrological cycle; and the impact of human modification of the hydrological cycle.

Evaluation: One 2-hour written paper 60%
Coursework (lab exercises and field project) 40%
GEOG2202   ATMOSPHERE & BIOSPHERE
(4 credits)   Semester 2   Level II

Prerequisites:  GEOG1101 and GEOG1201

Syllabus:  The recognition of non-random patterns in species distribution; causal processes in species distribution; and an explanation of species distribution in space and time. Climatic variations in the tropics. The nature of the atmosphere near the ground. The dynamics of and the debate on global warming and climate change. Climatic classifications.

Evaluation:  One 2-hour written paper 60%
Coursework (lab exercises and field project) 40%

PART II LEVEL III

Group A  GEOG3103   Tropical Agricultural Systems & Development
          GEOG3106   Geographies of Tourism

Group B  G GEO3201   Geomorphic Processes & Landforms
          G GEO3203   Climate Change in the Tropics

Group C  GEOG3301   Urban & Regional Planning
          G GEO3301   Introduction to Geographical Information Systems & Remote Sensing
          G GEO3302   Disaster Management

If two of these Level III courses are selected, they must be from different groups. If three or more courses are chosen, all groups must be represented in the selection.

GEOG3301   GEOGRAPHY OF THE CARIBBEAN
(4 credits)   Semester 1   Level III

Prerequisites:  Three of [GEOG2101, GEOG2102, GEOG2201, GEOG2202]

Syllabus:  Analysis of physical and cultural patterns within the Caribbean area. A geographical evaluation of the origin, development and present-day outlines of settlement, cultures, resource use, economic structure, and growth problems of selected Caribbean countries.

Evaluation:  One 2-hour written paper 60%
Course work 40%
GEOG3401 GEOGRAPHY RESEARCH PROJECT  
(4 credits) Semester 2 Level III

Prerequisites: GEOG2301 and any three from [GEOG2101, GEOG2102, GEOG2201, GEOG2202]

Syllabus: A 7000-word research project approved by the Department.

Evaluation: Research project typed and bound 100%

GROUP A: HUMAN LANDSCAPES

GEOG3103 TROPICAL AGRICULTURAL SYSTEMS & DEVELOPMENT  
(4 credits) Semester 1 Level III

Prerequisite: GEOG2101 or GEOG2102

Syllabus: An advanced course on the geography of agricultural systems, focusing on the relationships between population, resources and the environment. Agricultural decision-making in theory and practice as applied to small-scale farming and as applied to problems in the agrarian sector in developing countries.

Evaluation: One 2-hour written paper 60%  
Coursework 40%

GEOG3106 GEOGRAPHIES OF TOURISM  
(4 credits) Semester 2 Level III

Prerequisite: GEOG2101 or GEOG2102 or HOD permission

Syllabus: A focused examination and understanding of the ways in which tourist practices are intricately interwoven with space and place. In particular, students will explore the different ways that tourism can be understood, and the significance that this has in relation to contemporary concerns about travel, globalization, representation, and development. Through an examination of a selection of theoretical perspectives and case studies (e.g., colonialism and travel writing, mass tourism in the Caribbean, and ecotourism), the course will critically analyze how we understand concepts such as leisure and recreation, and how relationships between and across people and places exist in different ways.

Evaluation: One 2-hour written paper 60%  
Coursework 40%
GROUP B: THE PHYSICAL ENVIRONMENT

GGE03201 GEOMORPHIC PROCESSES & LANDFORMS
(4 credits) Semester 2 Level III

Prerequisite: GEOG2201 or GEOL2003

Syllabus: An advanced course in the study of landforms and geomorphic processes, with particular emphasis on Caribbean examples. Limestone geomorphology, volcanic geomorphology, coastal geomorphology, applied geomorphology, geomorphological field and laboratory techniques.

Evaluation: One 2-hour written paper 60%
Coursework 40%

GGE03203 CLIMATE CHANGE IN THE TROPICS
(4 credits) Semester 2 Level III

Prerequisites: GEOG2202 or GEOL2003 or GEOL2004 or HOD permission

Syllabus: A theoretical and practical basis for understanding present-day tropical environments and the causes of global environmental change, as well as for assessing the scale of human interference in natural environmental processes.

Evaluation: One 2-hour written paper 60%
Coursework 40%

GROUP C: TECHNIQUES AND APPLICATIONS

GGE03301 INTRODUCTION TO GEOGRAPHICAL INFORMATION SYSTEMS & REMOTE SENSING
(4 credits) Semester 1 Level III

Prerequisites: Any two from [GEOG2101, GEOG2102, GEOG2201, GEOG2202], or any two from [GEOL2001, GEOL2002, GEOL2003, GEOL2004], or HOD permission

Syllabus: An introduction to the concepts, techniques and applications of Geographical Information Systems (GIS) and Remote Sensing (RS). The course provides a background for further enquiry into GIS and RS technologies, as well as equipping students with practical expertise needed for operational GIS and image processing. The course has three main parts: first, the theory and principles of GIS and RS are covered in a lecture setting; secondly, supervised hands-on practical exercises are run in the laboratory; and, thirdly, projects are undertaken by
students to apply the knowledge and skills to a specific problem. Areas covered by the course include (but are not limited to) data acquisition and processing, data automation, database management, spatial analysis, image processing, mapping and modelling.

Evaluation: One 2-hour written paper 50%
Lab exercises 40%
Project 10%

GGeo3302 DISASTER MANAGEMENT
(4 credits) Semester 2 Level III

Prerequisite: GEOG2201 or GEOG2202 or GEOL2004 or HOD permission


Evaluation: One 2-hour written paper 60%
Coursework (extended essays, tests, lab work, field project, etc.) 40%
## GEOLOGY COURSES

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<th>CODES</th>
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<td>GEOL2001</td>
<td>PALAEONTOLOGY</td>
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<td>[GEOL1001 and GEOL1002], or [BIOL1063 and BIOL1015]</td>
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<td>SEDIMENTOLOGY</td>
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GEOLOGY COURSE DESCRIPTIONS

PART I

GEOL1001  INTRODUCTION TO EARTH SCIENCES I
(6 credits)  Semester 1  Level I

Prerequisites: FPAS Matriculation Requirements and at least two of the following at CSEC or its equivalent: Physics, Chemistry, Mathematics, Geography, Geology, [Biology or Botany or Zoology]

Syllabus: Minerals and rocks; stratigraphy; history of the Earth; earth processes and plate tectonics I; understanding maps and aerial photographs. *Laboratory course of 72 hours.*

Evaluation: One 3-hour written paper 50%
One 3-hour written practical exam 30%
Fieldwork/coursework 20%

GEOL1002  INTRODUCTION TO EARTH SCIENCES II
(6 credits)  Semester 2  Level I

Prerequisites: As for GEOL1001

Syllabus: Earth processes and plate tectonics II; structural geology; introduction to crystallography and mineral optics. Earth resources; environmental geology; geological maps; introduction to the use of stereographic projections; study of minerals in thin sections. *Laboratory course of 72 hours.*

Evaluation: One 3-hour written paper 50%
One 3-hour written practical exam 30%
Fieldwork/coursework 20%

PART II

GEOL2001  PALAEOONTOLOGY
(4 credits)  Semester 2  Level II

Prerequisites: [GEOL1001 and GEOL1002], or [BIOL1063 and BIOL1015]

Syllabus: Introduction to palaeobiology and palaeoecology; biostratigraphy; phylogenetic systematics; macroevolution; extinction and speciation in the fossil record. *Laboratory course of 36 hours covering major invertebrate and protistan fossil groups.*
Evaluation: One 2-hour written paper 50%
One 2-hour practical exam 50%

GEOL2002  SEDIMENTOLOGY
(4 credits) Semester 1 Level II
Prerequisites: GEOL1001 and GEOL1002
Syllabus: Sedimentology and sedimentary petrology.
Laboratory course of 36 hours.
Evaluation: One 2-hour written paper 50%
One 2-hour practical exam 50%

GEOL2003  IGNEOUS & METAMORPHIC PETROLOGY
(4 credits) Semester 1 Level II
Prerequisites: GEOL1001 and GEOL1002
Syllabus: Petrogenesis; tectonomagmatic setting of igneous rocks; classification of volcanic and plutonic rocks.
Basis of metamorphic petrology; facies and facies series; metamorphic textures and mechanisms; description of important metamorphic rock groups.
Laboratory course of 36 hours.
Evaluation: One 2-hour written paper 50%
One 2-hour practical exam 50%

GEOL2004  STRUCTURAL GEOLOGY & GEOLOGICAL MAPPING
(4 credits) Semester 2 Level II
Prerequisites: GEOL1001 and GEOL1002
Syllabus: Fracture analysis (joints and faults); extensional tectonics; compressional tectonics; strike-slip faults; analysis of folds, foliations, and lineations; use of stereographic projections in structural analysis.
Geological maps, their construction and interpretation; geological expression of structural styles and terrane histories; cross-section construction; application of subsurface data in the preparation of structural contours.
Principles of field mapping; measurement of stratigraphic sections; preparation of geological maps.
Laboratory course of 36 hours.
GEOL3001  RESEARCH PROJECT IN FIELD GEOLOGY  
(4 credits)  Semester 2  Level III
Prerequisites: GEOL2004 and at least two of [GEOL2001, GEOL2002, GEOL2003]
Syllabus: A field-based research project to be undertaken in the summer preceding the final year of the programme, followed by laboratory analyses and report writing. The completed project report and an oral presentation will be required in Semester 2 of the final year.
Evaluation: Project report 90%  
Oral examination (end of Semester 2) 10%

GEOL3002  CARIBBEAN GEOLOGY  
(4 credits)  Semester 1  Level III
Syllabus: Geological evolution of the Caribbean; geology of Caribbean mainland and island countries, and the Caribbean seafloor. Laboratory course of 36 hours.
Evaluation: One 2-hour written paper 70%  
Research paper 30%

GEOL3004  APPLIED SEDIMENTOLOGY & PETROLEUM GEOLOGY  
(4 credits)  Semester 2  Level III
Prerequisite: GEOL2002
Syllabus: Advanced sedimentology; facies analysis; petroleum geology. Laboratory course of 36 hours.
Evaluation: One 2-hour written paper 50%  
One 2-hour practical exam 50%
GEOL3005  MARINE GEOLOGY & GEOPHYSICS
(4 credits)  Semester 2  Level III


Syllabus: Morphology of ocean basins; ocean circulation; nearshore and offshore processes; marine deposits.
Aspects of pure, applied and exploration geophysics; seismic methods and seismology.
Labo ratory course of 36 hours.

Evaluation: One 2-hour written paper 60%
Written coursework assignment 20%
Field/lab projects 20%

GEOL3010  HYDROGEOLOGY
(4 credits)  Semester 1  Level III

Prerequisites: GEOL2002 or [GEOL1001 and GEOG2201]

Syllabus: An in-depth study of the hydrological cycle, evaporation/transpiration, rainfall-runoff relationships, and statistical methods in hydrogeology.

Evaluation: One 2-hour written paper 50%
One 2-hour practical exam 30%
In-course test 20%
## DEPARTMENT OF LIFE SCIENCES

### LIST OF UNDERGRADUATE COURSES

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<th>TITLES</th>
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<td>BL12C/ BIOL1016 OR BIOL1017 &amp; BIOL1018</td>
<td>CELLS, MOLECULAR BIOLOGY &amp; GENETICS</td>
<td>6 Credits</td>
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<td>CELLS BIOLOGY AND GENETICS</td>
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<td>BL20j/BIOL2011</td>
<td>GENERAL AND MOLECULAR GENETICS</td>
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<td>BL20l/BIOL2013</td>
<td>DIVING TECHNOLOGY FOR AQUATIC SCIENTISTS</td>
<td>4 Credits</td>
<td>Summer</td>
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<td>Completion of Level 1 in the FPAS (Regulation 15) and successful completion of a swim test.</td>
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<td>4 Credits</td>
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<td>BT21B/BOTN2011 and BT22A/BOTN2012</td>
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<tr>
<td>BT34A/ BOTN3015</td>
<td>PRINCIPLES OF PLANT BREEDING</td>
<td>4 Credits</td>
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<td>BT37Q/ BIOL3016</td>
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<td>4 Credits</td>
<td>Semester 2</td>
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<td>BL10J/BIOL1013, BL10L/BIOL1063, BL10M/BIOL1015 and BL23D/MICR2252</td>
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<tr>
<td>BT38B/ BOTN3016</td>
<td>PLANT BIOTECHNOLOGY</td>
<td>4 Credits</td>
<td>Semester 1</td>
<td>3</td>
<td>BT 22A/BOTN2012 OR BC 21C/BIOL2312</td>
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<td>PRINCIPLES OF HORTICULTURE</td>
<td>4 Credits</td>
<td>Semester 2</td>
<td>3</td>
<td>BT 21B/BIOL2011 AND BT22A/BIOL2012</td>
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<tr>
<td>Z 30A/ ZOOL3011</td>
<td>SENSORY AND NEUROMUSCULAR PHYSIOLOGY</td>
<td>4 Credits</td>
<td>Semester 1</td>
<td>3</td>
<td>ZZ0G/ZOOL2012 and ZZ0H/ZOOL2013, C06J/CHM0901 and C06K/CHM0902 or ‘A’ level Chemistry or equivalent.</td>
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<td>Z 30B/ ZOOL3012</td>
<td>METABOLIC PHYSIOLOGY</td>
<td>4 Credits</td>
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<td>ZZ0G/ZOOL2012 and ZZ0H/ZOOL2013, C06J/CHM0901 AND C06K/CHM0902 or ‘A’ level Chemistry or equivalent.</td>
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<td>GENERAL PARASITOLOGY</td>
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<tr>
<td>Z 30M/ ZOOL3017</td>
<td>IMMUNOLOGY</td>
<td>4 Credits</td>
<td>Semester 2</td>
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<td>Z20G/ZOOL2012 and Z20H/ZOOL2013</td>
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<tr>
<td>Z31B/ ZOOL3024</td>
<td>FISHERIES</td>
<td>4 Credits</td>
<td>Semester 1</td>
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<td>Z 20G/ZOOL2012 and Z 20H/ZOOL2013</td>
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<td><strong>Co-requisite:</strong> BL31E/BIOL3014</td>
</tr>
<tr>
<td>Z 31C/ ZOOL3018</td>
<td>FISH BIOLOGY</td>
<td>4 Credits</td>
<td>Semester 1</td>
<td>3</td>
<td>Z 20G/ZOOL2012 and Z 20H/ZOOL2013</td>
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<tr>
<td>Z 31F/ ZOOL3019</td>
<td>FISHERIES AND AQUACULTURE TECHNOLOGIES</td>
<td>4 Credits</td>
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<td>Z 20G/ZOOL2012 and Z 20H/ZOOL2013</td>
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<td></td>
<td><strong>Co-requisite:</strong> Z 31C/ZOOL3018</td>
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<tr>
<td>Z 32C/ ZOOL3020</td>
<td>INSECT BIOLOGY AND SYSTEMATICS</td>
<td>4 Credits</td>
<td>Semester 1</td>
<td>3</td>
<td>BL10L/BIOL1063 or BL12B or BIOL2163</td>
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<tr>
<td>Z 32G/ ZOOL3021</td>
<td>PEST MANAGEMENT</td>
<td>4 Credits</td>
<td>Semester 2</td>
<td>3</td>
<td>BL 20N/BIOL2014</td>
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</table>
The Department of Life Sciences currently offers 5 B.Sc. Majors (Botany, Zoology, Experimental Biology and Environmental Biology and Marine Biology) and 2 B.Sc. Options (Microbiology, and Biology with Education) and two Minors (Botany and Zoology).

**The Botany Major**

**Aim:** To enable students to gain detailed knowledge of selected aspects of the plant sciences through practical and theoretical studies and to foster the desire for their continued exploratory investigations in the plant sciences.

A **Major in Botany** requires a minimum of 24 credits from Level I and must include:

- **Either**
  - BL12C/BIOL1016 Cells, Molecular Biology and Genetics
  - or
  - BIOL1017 Cells Biology and Genetics
- **and**
  - BIOL1018 Molecular Biology
- **either**
  - BL12B/BIOL1261 Diversity of Organisms
  - or
  - BIOL1262 Living Organisms I
- **and**
  - BIOL1263 Living Organisms II

(in addition BC10M/BIOC1011 Introductory Biochemistry is highly recommended), and a total of 32 credits from Level II which must include:

- **BL20J/BIOL2011** General & Molecular Genetics
- **BL20N/BIOL2014** Ecology
- **BT21B/BOTN2011** Seed Plants
- **BT22A/BOTN2012** Plant Physiology

**and**

- 8 credits from Advanced Level ‘BT/BOTN’ courses

**and**

- 8 credits from Advanced Level ‘BT/BOTN’ or ‘BL/BIOL’ Courses or MICR2252.

**The Botany Minor**

**Aim:** To enable students to gain a fundamental knowledge in the plant sciences through practical and theoretical studies of the interrelationships between plants and their environment; the anatomy, morphology, taxonomy, classification and physiology of higher plants; the principles of genetics.
A **Minor in Botany** requires a minimum of 24 credits from Level I and must include:

**Either**

BL12C/BIOL1016  Cells, Molecular Biology and Genetics  

**or**

BIOL1017  Cells Biology and Genetics  

**and**

BIOL1018  Molecular Biology  

**either**

BL12B/BIOL1261  Diversity of Organisms  

**or**

BIOL1262  Living Organisms I  

**and**

BL12B/BIOL1263  Living Organisms II

**And a total of 16 credits from Level II comprising:**

BL20J/BIOL2011  General & Molecular Genetics,  

BL20N/BIOL2014  Ecology,  

BT21B/BOTN2011  Seed Plants and  

BT22A/BOTN2012  Plant Physiology.

**The Zoology Major**

**Aim:** To provide a detailed understanding and appreciation of the interrelatedness of the processes of evolution, natural selection and ecosystem functions, as well as the structural and functional organization of animals and animal-like protists. The graduate will also be equipped with the resources, capacity and foundation to further explore the animal kingdom.

A **Major in Zoology** requires a minimum of 24 credits at Level I and must include:

**Either**

BL12C/BIOL1016  Cells, Molecular Biology and Genetics  

**or**

BIOL1017  Cells Biology and Genetics  

**and**

BIOL1018  Molecular Biology  

**either**

BL12B/BIOL1261  Diversity of Organisms  

**or**

BIOL1262  Living Organisms I  

**and**

BIOL1263  Living Organisms II

(in addition BC10M/BIOC1011 Introductory Biochemistry is highly recommended), And a total of 32 credits from Level II, which must include:

BL20K/BIOL2012  Evolutionary Biology,  

BL20N/BIOL2014  Ecology,  

Z20G/ZOOL2012  Functional Organisation of Animals I
The Zoology Minor

Aim: To provide a basic understanding of the processes of evolution, natural selection, interrelationships with the environment, as well as the structural and functional organization of animals and animal-like protists.

A Minor in Zoology requires a minimum of 24 credits at Level I and must include:

- Either BL12C/BIOL1016 Cells, Molecular Biology and Genetics
- Or BIOL1017 Cells Biology and Genetics
- And BIOL1018 Molecular Biology
- Either BL12B/BIOL1261 Diversity of Organisms
- Or BIOL1262 Living Organisms I
- And BIOL1263 Living Organisms II

and a total of 16 credits from Part Level II comprising:

- BL20K/BIOL2012 Evolutionary Biology,
- BL20N/BIOL2014 Ecology,
- Z 20G/ZOOL2012 Functional Organisation of Animals I (Maintenance Systems) and
- Z 20H/ZOOL2013 Functional Organisation of Animals II (Coordination, Protection & Movement).

Double Major in Botany and Zoology

Aim: The double major in botany and zoology is a combination of the aims for the individual majors and will therefore enable students to gain detailed knowledge of selected aspects of the animal and plant sciences as well as the requisite skills to further explore the structure and functional organization of these organisms.

A Double Major in Botany and Zoology requires a total of 64 credits from Level II; these must include 32 credits from:

- BL20J/BIOL2011 General & Molecular Genetics,
- BL20N/BIOL2014 Ecology,
- BT21B/BOTN2011 Seed Plants,
- BT22A/BOTN2012 Plant Physiology,
- BL20K/BIOL2012 Evolutionary Biology,
- Z 20G/ZOOL2012 Functional Organisation of Animals I (Maintenance Systems),
- Z 20H/ZOOL2013 Functional Organisation of Animals II (Coordination, Protection & Movement),
- BL20P/BIOL2015 Biometry PLUS
32 credits from Level III with no more than 16 credits from either the Environmental Biology or Experimental Biology Double Major syllabuses.

**Marine Biology Major**

Aim: To enable students to gain detailed knowledge of selected aspects of the marine ecosystem so as to provide understanding of the concepts, strategies and practices available to scientifically investigate, analyse and manage marine species and communities.

**A Major in Marine Biology** requires:

A minimum of 24 credits from Level I and must include:

- Either BL12C/BIOL1016  Cells, Molecular Biology and Genetics
- Or     BIOL1017  Cells Biology and Genetics
- And    BIOL1018  Molecular Biology
- Either BL12B/BIOL1261  Diversity of Organisms
- Or     BIOL1262  Living Organisms I
- And    BIOL1263  Living Organisms II

The following 32 credits from Level II:

- BL20N/BIOL2014  Ecology,
- BL20P/BIOL2015  Biometry,
- Z 20G/ZOOL2012  Functional Organisation of Animals I (Maintenance Systems),
- Z 20H/ZOOL2013  Functional Organisation of Animals II (Coordination, Protection & Movement),
- BL31E/BIOL3014  Marine Ecology I: Biological Oceanography,
- BL31F/BIOL3015  Marine Ecology II: Benthic Communities,
- BL31G/BIOL3023  Coral Reef Biology and
- BL31A/BIOL3013  Coastal Management.

**Major in Experimental Biology**

Aim: To provide a detailed understanding of the principles, mechanisms and techniques available to explore through scientific experimentation the physiology, immunology, parasitology, virology, pathology, and genetic/propagative potential of selected organisms.

**A Major in Experimental Biology** cannot be taken with any other major or minor because of the number of credits required.

The Experimental Biology major requires a minimum of 24 credits from Level I and must include:

- Either BL12C/BIOL1016  Cells, Molecular Biology and Genetics
- Or     BIOL1017  Cells Biology and Genetics
- And    BIOL1018  Molecular Biology
- Either BL12B/BIOL1261  Diversity of Organisms
Or BIOL1262 Living Organisms I
And BIOL1263 Living Organisms II

(in addition BC10M/BIOC1011 is highly recommended) and 64 credits from Level II which must include:
BL20N/BIOL2014 Ecology,
BL20K/BIOL2012 Evolutionary Biology,
BL20J/BIOL2011 General & Molecular Genetics,
BL20P/BIOL2015 Biometry,
BT22A/BOTN2012 Plant Physiology,
BT21B/BOTN2011 Seed Plants,
Z 20G/ZOOL2012 Functional Organisation of Animals I (Maintenance Systems),
Z 20H/ZOOL2013 Functional Organisation of Animals II (Coordination, Protection & Movement) and

32 credits from the following courses:
BC21M/MICR2211 Microbiology,
BL38A/BIOL3017 Virology,
Z32C/ZOOL3020 Insect Biology & Systematics,
*BL30M/BIOL3011 Mycology,
BT37Q/BIOL3016 Plant Health,
Z32G/ZOOL3021 Pest Management,
Z30G/ZOOL3015 General Parasitology,
*Z31C/ZOOL3018 Fish Biology,
Z30M/ZOOL3017 Immunology,
Z30B/ZOOL3012 Metabolic Physiology,
*Z30A/ZOOL3011 Sensory & Neuromuscular Physiology,
*BL30K/BIOL3012 Soil Biology,
BT38B/BOTN3016 Plant Biotechnology,
BT34A/BOTN3015 Principles of Plant Breeding,
BT38D/BOTN3017 Principles of Horticulture,
BT33B/BOTN3018 Medicinal & Economic Botany,
BL39C/BIOL3018 Project.

Not all elective courses are available every year, and certain combinations of courses are limited by timetable constraints.

* Not offered in 2010/11 academic year.

Major in Environmental Biology

Aim: To provide a detailed understanding of the concepts, strategies and practices available to scientifically investigate and analyse species, communities and ecosystems towards the successful monitoring, management and development of strategies for sustainable use of these systems.

A Major in Environmental Biology cannot be taken with any other major or minor because of the number of credits required.
The Environmental Biology major requires a minimum of 24 credits from Level I and must include:

Either BL12C/BIOL1016 Cells, Molecular Biology and Genetics
Or BIOL1017 Cells Biology and Genetics
And BIOL1018 Molecular Biology

Either BL12B/BIOL1261 Diversity of Organisms
Or BIOL1262 Living Organisms I
And BIOL1263 Living Organisms II

(in addition BC10M/BIOC1011 is highly recommended)

PLUS

a total of 64 credits from Level II which must include:

BL20N/BIOL2014 Ecology,
BL20K/BIOL2012 Evolutionary Biology,
BL20J/BIOL2011 General & Molecular Genetics,
BL20P/BIOL2015 Biometry,
BT22A/BOTN2012 Plant Physiology,
BT21B/BOTN2011 Seed Plants,
Z 20G/ZOOL2012 Functional Organisation of Animals I (Maintenance Systems),
Z 20H/ZOOL2012 Functional Organisation of Animals II (Coordination, Protection & Movement) and

32 credits from the following courses:

Z 32C/ZOOL3020 Insect Biology & Systematics,
Z 32G/ZOOL3021 Pest Management,
BL32E/BIOL3020 Conservation Biology,
BL39D/BIOL3019 Caribbean Biodiversity,
BT33A/BOTN3014 Forestry, Agroforestry & Sustainable Development,
*Z 31C/ZOOL3018 Fish Biology,
Z 31F/ZOOL3019 Fisheries & Aquaculture Technologies,
BL33D/BIOL3021 Freshwater Ecology,
*BT31A/BOTN3011 Phycology,
BL31E/BIOL3014 Marine Ecology I: Biological Oceanography,
BL31F/BIOL3015 Marine Ecology II: Benthic Communities,
BL31G/BIOL3023 Coral Reef Biology
BL31A/BIOL3012 Coastal Management,
*BL30K/BIOL3012 Soil Biology,
BT37Q/BIOL3016 Plant Health,
BL39C/BIOL3018 Project,
BC21M/BIOC2211 Microbiology,
BC31M/MICR3213 Applied & Environmental Microbiology,
GL32A/GEOL3002 Caribbean Geology,

Not all elective courses are available every year, and certain combinations of courses are limited by timetable constraints.

* Not offered in 2010/11 academic year.
BIOLOGY WITH EDUCATION OPTION

Aim: To provide a solid foundation in selected aspects of plant and animal science and expose students to the practice of science pedagogy

The Option was designed to focus on biology with less emphasis on education courses as it is aimed at students lacking in biology but who, through experience or previous courses, had exposure to the requisite teaching skills.

Year I

Semester 1

BL12C/BIOL1016 Cells, Molecular Biology and Genetics (6 credits)
or
Biol 1017 Cell Biology and Genetics (3 credits)
and
Biol1018 Molecular Biology (3 credits)
ED20C/EDPS2003 Motivation and the Teacher (6 credits)
either
ED20M/EDCU2013 Introduction to the Curriculum (3 credits)
or
ED10T/EDTL1020 Introduction to Teaching & Learning (3 credits)

Semester 2

FPAS Level I course (BC10M/BIOC1011 highly recommended) (6 credits)
BL10L/BIOL1261 Diversity of Organisms (6 credits)
or
BIOL 1262 Living Organism I (3 credits)
and
BIOL 1263 Living Organisms I and II (3 credits)
ED30D/EDTK3004 Educational Technology (3 credits)
either
ED34H/EDSC3408 Environmental Education (3 credits)
or
ED10U/EDTL1021 Planning for Teaching (3 credits)

Part II

A major in Biology (Life Sciences) 32 credits consisting of:

BL20J/BIOL2011 General & Molecular Genetics (4 credits)
BL20P/BIOL2015 Biometry (4 credits)
BL20N/BIOL2014 Ecology (4 credits)
BL20K/BIOL2012 Evolutionary Biology (4 credits)
BT21B/BOTN2011 Seed Plants (4 credits)
BT22A/BOTN2012 Plant Physiology (4 credits)
plus 6 credits from the Department of Educational Studies each semester as follows:

Year II

Semester 1

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<th>Course Title</th>
<th>Credits</th>
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<td>BL20J/BIOL2011</td>
<td>General &amp; Molecular Genetics</td>
<td>(4 credits)</td>
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<tr>
<td>BL20P/BIOL2015</td>
<td>Biometry</td>
<td>(4 credits)</td>
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<tr>
<td>ED24G/EDSC2407</td>
<td>Teaching Methodologies in Science</td>
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<td>ED 24E/EDSC2405</td>
<td>The Psychology of Science Teaching and Learning</td>
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Semester 2

<table>
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<td>BT21B/BOTN2011</td>
<td>Seed Plants</td>
<td>(4 credits)</td>
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<tr>
<td>BT22A/BOTN2012</td>
<td>Plant Physiology</td>
<td>(4 credits)</td>
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<td>ED34Q/EDSC3417</td>
<td>Introduction to Secondary Science Practicals</td>
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<td>ED20U/EDTL2021</td>
<td>School Based Experience I</td>
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Year III

Semester 1

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<td>BL20N/BIOL2014</td>
<td>Ecology</td>
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<td>ED34C/EDSC3403</td>
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Semester 2

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<td>Functional Organisation of Animals I (Maintenance Systems)</td>
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<td>Z 20H/ZOOL2013</td>
<td>Functional Organisation of Animals II (Coordination, Protection &amp; Movement)</td>
<td>(4 credits)</td>
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<td>ED30Q/EDTL3017</td>
<td>School Based Experience II</td>
<td>(3 credits)</td>
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<tr>
<td>ED30S/EDSC3019</td>
<td>Classroom Enquiry</td>
<td>(3 credits)</td>
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</table>
MICROBIOLOGY OPTION

Aim: To provide a comprehensive knowledge of the biology, phylogeny, ecology, and diversity of microorganisms, and to develop laboratory skills and familiarity with the basic microbiological methods. This Option is taught jointly between the Department of Life Sciences and the Biochemistry Section, Department of Basic Medical Sciences.

Level I

Level I credits as follows:

Either
BC10M/BIOC1011 Introductory Biochemistry (6 credits)
BL12C/BIOL1016 Cells, Molecular Biology and Genetics (6 credits)
or
BIOL1017 Cells Biology and Genetics (3 credits)
and
BIOL1018 Molecular Biology (3 credits)
either
BC10M/ BIOC1011 Introductory Biochemistry (6 credits)
BL12/BIOL1261 Diversity of Organisms (6 credits)
or
BIOL1262 Living Organisms I (3 credits)
and
BIOL1263 Living Organisms II (3 credits)
C10J/CHEM1901 Introductory Chemistry A (6 credits)
C10K/CHEM1902 Introductory Chemistry B (6 credits)

Level II

Sixty four (64) credits as follows:

Forty (40) core credits:
BC21C/BIOC2312 Molecular Biology I (4 credits)
BC21D/BIOC2014 Bioenergetics & Cell Metabolism (8 credits)
BC21M/MICR2211 Microbiology (4 credits)
BL20J/BIOL2011 General & Molecular Genetics (4 credits)
BL38A/BIOL3017 Virology (4 credits)
BL30M/BIOL3011 Mycology (4 credits)
BC31M/MICR3213 Applied & Environmental Microbiology (4 credits)
**BT31A/BOTN3011Phycology (4 credits)
either
BL39C/BIOL3018 Project (4 credits)
or
BC36A/BIOC3413 Laboratory Project (4 credits)
* Students should take
  either
  BL30M/BIOL3011
  or
  BL23D/MICR2252
  NOT BOTH

** Not offered in 2010/11 academic year- replaced with BC34M/MICR3214
Molecular Microbiology

Plus Twenty four (24) credits from courses listed below:

- BC34C/BIOL3312 Molecular Biology II (4 credits)
- BC35C/BIOT3113 Biotechnology I (4 credits)
- BC35D/BIOT3114 Biotechnology II (4 credits)
- BL20P/BIOL2015 Biometry (4 credits)
- Z 30G/ZOOL3015 General Parasitology (4 credits)
- Z 30M/ZOOL3017 Immunology (4 credits)
- *BL30K/BIOL3012 Soil Biology (4 credits)
- BT37Q/BIOL3016 Plant Health (4 credits)
- BT38B/BOTN3016 Plant Biotechnology (4 credits)
- *Z 30H/ZOOL3016 Applied Parasitology (4 credits)
- MICR3215 Food Microbiology (4 credits)

* Not offered in 2010/11 academic year

Not all elective courses are available every year, and certain combinations of courses are limited by from timetable constraints.
COURSE DESCRIPTIONS

PRELIMINARY COURSES

BL05A/ BIOL0011  PRELIMINARY BIOLOGY I
(6 P-Credits)  Semester 1  Level 0

Aim: To equip students with a basic knowledge of biological principles and processes.

Objectives: Upon successful completion of the course the students should be able to:
- describe the chemical and biological foundation for life;
- describe the role of cell division mechanisms in the processes of sexual and asexual reproduction;
- explain the basic principles involved in evolution;
- distinguish between the various forms of prokaryotic and eukaryotic organisms.

Pre-requisites: CSEC Biology or equivalent

Course Content:
Biological Techniques
- Biological Chemistry: Chemicals of Life; Enzymes; Cells and Tissues; Cell Division; Genetics
- Evolution; Mechanisms of Speciation
- Variety of life: Bacteria, Protists, Fungi, Plants and Animals

Mode of Delivery:
36 hours of lectures, 12 hours of tutorials and 72 hours of laboratory exercises involving experiments demonstrating biochemical and biological processes and principles; studies of living/fresh and preserved protist, fungi, plants and animals to demonstrate biodiversity.

Evaluation:
Final Examinations: 60%
One 2-hour theory paper 30%
One 2-hour comprehensive paper 30%

Coursework: 40%
One in-course theory test 6%
Two in-course practical tests 24%
Laboratory reports 10%

Prescribed text:
Aim: To equip students with a basic knowledge of the systems in plants and animals.

Objectives: Upon successful completion of the course the students should be able to:
- explain the relationships between organisms and the environment and between each other;
- describe the role of energy flow and the cycling of nutrients in the sustenance of ecosystems;
- describe the general form and function of plant life;
- describe the general form and function of animal life.

Pre-requisites: CSEC Biology or equivalent

Course Content:
- Organisms and the environment:
  Levels of Ecological Organisation
  Energy Flow
  Biogeochemical Cycles
- Systems in plants and animals:
  Plant Structure
  Transpiration, Translocation, Photosynthesis
  Animal structure
  Respiration, Transport, Nutrition
  Coordination and Control, Excretion and Osmoregulation
  Movement and Support
  Reproduction, Growth and Development

Mode of Delivery: 36 hours of lecture, 12 hours of tutorials and 72 hours of laboratory exercises involving the study of living/fresh and preserved organisms and prepared slides to demonstrate the relationship between structure and function of the systems in plants and animals.

Evaluation:

<table>
<thead>
<tr>
<th>Evaluation Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Final Examinations</td>
<td>60%</td>
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<tr>
<td>One 2-hour theory paper</td>
<td>30%</td>
</tr>
<tr>
<td>One 2-hour comprehensive paper</td>
<td>30%</td>
</tr>
<tr>
<td>Coursework</td>
<td>40%</td>
</tr>
<tr>
<td>One in-course theory test</td>
<td>6%</td>
</tr>
<tr>
<td>Two in-course practical tests</td>
<td>24%</td>
</tr>
<tr>
<td>Laboratory reports</td>
<td>10%</td>
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</tbody>
</table>

Precribed text:

LEVEL 1 COURSES

BIOL1017 CELL BIOLOGY
(3 credits) Semester 1 Level I

Aim:
1. To expose students to a variety of mechanisms involved in the functioning of eukaryotic and prokaryotic cells, and the identification, replication and transmission of genetic material.
2. To develop skills in microscopy and other basic biological skills

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

1. identify and characterize various types of cells and their levels of biological organization.
2. mount living organisms for proper examination under the various types of light microscopes.
3. explain how the cellular components are used in the transfer and utilization of energy and information in cells.
4. interpret experimental data derived from hypothetical investigations into cell function.
5. analyze the effectiveness of the mechanisms utilized by cells to maintain internal thermodynamic stability.
6. apply their knowledge of cell biology to selected examples of response(s) that take place within cells consequent upon defined environmental or physiological changes.
7. outline the processes by which cells gather raw materials from the environment, construct out of these a new cell in its own image, complete with a new copy of the hereditary information.
8. describe the basic functional events involved in cell reproduction and the factors that regulate this process.

Pre-requisites: A pass in one of the following:
Preliminary Biology I and II (BL05A/BIOL0011 and BL05B/BIOL0012) or CAPE ('A' level) Biology or equivalent

Course Content:
Microscopical techniques to study living and fixed cells.
Structural organization of cells.
Specialization in cells.
Basic functional processes in cells and their regulation.
Mitosis and Meiosis.
• **Practical Work:**
  Observation of living cells and permanent microscopical preparations.
  Making microscopical preparations.
  Interpretation of electron micrographs

Mode of Delivery:

<table>
<thead>
<tr>
<th></th>
<th>Hours</th>
<th>Type</th>
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</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>18</td>
<td>Didactic and interactive</td>
</tr>
<tr>
<td>Tutorials</td>
<td>6</td>
<td>Interactive</td>
</tr>
<tr>
<td>Practicals</td>
<td>33</td>
<td></td>
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</table>

Evaluation:

Final Examination: 50%
One 2-hour comprehensive paper

Course Work: 50%
Laboratory reports 20%
Tutorial attendance and incourse writing assignments 10%
One 1-hour incourse test 20%

Recommended Text:

ISBN 81-219-2442-1

Useful websites


**BIOL1018**  **MOLECULAR BIOLOGY AND GENETICS**
(3 credits) Semester 1 Level I

Aim: To provide an introduction to the identification, replication and transmission of genetic material of eukaryotic and prokaryotic cells and the essential concepts of the genetic theory

Objectives: Upon successful completion of this course, students should be able to:
1. Outline the essential principles and processes of molecular biology
2. Analyze the outcome of experiments that involve the use of recombinant DNA technology and other common gene analysis techniques
3. Explain Mendelian inheritance, quantitative traits, linked genes, crossing-over, gene mapping, sex determination, and gene frequencies in natural populations
4. Apply genetic concepts to solving problems on classic mechanisms of inheritance and those mechanisms of inheritance that extend beyond Mendel

Pre-requisites: A pass in one of the following:
Preliminary Biology I and II (BL05A/BIOL0011 and BL05B/BIOL0012) or CAPE ('A' level) Biology or equivalent

Course Content:
- **Molecular Biology**
  The nature of genes
  DNA replication
  Transcription
  Protein synthesis
  Control of gene expression
  PCR, cloning and DNA sequencing

- **Genetics**
  Mendelian inheritance.
  Probability, binomial theorem and chi-square test.
  Quantitative traits.
  Linkage, crossing over and mapping.
  Sex linkage and sex determination.
  Gene frequencies in natural populations.

- **Practical Work:**
  DNA isolation, restriction digestion and agarose electrophoresis
  Exercises on Mendelian crosses and gene frequencies

Mode of Delivery:
Lectures 18 hours Didactic and interactive
Tutorials 6 hours Interactive
Practicals 33 hours

Evaluation:
Final Examination: 50%
  One 2-hour comprehensive paper

Course Work: 50%
  Laboratory reports 20%
  Tutorial attendance and incourse writing assignments 10%
  One 1-hour incourse test 20%

Recommended Text:
Useful websites:
http://ourvle.mona.uwi.edu/file.php/1889/Nucleic_Acid_Structure_and_DNA_Repli
cation.pdf

BIOL1262 LIVING ORGANISMS I
(3 credits) Semester 2 Level I

Aim: 1. Introduce students to the major groups of prokaryotes, autotrophic protists and plants, their evolutionary associations, and adaptive radiation
2. Develop skills appropriate to the study of plants and prokaryote in the laboratory

Learning Outcomes: Upon successful completion of this course, students should be able to:
1. Describe the characteristic features of selected prokaryotes
2. Compare the biology of autotrophic protists and plants.
3. Classify common plants that occur in the Caribbean using the Linnaean system
4. Explain the functional consequences of different types of body and tissue organization in plants
5. Outline the main associations between the major taxonomic groups of plants
6. Describe the adaptive radiation of the major groups of plants
7. Solve simple problems in plant science
8. Demonstrate laboratory skills appropriate to the study and interpretation of living and preserved botanical specimens

Pre-requisites: A pass in: Preliminary Biology I and II (BIOL0011 and BIOL0012), OR CAPE Biology (Units 1 and 2), OR equivalent training.

Course Content:
Evolutionary Concepts
Archaeabacteria & Eubacteria
Autotrophic protists
Phylogeny and classification of plants
Bryophytes
Seedless vascular plants
Seed plants – Gymnosperms
Seed plants – Angiosperms (form and function)
Photosynthetic systems
Reproductive systems
Ecology
**Practical Work:**

Structure of bacteria and protists  
Classification of plants  
Studies of the structure of the main groups of plants  
Demonstrations of adaptive radiation of main groups of plants  
The virtual and actual herbarium  
The dichotomous key

**Mode of Delivery:**

<table>
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<th>18 hours</th>
<th>Didactic; interactive</th>
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</thead>
<tbody>
<tr>
<td>Tutorials</td>
<td>6 hours</td>
<td>Interactive; mind maps; problem-solving</td>
</tr>
<tr>
<td>Laboratory classes</td>
<td>33 hours</td>
<td>Interactive practical tasks; problem-solving</td>
</tr>
</tbody>
</table>

**Evaluation:**

- **Final Examination:** One 2-hour Comprehensive paper 50%
- **Course Work:**  
  - Writing across the curriculum exercises 5%  
  - Laboratory reports (10 x 2% each = 20%) 20%  
  - One in-course test 20%  
  - Tutorial Attendance and participation 5%

**Prescribed Text:**


**Recommended Text:**


**Useful Websites**

- [http://bcourses.wfcom.com/raven7e/](http://bcourses.wfcom.com/raven7e/)

**BIOL1263 LIVING ORGANISMS II**

(3 credits) Semester 2 Level I

**Aim:**

1. Introduce students to the major groups of:  
   (a) animals, their evolutionary associations, and adaptive radiation; and  
   (b) fungi as decomposers, symbionts, and pathogens
2. Develop practical skills appropriate to the study of animals and fungi in the laboratory

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

1. Classify common animals and fungi using the Linnaean system
2. Explain the functional consequences of different types of body organization of animals
3. Outline the main associations between the major groups of animals based on neo-Darwinian evolution
4. Describe the adaptive radiation of the major groups of animals and fungi
5. Solve simple problems in zoology
6. Compare the roles of fungi as primary decomposers, symbionts, and pathogens
7. Demonstrate laboratory skills appropriate to the study and interpretation of living and preserved specimens of animals and fungi

Pre-requisites: A pass in: Preliminary Biology I and II (BIOL0011 and BIOL0012); OR CAPE Biology (Units 1 and 2); OR equivalent training

Course Content:

- Origin of animals
- Evolution of diversity
- Classification and phylogeny of animals
- Ecological principles
- Animal-like protists
- Animal Architecture
- Invertebrate animals
- Vertebrate animals
- Major groups of fungi

Practical Work:
- Classification of animals
- Studies of the morphology of the main groups of animals and fungi
- Dissection of selected animals to show internal anatomy and evolutionary development of the taxonomic group
- Demonstrations of adaptive radiation of main groups of animals and fungi

Mode of Delivery:

| Lectures | 18 hours | Didactic; interactive
| Tutorials | 6 hours | Interactive; mind maps; problem-solving
| Laboratory classes | 33 hours | Interactive practical tasks; problem-solving |
Evaluation:

Final Examination: 50%  
One 2-hour Comprehensive paper

Course Work: 50%  
Writing across the curriculum exercises 5%  
Laboratory reports (10 x 2% each = 30%) 20%  
One in-course test 20%  
Tutorial Attendance and participation 5%

Prescribed Text:


Useful website (animals): www.mhhe.com/hickmanad4e  
Useful website (fungi): http://tolweb.org/fungi

LEVEL II COURSES

In order to proceed to Level 2 courses in Life Sciences, candidates must have successfully completed BL12B or BIOL1262 and BIOL1263 and BL12C or BIOL1017 and BIOL1018 PLUS ANOTHER 12 CREDITS OF LEVEL 1

IN- FACULTY COURSES

BL20J/BIOL2011  GENERAL AND MOLECULAR GENETICS  
(4 credits)  Semester 2  Level II

Aim:  
To provide a comprehensive and balanced account of genetics and genomics by integrating the subfields of classical genetics, molecular genetics, cytogenetics and population genetics.

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

- explain the basic processes of gene transmission, mutation, expression, regulation, cloning, recombination and genome mapping
- describe the experimental methods used by geneticists
- explain the development of genetics and genomics over time and current trends

Pre-requisite:  
BL10J/ BIOL1013 and either BL10L/BIOL1063 or BL10M/BIOL1015 or BL12B or BIOL1262 and BIOL1263 and BL12C or BIOL1017 and BIOL1018

Course Content:
1. The course deals primarily with the physical and molecular basis of heredity
2. The nature of the genetic apparatus from molecules to chromosomes of viruses, bacteria and higher organisms
3. Gene controlled pathways and morphogenesis
4. Gene regulation and differentiation in higher organisms
5. Gene mutations
6. Genetic consequences of structural and numerical changes in chromosomes
7. Extra-nuclear inheritance
8. Recombinant DNA and gene manipulation
9. Gene mapping quantitative traits
10. Gene frequency and genetics of populations
11. Dynamics of micro-evolution
12. The role of new, improved varieties (cultivars) of crops in agriculture crop improvement through genetics

Mode of Delivery:

24 hours of lecture, 6 hours of tutorials, 36 hours of field and laboratory work which emphasizes the preparation of the root tip squashes (mitosis), preparation of the anther squashes (meiosis), mapping of the prokaryotic and eukaryotic genomes, chromosomal mutations, electrophoresis of DNA and proteins, genetic structure of natural plant/animal populations.

Evaluation:

Final Examination:
One 2-hour theory paper 70%

Coursework 30%
One 2-hour practical test 20%
Laboratory reports 10%

Prescribed text:

BL20K/BIOL2012  EVOLUTIONARY BIOLOGY
(4 credits)  Semester 1  Level II

Aim:  1. To establish the fact of evolution and present natural selection as an observable process.

2. To demonstrate in a dynamic and interdisciplinary fashion the relevance of evolution to global issues.
Objectives: Upon successful completion of this course student should be able to:

- identify the mechanisms of evolutionary changes;
- describe the experimental and analytical methods used in evolutionary science;
- explain how population and genetic models can be applied to real life issues.

Pre-requisites: BL 10L/BIOL1063 AND BL 10J/ BIOL1013 or BL12B/BIOL1261 or BIOL1262 and BIOL1263 and BL12C/BIOL1016 or BIOL1017 and BIOL1018

Course Content:

- A historical perspective to evolution and variation
- Polymorphism, Hardy-Weinberg equilibrium, selection, migration and genetic drift in relation to population size
- Evolution below the species level, clines, deception and sex-ratio, with special reference to man
- Speciation, phylogeny, and the evolution of the hominids

Mode of Delivery:

24 hours of lectures, 6 hours of tutorials, 36 hours of field and laboratory work, which emphasizes the quantitative approach to evolutionary biology with the consideration of design of experiments, simple statistics and the presentation of results from laboratory and field exercises.

Evaluation:

Final Examination: One 2-hour theory paper 65%

Course Work: 35%
- One 2-hour practical test 20%
- Comprehensive tests (2 X 5%) 10%
- Laboratory report 5%

BL20L/BIOL2013  DIVING TECHNOLOGY FOR AQUATIC SCIENTISTS
(4 credits)  Summer  Level II

Aim: To train students in SCUBA diving to CMAS (The World Underwater Federation) 2 star diver standard and expose them to techniques for conducting scientific work underwater.

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

1. explain the principles of the physiology of diving and safe diving practices
2. SCUBA dive safely to a depth of 20 meters
3. perform a complete in-water rescue including CPR and oxygen administration
4. conduct an underwater survey of marine life using SCUBA diving skills

Pre-requisite: Completion of Level 1 in the FPAS (Regulation 15) and successful completion of a swim test.

Course Content:

- **Principles of diving**
  Pressure and buoyancy; atmospheric and water pressure; factors affecting buoyancy
  Diving equipment; the aqualung and accessory apparatus
  Decompression tables; planning and conducting no-stop dives and dives requiring decompression stops

- **Physiology of diving**
  The human life support system; physiology of circulatory and respiratory systems.
  Effect of pressure on human body; adverse effects of gases; role of nitrogen in decompression sickness (DCS); signs and symptoms of DCS

- **Safe diving practices**
  Dive planning and preparation; entry and exit methods
  Diver self-help techniques; situation avoidance and assessment
  Diver rescue techniques; emergency ascents
  Artificial ventilation; cardiopulmonary resuscitation; oxygen administration; first aid
  Adventurous diving; deep diving; night diving; wreck diving; drift diving
  Diving from small boats

- **Diving with a purpose**
  Fauna and flora of the coral reef
  Underwater search techniques
Underwater navigation; natural navigation and use of underwater compass
Underwater sampling, survey and recovery methods
Underwater photography

Mode of delivery:

22 hours of lecture, 4 of tutorial and 47 hours of practical involving snorkeling and diving, aqualung diving skills, diver self-help, diver rescue, underwater navigation, diving with a surface marker buoy and boat diving procedures. Each student must complete 10+ dives with confidence-building exercises progressing to 20 m depth.
Exercises in underwater scientific survey techniques.

Evaluation:

Final Examination:
One 2 hour theory paper 50 %

Course Work:
One 1-hour MCQ paper (practical questions) 10 %
Open water Competence Assessments 30 %
Project 10 %


BL20N/BIOL2014  ECOLOGY
(4 credits)   Semester 1   Level II

Aim: To introduce the scientific study of the interrelationships between and among organisms and between organisms and all aspects of the living and non-living environment.

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

1. outline population distributions and the abiotic and biotic factors which influence them
2. identify species interactions and evaluate the interdependence of species
3. design and execute basic sampling techniques appropriate for any population or community of organisms
4. describe concepts of community productivity, succession, cycling and transformation
Pre-requisites: BL10L/BIOL1063 and BL10M/BIOL1015 or BL12B/BIOL1261 or BIOL1262 and BIOL1263 and BL12C/BIOL1016 or BIOL1017 and BIOL1018

Course Content:

- Ecology and its domain, autecology and synecology; distribution and abundance
- Geographic range habitat and niche. Abiotic and biotic environment, populations communities and ecosystems
- Ecological role of abiotic factors (climatic and edaphic) on plant and animal populations Population performance along physical gradients
- Population structure and demography; population change over time, growth models, dispersal, life tables and resource allocation patterns
- Species interactions: competition, predation, herbivory, commensalism, ammensalism, protocooperation and mutualism
- Photosociology methods of describing communities; community classification, concepts and attributes
- World biomes, adaptive features of the vegetation of world biomes and the worldwide distribution of vegetation; Major vegetation formations of Jamaica
- Community metabolism, photosynthesis, ecophysiology, nutrient cycling and energy flow Primary and secondary production, ecological efficiency and energy transfers
- Primary and secondary succession, allogenic and autogenic succession, xerarch and hydrarch succession

Mode of Delivery:

24 hours of lecture, 6 hours of tutorials, 36 hours of field and laboratory work including a weekend field trip.

Evaluation:

Final Examination:
One 2-hour theory paper 60%

Course Work:
One 2-hour practical test 20%
Laboratory and field reports 10%
MCQ Test 10%

BL20P/BIOL2015  BIOMETRY  
(4 credits)  Semester 1  Level II

Aim:

1. To provide a foundation in statistical concepts applicable to biological experiments.

2. To give an overview of descriptive methods and tests for one and two variables, using biological examples.

3. To introduce testing relationships between multiple variables.

Objectives:

Upon successful completion of this course the students should be able to:

- explain basic statistical concepts;
- summarise quantitative biological data using methods of descriptive statistics;
- based on specified criteria, identify appropriate statistical tests for one and two variables;
- apply statistical test procedures and interpret the results;
- describe relationships among multiple independent variables.

Prerequisites: BL10L/BIOL1063 and BL10M/BIOL1015 or BL12B/BIOL1261 or BIOL1262 and BIOL1263 and BL12C/BIOL1016 or BIOL1017 and BIOL1018

Course Content:

- Data in Biology: types of variables; accuracy and significant figures; data Management
- Populations and Samples: statistical populations; the need for samples; sampling procedures
- Descriptive Statistics: frequency distributions; measures of central tendency; measures of dispersion
- The Normal Distribution: probability density functions; properties of the norma distribution; the distribution of sample means; confidence intervals
- Statistical Hypothesis Testing: making decision about populations based on samples; null and alternative hypotheses; alpha and beta error
- One-Sample Hypotheses: hypotheses concerning population parameters; testing goodness of fit
- Testing the relationship between two variables: the nature of a statistical relationship; criteria used to select appropriate tests; overview of major tests
- Applying tests for two variables: contingency tests; analysis of variance; regression and correlation; rank tests; multiple
comparisons; assessing validity of statistical assumptions.

- Tests for more than two variables: separating the influences of multiple independent variables on a dependent variable; statistical interaction

Mode of Delivery:

24 hours of lectures, 6 hours of tutorials, 36 hours of practical work involving exercises in solving statistical problems using a software application and by hand.

Evaluation:

Final Examination:
One two-hour theory paper 60%

Course Work:
One 2-hour practical test 20%
Laboratory reports 20%

Prescribed text:


BL23D/MICR2252  EUKARYOTIC MICROORGANISMS
4 (credits)  Semester 1  Level II

Aim: To expose students to the nature and properties of eukaryotic microorganisms, their effects on humans and the environment, and how they can be exploited to provide useful products.

Objectives: Upon successful completion of this course the students should be able to:

- describe the structure of eukaryotic microorganisms and be able to distinguish them from prokaryotes
- classify eukaryotic microorganisms
- describe growth and metabolism in eukaryotic microbes
- identify and explain strategies for controlling eukaryotic microorganisms
• outline the role of eukaryotic microorganisms in diseases, the environment, and food industries

Pre-requisites:

*Mona*

BL10J/BIOL1013 and either BL10L/BIOL1063 or BL10M/BIOL1015 or BL12B/BIOL1261 or BIOL1262 and BIOL1263 and BL12C/BIOL1016 or BIOL1017 and BIOL1018

*Cave Hill*

MICR2251 General Microbiology

Course Content:

An introduction to the biology of the eukaryotic microorganisms: algae, fungi, and protists: their structure and function, reproduction, physiology, behaviour, and ecology.

Mode of delivery:

24 hours of lectures, 6 hours of tutorials and 36 hours of practical work involving laboratory techniques to isolate, culture, and examine the basic characteristics of eukaryotic microorganisms, inclusive of making media, inoculation techniques, aseptic technique, sterilization, and staining.

Evaluation:

*Mona*

Final Examination:
One 2-hour theory paper 60%
Coursework: 40%
One 2-hour practical test 20%
Laboratory reports 20%

*Cave Hill*

Final Examination: 60%
One 3-hour theory paper

Coursework: 40%
In-course test(s)/Assignments 10%
Practical reports 30%

Prescribed Text:
There is no text currently available that covers all the topics at the appropriate level.
Recommended Reading:


BT21B/BOTN2011 SEED PLANTS
(4 credits) Semester 2 Level II

Aim: To provide students with the knowledge that is fundamental to the classification of the gymnosperms and angiosperms

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

- identify the morphological and reproductive structures of both living and fossilized gymnosperms
- identify the possible ancestors of the angiosperms
- describe the evolution of floral structures
- outline the modern trends in plant taxonomy
- collect, describe and identify plant specimens

Pre-requisites: BL10M/BIOL1015 and BL10J/ BIOL1013 or
BL12B/BIOL1261 or BIOL1262 and BIOL1263 and
BL12C/BIOL1016 or BIOL1017 and BIOL1018

Course Content:

1. Structure, evolution and significance of the seed plants illustrated by reference to select Gymnosperm and Angiosperm groups
2. The significant biological distinction between major groups and the formal processes by which species and higher taxa are derived
3. Development of classification systems: Artificial, Natural and Phylogenetic
4. Taxonomic value of characters: Morphological, Anatomical, Cytological, Phytochemical, Ecological and Geographical
5. Numerical Taxonomy

Mode of delivery:

24 hours of lectures, 6 hours of tutorials, 36 hours of laboratory work involving macroscopic and microscopic examination of plant specimens and slide preparations to illustrate the characteristics taxonomic features of the various groups of the seed-bearing plants; introduction to taxonomic/phylogenetic keys and to the reproductive and morphological structures of seed plants.

Evaluation:

Final Examination:
One 2-hour theory paper 60%

Coursework 40%
One 2-hour practical test 30%
Plant collection 10%

Prescribed texts:


BT22A/BOTN2012 PLANT PHYSIOLOGY (4 credits) Semester 1 Level II

Aim:
- To provide a foundation in the fundamental concepts of plant physiology by describing the functioning, growth and development of flowering plants.
- To introduce experimental plant science using methods that illustrate basic principles of plant physiology.

Objectives: Upon successful completion of the course, students should be able to:
- identify the main processes and controls of plant cell growth and differentiation
- describe developmental stages from germination to flowering, fruiting and senescence and how they are regulated by plant hormones and environmental factors
- explain water, mineral nutrient and carbohydrate movement in plants
- explain the difference between the three main pathways of carbon fixation and assimilation and identify their benefits under various environmental conditions
- undertake, interpret and report basic plant physiological experiments in the laboratory and greenhouse

Pre-requisites: BL10J/BIOL1013 and BL10M/BIOL1015 or BL12B/BIOL1261 or BIOL1262 and BIOL1263 and BL12C/BIOL1016 or BIOL1017 and BIOL1018

Course Content:

How plants function at the level of cells, tissues, organs and the whole plant. The physiology of:
- seed germination and dormancy
- growth and differentiation, growth analysis
- control of growth by plant growth regulators
- water relations; mineral nutrition; carbon assimilation; translocation
- photomorphogenesis and photoperiodism
- flowering and fruit development; senescence.

Delivery mode: 24 hours of lectures, 6 hours of tutorials, 36 hours of laboratory and greenhouse work.

Evaluation:

Final Examination:
One 2-hour theory examination 60%

Coursework:
One 2-hour practical test 20%
Practical quizzes (X 2) 10%
Practical reports 10%

Prescribed text:
ISBN: 0878938567
Z20G/ZOOL2012 FUNCTIONAL ORGANIZATION I: ANIMAL MAINTENANCE SYSTEMS  
(4 credits) Semester 2 Level II

Aims: 1. To equip students with knowledge of the major maintenance systems involved in the functioning of animals and the evolutionary development of these systems

2. To develop knowledge of these systems by examination of appropriate biological materials in the practical classes

3. To develop and improve dissection and other practical zoological skills

Objectives: Upon completion of this course students should be able to:

1. describe the variety of maintenance systems in animals of different organizational levels

2. explain the design and performance of maintenance systems

3. discuss the advantages and disadvantages of the different designs of maintenance systems

4. outline the evolutionary trends visible within these systems

5. dissect and display basic animal systems

Pre-requisites: BL10J/BIOL1013 and BL10L/BIOL1063 or BL12B/BIOL1261 or BIOL1262 and BIOL1263 and BL12C/BIOL1016 or BIOL1017 and BIOL1018

Course Content:

- Respiration and respiratory structures
- Circulatory systems
- Feeding and Digestive systems
- Excretory systems and the process of excretion
- Reproduction and reproductive systems

Mode of Delivery:

24 hours of lectures, 6 hours of tutorials and 36 hours of practical work involving laboratory exercises that will parallel the lecture course.
Evaluation:

Final Examination:
One 2-hour theory paper 70%

Course Work:
One 2-hour practical test 20%
Laboratory reports 10%


Z20H/ZOOL2013 FUNCTIONAL ORGANIZATION II. ANIMAL COORDINATION, PROTECTION AND MOVEMENT (4 credits) Semester 2 Level II

Aim:

• To provide an introduction to the structure and evolutionary development of selected systems (nervous, endocrine, support, integument) in vertebrates and invertebrates.

• To develop knowledge of these systems by reference to appropriate biological materials in the practical classes.

• To develop and improve dissection and other practical zoological skills.

Objectives: Upon successful completion of the course students should be able to:

1. describe and explain the structure and evolutionary development of the nervous, endocrine, support and integument systems
2. describe the embryological development of selected structures related to the above mentioned systems
3. recognize and identify the cellular structure of tissues and organs associated with the above systems
4. dissect and display selected animal systems
Pre-requisites: BL10J/BIOL1013 and BL10L/BIOL1063 or BL12B or BIOL1262 and BIOL1263 and BL12C or BIOL1017 and BIOL1018

Course Content:

- Coordination and control: nervous systems, endocrine systems
- Support and locomotion: exoskeleton, endoskeleton, muscular and non-muscular movement.
- Integument

Mode of Delivery:

24 hours of lectures, 6 hours of tutorials and 36 hours of practical work involving laboratory exercises that will parallel the lecture course.

Evaluation:

Final Examination:
One 2-hour theory exam  70%

Course Work:
One 2-hour practical exam  20%
Laboratory reports  10%


LEVEL III COURSES:

BL30K/BIOL3012  SOIL BIOLOGY (Not offered in 2010/11 academic year)  
(4 credits)   Semester 1   Level III

Aim:  To increase students’ knowledge of soil as a habitat for diverse forms of life and how environmental factors affect soil biological processes.

Objectives:  Upon successful completion of the course, students should be able to:
1. describe the main biotic and abiotic components of the soil environment

2. identify the important biological processes in the soil and effects of changing environmental factors

3. apply laboratory techniques to study the effects of various environmental factors on the activities of soil organisms

Pre-requisites: BL10J/BIOL1013 or BL12C/BIOL1261 or BIOL1262 and BIOL1263 and BL20N/BIOL2014

Course Content:

- The soil environment: soil formation, soil abiotic components, soil organisms: prokaryotic and eukaryotic microorganisms, animals and plant parts; biological processes occurring in soil.

- Environmental issues affecting life in the soil: acid rain, metal toxicity, salinity, radioactivity, pesticides, and the introduction of organisms.

- The impact of human activities on soil ecology and biodiversity.

Delivery mode: 24 hours of lectures, 6 hours of tutorials, 36 hours of laboratory and field work.

Evaluation:

One 3-hour Theory examination 60%

Course work 40%

Consisting of:

In-course test (1 hour) 15%
Project 15%
Laboratory reports 10%

Highly Recommended Texts:


BL30M / BIOL3011 MYCOLOGY

(4 credits) Semester I Level III

Aim: That students will gain an understanding of the behaviour and function of fungi

Objectives: Upon successful completion of the course, students should be able to:
• Describe the biological characteristics of the major groups of fungi

• Conduct studies to investigate the behaviour of fungi under various conditions

• Explain the significance of fungi and their interactions

• Give accounts of current and developing uses of fungi to man

• Identify suitable methods for obtaining and preserving various types of fungi

Pre-requisites: BL23D / MICR2252

Course Content:
• The structural and ultrastructural characteristics and the ecological significance of the major groups of fungi of importance in the West Indies
• The influence of genetic, nutritional and environmental factors on fungal growth, differentiation, reproduction and dispersal and germination of spores
• The practical exploitation by man of fungal interactions; of fungal metabolite production; of fungi as sources of food; of the roles of fungi in biotechnology
• Prevention and control of fungal growth responsible for the biodeterioration of commercial products
• Collection and preservation of fungi

Evaluation: Theory examination (2 hours) 60%
Course work 40%
Consisting of:
In-course test (1 hour) 15%
Laboratory work 10%
Group project 15%

Mode of Delivery: Lectures 24 hours
Laboratory studies 36 hours
Tutorials 4 hours minimum

Recommended reading:


**BL31A/BIOL3013 COASTAL MANAGEMENT**

(4 credits) Semester 2 Level III

**Aim:** To introduce the investigation of natural coastal processes, human interference with natural processes and how plans and actions may protect conserve and restore coastal environments.

**Objectives:** Upon successful completion of the course, students should be able to:

1. identify the limits, types and contents of the coastal zone
2. know the physical regime and natural processes of the coastal zone
3. evaluate the activities, demands and uses of the coastal zone
4. outline and evaluate management frameworks applicable to the coastal zone.

**Pre-requisite:** BL20N/BIOL2014

**Co-requisite:** BL31F/BIOL3015 OR BL31G/BIOL3023

**Course Content:**

- **Coastal Resources**
  An examination of the natural resources associated with beaches, reefs, wetlands, estuaries, harbours and off-shore features.

- **An examination of the kinds of pollution affecting coastal resources especially organic, oil, pesticide, heavy metal, physical and thermal pollution, their sources, effects and remedies.**

- **Resource Management Practices**
  Coastal surveys, environmental monitoring, water quality criteria, zoning, legislation and enforcement. Marine Parks and Conservation Areas
  Their purpose, criteria, development and management.

**Mode of Delivery:**

24 hours of lecture, 6 hours of tutorials, 36 hours of field and laboratory
exercises to illustrate the principles of coastal management.

Evaluation:
- One 3-hour theory paper 60%
- Course Work 40%
  - Consisting of one 2-hour practical test 10%
  - Laboratory and field reports 20%
  - Research and oral presentation 10%


**BL31E/BIOL3014 MARINE ECOLOGY I: BIOLOGICAL OCEANOGRAPHY.**
(4 credits) Semester 1 Level III

**Aim:**
1. Impart knowledge of the organisms as well as the physical and chemical processes associated with the marine pelagos.
2. Introduce the appropriate methods of measuring and sampling the oceans.

**Objectives:** Upon successful completion of this course students should be able to:
1. identify the types of organisms associated with the marine pelagos- their biology, associations and distribution.
2. describe and evaluate the physical and chemical processes associated with the marine pelagos.
3. adequately investigate the organisms, habitats and processes of the marine pelagos through “hands on” practical exercises.
4. analyse, interpret and present their investigations in a scientific report.

**Pre-requisite:** BL20N/BIOL2014. Admission to this course is limited due to the restriction of boat space on field trips.

**Course Content:**
- Ocean basins- their origin and structure.
- Chemical and physical properties of ocean water.
Circulation and mixing: currents, waves & tides.
Marine sediments- their origin and deposition.
Form and function of planktonic organisms
Distribution of planktonic organisms
Primary production and its measurement
Secondary production and its measurement
Food chains/food webs in the pelagic province
Vertical migration and the deep sea pelagos

Mode of Delivery:

24 hours of lecture, 6 hours of tutorial and 36 hours of laboratory and field exercises involving sampling from small boats which illustrate the major aspects of the lecture course. Laboratory sessions which involve field trips off campus necessitate adding 2 hours of travel time to the 6 hours normally used for the practical exercise.

Evaluation:

One 3-hour theory paper 60%
Coursework 40%
Consisting of:
Laboratory reports 20%
End of course practical test 20%


BL31F/BIOL3015 MARINE ECOLOGY II: BENTHIC COMMUNITIES
(4 credits) Semester 1 Level III

Aim: To impart knowledge of the range of habitats, organisms and ecological processes associated with the marine benthic environment as well as introduce the appropriate methods of investigation.

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

1. identify and categorise the range of marine benthic habitats.
2. identify the organisms in each habitat as well as their biology and interactions.
3. describe the important physical and chemical processes associated with benthic marine habitats.

4. adequately sample and investigate the organisms, habitats and processes through “hands on” practical exposure.

5. analyse, interpret and present their investigations in a scientific report.

Pre-Requisite: BL20N/Biol2014. Admission to this course is limited due to the restriction of boat space on field trips.

Co-requisite: BL31E/Biol3014.

Course Content:

1. The nature of the intertidal and sub-tidal benthic environment
2. The communities associated with sandy shores
3. The communities associated with rocky shores
4. Mangrove swamp communities
5. Seagrass communities
6. Meiofauna
7. Symbioses in the sea

Mode of Delivery:

24 hours of lecture, 6 hours of tutorial and 36 hours of laboratory and field exercises involving the range of habitats which illustrate the major aspects of the lecture course.
Laboratory sessions which involve field trips off campus necessitate adding 2 hours of travel time to the 6 hours normally used for the practical exercise.

Evaluation:

One 3-hour theory paper 60%
Coursework 40%
Consisting of:
Laboratory reports 20%
End of course practical test 20%

BL31G/BIOL3023  CORAL REEF BIOLOGY
(4 credits)  Semester 2  Level III

Aim: To provide an introduction to the biology of reef building corals, the ecology of coral communities, and the natural phenomena and anthropogenic factors that impact coral reefs.

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

1. Identify Caribbean coral species and describe their biology, distribution and interactions.

2. Describe how reefs are formed and explain the role of the non-coral organisms associated with them.

3. Conduct laboratory and field exercises involved in the investigation of coral reefs.

Pre-Requisite:   BL20N/BIOL2014
Co-requisite:    BL31E/BIOL3014 and BL31F/BIOL3015

Course content:

- Biology of scleractinian corals: Anatomy, skeletal morphology, calcification and skeletogenesis, endosymbiosis with zooxanthellae, modes of feeding, reproduction and recruitment, environmental factors that influence growth and distribution.


- A survey of the major groups of reef-associated organisms including other coelenterates, porifera, echinoderms, fishes, and algae.

Throughout the course the emphasis will be on Caribbean coral reefs, but comparisons will be made to reefs from other regions.

Mode of Delivery:

24 hours of lectures, 6 hours of tutorial and 36 hours of laboratory exercises on taxonomy and physiology of corals and other reef-associated organisms, and field exercises on coral reef assessment and monitoring.
Evaluation:

One 3-hour theory examination 60%

Course Work: 40%
Consisting of Laboratory reports 30%
In-course practical tests 10%

Prescribed Text:

BL33D/BIOL3021  FRESHWATER ECOLOGY
(4 credits) Semester 2 Level III

Aims: 1. To introduce students to the diversity and taxonomy of freshwater fauna and flora.

2. To introduce the biotic and abiotic factors responsible for controlling the dynamics of freshwater communities.

3. To have students develop the necessary practical skills to undertake basic research in fresh water ecology.

Objectives: Upon successful completion of the course students should be able to:

1. Recognize and identify the common benthic macro invertebrates taxa found in Jamaica freshwaters.

2. Describe the physico-chemical factors and biotic interactions affecting freshwater communities with special emphasis on effects of anthropogenic disturbance.

3. Demonstrate the skills needed to assess and monitor water quality in fresh water systems.

Pre-requisite: BL20N/BIOL2014

Course Content:

and the applicability of these concepts to the tropics. Breakdown of allochthonous material in rivers. Macroinvertebrates in rivers as consumers and their feeding strategies. Riverine freshwater fishes and their feeding strategies. Adaptations of fishes and macroinvertebrates in riverine habitat.


Zoogeography of freshwaters.

Mode of Delivery:

24 hours of lecture, 6 hours of tutorials and 36 hours of mainly field based practical work utilizing a variety of techniques to illustrate freshwater habitats and communities.

Laboratory based analysis of biological material and other data.

Evaluation: One 3-hour theory examination 60%

Course Work: 40%
Consisting of one 2-hour practical coursework test 20%
Practical reports 20%


BL38A/Biol3017 VIROLOGY
(4 credits) Semester 2 Level III

Aim: To introduce students to the fundamental concepts of viral structure, classification and pathogenesis.
Objectives: Upon successful completion of the course students should be able to:

- explain the basic principles of viral structure
- describe major animal and plant viral groups and the processes of virus replication
- identify and describe commonly occurring viral diseases of plants and animals and methods of control

Pre-requisite: BL 20J/BIOL/2011 or BC21C/BIOL2312

Course Content:

- Introduction to virology and the nature of viruses and sub-viral entities
- Structure and replication of RNA viruses, DNA viruses, and viroids
- Methods in Virology: detection, quantification and characterization
- Virus transmission
- Host cell-virus interactions: morphological alterations, biochemistry and molecular biology of the infection process
- Biological consequences of viral infections on organisms and populations; development of control strategies

Mode of delivery:

24 hours of lectures, 6 hours of tutorials, and 36 hours of laboratory exercises involve plant virus transmission, virus purification, electron microscopy, and serology

Evaluation: Written theory exam (3 hours) 60%
Coursework 40%
Two 1-hour In-course tests 20%
Laboratory reports 20%

Prescribed texts:

BL39C/BIOL3018 RESEARCH PROJECT
(4 credits) Semester 1 or 2 Level III

Aim: To equip students with the basic knowledge and skills required to undertake and report on scientific research in the field of biology.
Objectives: On completion of the course students should be able to:

- Search information bases for appropriate supporting literature for a given topic.
- Formulate hypotheses for a proposed piece of scientific research and design appropriate means for testing the same.
- Collate and analyse data from their research and prepare a report in standard scientific format.

Co-requisite: BL20P/BIOL2015

This course is available to students at the discretion of the Department.

Course Content:

- The basics of scientific writing, experimental design, project reporting and presentation.
- Aims and means of assessing feasibility of projects.
- Techniques in data collection, collation and analysis.
- Investigation and written report on an approved topic.

Mode of Delivery:

8 hours of lectures, 2 hours of interactive tutorial sessions and 56 hours of student driven research under the supervision of a member of the academic staff.

Evaluation:

Project report 75%
Oral Examination 25%

BL39D/BIOL3019  CARIBBEAN BIODIVERSITY
(4 credits) Semester 2 Level III

Aims: The course is designed to:

1. Introduce concepts, patterns and processes in biogeography
2. Develop an appreciation of the uniqueness and diversity of Caribbean flora, fauna and ecosystems.
3. Develop an understanding of the evolution, biogeography and classification of the Caribbean biota.

Objectives: Upon successful completion of this course students should be able to:
1. identify and describe the major ecosystems in the Caribbean;

2. provide an overview of the diversity of selected Caribbean taxa;

3. describe and evaluate models addressing island biogeography, patterns and the origin of the Caribbean biota;

4. relate species distributions to geographic and site factors including human disturbance;

5. evaluate the relevance of Caribbean biodiversity from a regional and global perspective.

Prerequisite: BL20N/BIOL2014 and BL20K/ BIOL 2012

Course Content:

1. Major biomes of the Caribbean islands
2. Characteristics of the Caribbean biota
3. Island gradients in species diversity
4. Adaptive radiation within islands
5. Ecology and conservation status of selected taxonomic groups.

Mode of Delivery:

24 hours of lectures applying audiovisual methods including presentation software and video, 6 hours of tutorials, 3 one-day field trips to study the biological diversity in selected habitats and taxonomic groups. and 18 hours for the conduction of a Group project (with 3/4 students per group) studying a biodiversity pattern in the field (18 hours). Project works accounts for 50% of the practicals.

Evaluation:  
One 3 hour theory exam 65%
Course Work 35%
Consisting of a project report 25%
Lab reports 10%

Prescribes Text:  

BL 39E/BIOL3020  CONSERVATION BIOLOGY
(4 credits)  Semester 2  Level III

Aims:  
1. To evaluate sources of species extinctions and current threats to biodiversity.
2. To demonstrate strategies for the conservation of threatened species and habitats.

3. To establish the theoretical basis for managing small populations.

4. To establish the social context in which conservation efforts must proceed.

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

1. Describe the history and current status of the human-mediated extinction crisis.

2. Explain how population genetic models can be used to inform conservation efforts directed at endangered species.

3. Outline the values of and threats to biodiversity.

4. Show why island species are particularly vulnerable to anthropogenic impacts such as invasive species.

5. Describe techniques used to control or eradicate invasive species.

6. Explain the theoretical and practical aspects of designing protected areas.

Pre-requisites: BL 20N/BIOL2014 and BL20K/BIOL2012

Course Content:

- Biological diversity and its values.
- Threats to biological diversity: habitat destruction, exotic species, and over-exploitation.
- Population biology of threatened species.
- Managing threatened species: in-situ and ex-situ.
- Establishing and managing protected areas. Social framework for the conservation of biodiversity

Mode of Delivery:

24 hours of lecture, 6 hours of tutorials and 36 hours of field work in the form of a 2 night camping field trip (Friday to Sunday), which involves an assessment of conservation needs and the implementation of conservation measures in the Hellshire Hills and along the Hellshire coast as well as visiting current conservation projects in the field.

Evaluation:

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<tr>
<th>Evaluation</th>
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<tbody>
<tr>
<td>One three-hour theory exam</td>
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<tr>
<td>Course Work</td>
<td>35%</td>
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<td>Consisting of laboratory report</td>
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<td>Project report</td>
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<td>In course test</td>
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BT33A/BOTN3014  FOREST ECOLOGY, AGROFORESTRY & SUSTAINABLE DEVELOPMENT
(4 credits)  Semester 2  Level III

Aim: To provide an introduction to the world’s tropical rain forests, specifically to describe their structure and functioning, dynamics, succession and regeneration processes, their role in water and nutrient cycling and how disturbance affects these processes.

Objectives: Upon successful completion of this course the students should be able to:

- identify different forest types, where they occur and how environmental factors influence forest type.
- identify the role of natural disturbance in forest dynamics and the maintenance of species diversity.
- explain the importance of forests in the hydrological and nutrient cycles and the effects of anthropogenic disturbance on these cycles.
- explain how trees improve the soil and ways in which these enhancements can be incorporated in present agricultural systems.
- use various methods for forest inventory and monitoring.

Pre-requisite: BL20N/BIOL2014

Course Content:

1. Origins of tropical rain forests
2. Origins of tropical forest diversity
3. Contemporary diversity
4. Characteristics of tropical rain forests
5. Tropical rainforest formations
6. Tropical dry forests
7. Forests of Jamaica
8. Reproductive ecology of tropical rain forest trees
9. Reproductive ecology of tropical dry forest trees
10. Principles of tropical forest hydrology
11. Tropical forest nutrient cycles
12. Trees and soil fertility
13. Agroforestry systems

Mode of delivery:

24 hours of lectures, 6 hours of tutorial and 36 hours of laboratory sessions in which students will gain an understanding, through class sessions and field trips, data collection and analysis about the ecological information needed for the management and conservation of tropical forests, what research methods are used and how the results of this research can be applied. The field trips will include weekend camping to study types of forests

Evaluation:  One 3-hour theory examination (Paper I)  70%
Fieldwork report  30%

Prescribed text:

BT33B /BOTN 3018    MEDICINAL AND ECONOMIC BOTANY
(4 credits)          Semester 2      Level III

Aim:  The course is designed to develop students’ understanding about the economic and ethnobotanical aspects of plant resource utilization medicinal properties of the various plant groups

Objectives:  Upon successful completion of this course the students should be able to:
- describe the non-agricultural uses of plants
- identify and describe commonly occurring plants of medicinal value
- assess the use of phytochemicals in medicinal and industrial applications
- outline the ways in which plants may be sustainably exploited for crop diversification

Pre-requisite:  BT21B/BOTN2011 and BT22A/ BOTN 2012

Course Content:

Plant families of medicinal and economic importance Ethnobotany:
Medicinal Plants
- Phytochemicals
- Herbs and spices
- Nutraceuticals
- Plant Products: flavours and fragrances, gums, resins, oils,
fibre
- Aromatherapy
- Under-utilized tropical plant food
- Timber and non-timber forest products
- Economic uses of algae, bryophytes and pteridophytes
- Conservation of medicinal and economically important plant genetic resources.

Mode of Delivery:
24 hours of lectures, 6 hours of tutorials and 36 hours of laboratory exercises and field work.

Evaluation:
One 3-hour theory examination (paper I) 60%

Course work 40%
Consisting of:
Practical Course test (2 hour) 20%
Laboratory reports 20%

Prescribed text:

BT34A/BOTN3015 PRINCIPLES OF PLANT BREEDING
(4 credits) Semester 2 Level III

Aims:
To provide an understanding of genetic manipulation of sexually and asexually propagated crops with an emphasis on sustainable agricultural production.

To prepare students for employment in plant breeding

Objectives: Upon successful completion of the course the students should be able to:

1. formulate breeding strategies that would lead to an increase in productivity and profitability in agriculture and horticulture.

2. use plant breeding to mitigate the impact of pests and diseases avoiding pesticide damage to the environment.

3. discuss the use of plant breeding in developing sustainable agricultural production systems that satisfy the increasing demand for food, fiber and plant based industrial products.

Pre-requisite: BL 20J/BIOL2011
Course Content: The course is designed to convey basic methods used in genetic improvement of crop plants and includes:

1. plant domestication
2. mating systems in crop plants
3. continuous versus discontinuous variation traits
4. heritability of economically important traits, genetics of self and cross pollinated crops
5. breeding methods with self and cross-pollinated crops
6. design of field experiments
7. genetics of disease and insect pest resistance in crop plants
8. induced mutations and chromosome manipulation in crop improvement
9. genetic diversity in crops and gene banks
10. seed production industry
11. crop improvement through genetic engineering
12. general breeding problems associated with regional crops.

Mode of delivery:

24 hours of lectures, 6 hours of tutorial and 36 hours of Laboratory exercises, inclusive of field exercises.

Evaluation:  
1 Theory examination (paper I) 65%
1 Practical test (2 hours) 20%
Laboratory report 15%

BT37Q/BIOL3016  PLANT HEALTH  
(4 credits)  Semester 2  Level III

Aims: 
To expose students to the ways in which a changing environment can affect the activities of beneficial and pathogenic macro- and micro-organisms, plants, and the interactions amongst them.

To demonstrate how the manipulation of the environment can promote plant health.

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

- Identify the factors that promote plant health or cause disease development, and explain how environmental change may affect these factors
- Conduct field, greenhouse and laboratory tests to evaluate the influence of changing environmental factors on plant health

Pre-requisites: BL10J/ BIOL1013, BL10L/BIOL1063, BL10M/BIOL1015 or BL12B or BIOL1262 and BIOL1263 and BL12C or BIOL1017 and
BIOL1018 and BL23D / MICR2252

Course Content:

- Abiotic factors (e.g. nutrients, frost, sunscorch, herbicides, machinery) and biotic factors (e.g. fungi, bacteria, protists, nematodes, insects) contributing to plant health or disease development for plants in undisturbed land and various horticultural and agricultural systems
- The significance of the interactions between the environment, macro- and micro-organisms, and plants on plant health
- The effects of climate change, radiation, salinity, atmospheric, water and soil pollution, the introduction of genetically-modified organisms, and other environmental changes on plant health
- The environmental challenge to the management of plant diseases and remediation of disorders.
- Practical work conducted in the laboratory, greenhouse and field to demonstrate how changes in the atmosphere, water and soil can promote plant health or disease development

Evaluation: Theory examination (2 hours) 60%

Course work 40%

Consisting of:
- In-course test (1 hour) 15%
- Laboratory work 10%
- Group project 15%

Mode of Delivery: Lectures 24 hours
Field, greenhouse and laboratory studies 36 hours
Tutorials 4 hours minimum

Prescribed texts:
None. A list of useful references is supplied and includes the following:

Highly recommended:


BT38B/BOTN3016  PLANT BIOTECHNOLOGY
(4 credits)  Semester 1  Level III

Aim: To introduce students to the basic principles and applications of plant tissue culture and genetic engineering.

Objectives: Upon successful completion of the course the students should be able to:

- describe the underlying principles of aseptic culture of plant cells, tissues and organs outline the use of specialized plant cell culture techniques in plant science research and industry
- explain the principles of plant genetic engineering; describe the development and applications of transgenic plants
- discuss the role of patents and ethical issues associated with plant genetic engineering

Pre-requisite: BT 22A/BOTN2012 OR BC 21C/BIOL2312

Course Content:

- Overview of plant tissue culture
- Principles of aseptic culture, basic media components
- Organ culture, callus culture, cell suspension culture, organogenesis, somatic embryogenesis, micropropagation, anther culture, protoplast isolation, culture and regeneration
- Applications of plant tissue culture
- Overview of gene structure, regulation, and expression
- Methods of plant transformation
- Development and analysis of genetically modified plants
- Ethical, safety, social, legal and environmental issues associated with the technology

Mode of delivery:

24 hours of lectures, 6 hours of tutorials, and 36 hours of laboratory exercises including the aseptic culture of plant tissues, plant transformation and molecular analysis of regenerants.

Evaluation: Written theory exam (3 hours) 60%
Coursework 40%
- Two 1-hour In-course tests 20%
- Laboratory reports 20%
Prescribed texts:

BT38K/BOTN3017 PRINCIPLES OF HORTICULTURE
(4 credits) Semester 1 Level III

Aim: To provide training in principles and practices of horticulture, especially as they relate to the Caribbean and the tropics.

Objectives: Upon successful completion of the course the students should be able to:
- propagate vegetable, ornamental and fruit tree crops.
- organize the cultivation of horticultural crops in nurseries, greenhouses and the field.
- explain the factors involved in the harvesting and handling of horticultural crops.

Pre-requisites: BT 21B/BIOL2011 AND BT22A/BIOL2012

Course Content:
- Horticultural Plants (as distinct from routine agricultural plants): morphology, taxonomy, environmental physiology
- Propagation of Horticultural Plants
  - Sexual propagation
  - Seed production and certification, methods of seeding, seed nursery, transplantation
  - Asexual propagation: cuttings, grafting, budding, layering, specialised underground structures, micropropagation
- Nursery Management
- Controlled Environment Horticulture
  - Greenhouse design and construction
  - Internal environment control
  - Light, irrigation, temperature, humidity, substrate, pot and bed culture
- Out-door Environment Horticulture: principles of landscaping, nursery production, bedding plants, ground cover/grasses, trees and shrubs
- Growing Garden Crops: ornamentals, vegetables, herbs, fruit trees
Mode of delivery:

24 hours of lectures, 6 hours of tutorials, and 36 hours of laboratory and field exercises. Practical work includes plant propagation techniques, field trips to, and work at, various horticultural entities.

Evaluation:

One 3-hour Theory examination (paper I) 60%

Coursework 40%
Consisting of:
Laboratory/Field report 20%
In-course test 20%

Prescribed text:

Z 30A/ZOOL3011 SENSORY AND NEUROMUSCULAR PHYSIOLOGY
(Not offered in 2010/11 academic year)
(4 credits) Semester 1 Level III

Aim: 1. To expose students to the variety of mechanisms involved in animal sensory and neuromuscular physiology.

2. To expose students to a range of techniques used in the study of animal sensory and neuromuscular physiology.

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

• explain the mechanism of transport across cell membranes, membrane potential;
• explain membrane potential and the equations used to describe it;
• explain and demonstrate action potentials and their propagation;
• explain chemical and electrical synapses;
• describe and explain sensory coding, pain, and animal learning and memory; and
• explain motor control of muscular contraction, the sliding filament theory, excitation contraction coupling, and the characteristics of isometric and isotonic contractions.
Pre-requisites: Z20G/ZOOL2012 and Z20H/ZOOL2013, C06J/\textit{CHEM0901} and C06K/\textit{CHEM0902} or ‘A’ level Chemistry or equivalent.

Course Content:

- Structure of the neurone
- Input systems
- Ionic basis of neuronal activity
- Synaptic transmission
- Effector systems
- Aggregates of neurones
- Co-ordination
- Plasticity of the central nervous system

Mode of delivery: 24 hours of lectures, 6 hours of tutorial and 36 hours of practical work involving laboratory exercises in experimental physiology

Evaluation:

One 3-hour theory paper 60%

Course Work: 40%

- Comprising one 2-hour practical coursework test 20%
- Laboratory Reports 20%


\textbf{Z 30B/ZOOL3012  METABOLIC PHYSIOLOGY}

(4 credits) Semester 1 Level III

Aims

1. To expose students to the variety of mechanisms involved in animal metabolic physiology.

2. To expose students to a range of techniques used in the study of the mechanisms involved in animal metabolic physiology.

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

- make a comparative analysis of the use of air and water as respiratory media
• explain respiratory regulation, oxygen and carbon dioxide transport in animals

• describe regulation of cardiac output and vasomotor tone in vertebrates

• describe thermoregulatory, osmoregulatory and ionoregulatory mechanisms

• explain urine formation and its regulation

• describe mechanisms of hormone action

• explain the process of ageing in animals

• design and execute physiological research on animal metabolism

Pre-requisites: Z20G/ZOOL2012 and Z20H/ZOOL2013, C06J/ CHEM0901 AND C06K/ CHEM0902 or ‘A’ level Chemistry or equivalent.

Course content:

• Energy metabolism of the whole animal
• Respiration
• Circulation
• Water and solute metabolism
• Nitrogen metabolism
• Body temperature and energy metabolism
• Control of metabolism

Mode of delivery:

24 hours of lectures, 6 hours of tutorial and 36 hours of practical work involving laboratory exercises in experimental physiology

Evaluation:

One 3-hour theory paper 60%

Course Work: 40%

Comprising one 2-hour practical coursework test 20%
Laboratory Reports 20%

Z 30G/ZOOL3015   GENERAL PARASITOLOGY
(4 credits)   Semester 1   Level III

Aims
The course seeks to increase awareness of the impact of the major parasites on the health of man and domesticated animals, and economic significance of the major parasites.

Objectives
Upon successful completion of this course students will be able to:

1. identify the major types of protist, helminth and arthropod parasites of man and domestic animals;
2. describe the life cycles of these parasites and pathology of infections;
3. determine the current health and economic costs of these parasites;
4. propose basic control strategies for infections.

Pre-requisites: Z20G/ZOOL2012 and Z20H/ZOOL2013

Course Content

- Introduction to parasitism: inter-specific associations; endo- and ecto-parasitism; hosts and host specificity
- Distribution, prevalence, life cycle, transmission, nutrition, immunology, pathology and control of the main protist, helminth and arthropod parasites of man and domestic animals.
- The cost of parasitism.

Mode of delivery:

24 hours of lectures, 10 hours of tutorials and 32 hours of laboratory exercises which include the identification and functional morphology of the major protist, helminth and arthropod parasites of man and domestic animals from living and preserved materials; stained whole mount preparations of helminth parasites; epidemiological exercises.

Evaluation:

One 2-hour theory examination               50%
Course Work:
Consisting of one 2-hours comprehensive test 25%
(Mix of practical and theory)
Laboratory reports 25%

Z 30M/ZOOL3017 IMMUNOLOGY
(4 credits) Semester 2 Level III

Aims: This course is designed to present the principles of immunology and to highlight the major functional operations and applications of immune responses.

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

1. describe the basic concepts in immunology
2. explain the role of immunology in real life situations e.g. transplantation, allergy, autoimmunity, HIV infection, vaccination, etc

Pre-requisites: Z20G/ZOOL2012 and Z20H/ZOOL2013

Course Content

- **Basic Immunology**
  Evolution of immune responses; Components of innate and acquired immunity; Immunogens and antigens; Antibody structure and function; Antibody-antigen interactions; The complement system; Ontogeny of immune cells; Triggering the immune response; The major histocompatibility complex in immune responses; Control mechanisms in the immune response

- **Immunity in action**
  Immunoassays; Hypersensitivity reactions; Disorders of the immune response; HIV Infection; Autoimmunity; Transplantation immunology; Tumor immunology

Mode of delivery:

24 hours of lectures, 10 hours of tutorials and 32 hours of laboratory exercises which include histology of lymphoid organs of the mouse, viable counts of splenic lymphocytes, precipitation & agglutination reactions, diagnostic immunology - IFA, ELISA and use of a Computer-assisted learning package (Ammit program)

Evaluation:

- One 2-hour theory paper 50%
- Course Work: 50%

186
Consisting of one 2-hour MCQ paper 25%
Laboratory reports (5 x 5% ea) 25%

Useful URL: http://pathmicro.med.sc.edu/book/immunol-sta.htm

**Z31B/ ZOOL3024 FISHERIES (Not offered in 2010/11 academic year)**
(4 credits) Semester 1 Level III

**Aims:**
This course is designed to familiarize the student with the basic principles of fisheries science and how these may be applied to the sustainable harvesting of fishable resources in actual situations. Examples are selected to demonstrate a variety of real life situations around the world.

**Objectives:**
Upon successful completion of this course students should be able to:

1. describe the main types of fishable resources
2. explain the principles of fish populations dynamics and stock assessment
3. apply the principles of fish population dynamics and stock assessment to the integrated management of fishable resources.

**Prerequisite:** Z 20G/ZOOL2012 and Z 20H/ZOOL2013
**Co-requisite:** BL31E/BIOL3014

**Course Content:**

- **Fish population dynamics and stock assessment**
  Stock, gear selection, growth recruitment, stock assessment, yield and yield models, mortality.

- **Caribbean Fisheries**
  Distribution of regional fisheries resources regional fishing methods: Jamaican fishing industry.

- **World Fisheries**
  An examination of important features of world fisheries resources, fishing methods of the world, selected case studies.

- **Fisheries Management**
  Principles of fisheries management, fisheries legislation, recent developments in fisheries, fishing industry practices.

**Mode of Delivery:**
24 hours of lecture, 6 hours of tutorial and 36 hours of practicals involving field and laboratory exercises

Evaluation: One 3–hour theory examination 60%

Course Work:
Consisting of one 2-hour practical course test 20%
Laboratory reports 20%

Prescribed Text:

Z 31C/ZOOL3018 FISH BIOLOGY (Not offered in 2010/11 academic year)
(4 credits) Semester 1 Level III

Aims: 1. To provide an introduction to the diversity and taxonomy of living fishes.

2. To give an introduction to various aspects of the biology and economy of fishes and fish communities.

3. To provide students with the necessary practical skills to undertake basic research in fish biology.

Objectives: Upon successful completion of the course students should be able to:

1. recognize and identify the common fish families found in Jamaica.

2. identify the basic elements of taxonomy, anatomy, physiology and ecology of fishes.

3. identify and assess feeding habits, fecundity and to ageing of fishes using practical skills.

Prerequisite: Z 20G/ZOOL2012 and Z 20H/ZOOL2013

Course Content:

- Classification and characteristics of main groups of Chondrichthyes and Osteichthyes.
- Body structure and its modifications.
- Digestive structure and physiology. Nutrition. Feeding ecology. Optimal foraging theory.
- Circulatory system. Gills and gaseous exchange system.
- Muscles and swimming. Osmoregulation. Aspects of the endocrine
system.

- Aspects of behaviour.
- Ecology and structure of fish communities associated with the marine pelagic, estuarine and coral reef habitats.
- Threats to fish communities.

Mode of Delivery:

24 hours of lectures, 6 hours of tutorials and 36 hours of practicals consisting of mainly laboratory based classes demonstrating a variety of basic techniques used in fish biology.
Field excursion(s) for collection of fishes.

Evaluation: One 3-hour theory examination 60%
Course Work: 40%
Consisting of one 2-hour practical test 20%
Practical reports 20%

Prescribed Text:

Z 31F/ZOOL3019 FISHERIES AND AQUACULTURE TECHNOLOGIES
(4 credits) Semester 1 Level III

Aims: 1. To expose students to the basic principles related to natural production in Enclosed aquatic systems
2. To familiarize them with the main issues surrounding production and maintenance of these aquatic resources.

Objectives: Upon successful completion of this course students will be able to:
1. describe the basic principles related to sustainable harvesting of fishable resources
2. outline and evaluate the issues surrounding their assessment and management
3. outline the principles underlining the culture of aquatic animals and selected plants
4. evaluate the advantages as well as disadvantages surrounding aquaculture and mariculture practices.
Pre-requisite: Z 20G/ZOOL2012 and Z 20H/ZOOL2013
Co-requisite: Z 31C/ZOOL3018 if available

Course Content:

- **Part A.** Fisheries dynamics, assessment and management.
  Age and growth. Fishable stock, populations and recruitment. Gear Selectivity and fishing effort. Yield models and their value. Introduction to principles of fisheries management.

- **World and Caribbean Fisheries**

- **Part B.** Principles of Fin-fish Aquaculture

- **Non-Finfish Culture Principle**
  Penaeid shrimp and freshwater prawn culture. Oyster and seaweed culture.

Mode of Delivery:
24 hours of lectures, 6 hours of tutorials and 36 hours of practicals consisting of mainly laboratory based classes involving mainly field and some laboratory-based classes demonstrating major aspects of theory.

Evaluation:
One 3-hour theory examination  60%
Course Work:  40%
  Consisting of one 2-hour practical test  20%
  Practical reports  20%

Prescribed Text:

**Z 32C/ZOOL3020 INSECT BIOLOGY AND SYSTEMATICS**
(4 credits) Semester 1 Level III

Aims: 1. To equip students with a general knowledge of the biology and taxonomy of insects.

2. To develop an understanding of the general principles of systematics with special emphasis on the rules governing insect taxonomy.

Objectives: Upon successful completion of this course students should be able to:
1. Identify and classify insects to the level of family.

2. Describe the biology of the different insect orders.

3. Explain the principles and techniques of insect systematics.

Pre-requisite: BL10L/BIOL1063 or BL12B/BIOL1261 or BIOL1262 and BIOL1263

Course Content:

- External and internal morphology in relation to taxonomy and evolution.
- The biology, life histories and, where applicable, social organization of the insect orders with special reference to economically important groups.
- The diversity of insects, with emphasis on Caribbean fauna and economically important groups.
- Principles of systematics, including important regulations. Theories of phylogenetics. Techniques in contemporary insect taxonomy.

Mode of Delivery:

24 hours of lectures, 6 hours of tutorials and 36 hours of practicals including hands-on laboratory sessions and field trips which emphasize the collection of insects and the study of insect in situ. Students are expected to produce a collection of 100 insect species.

Evaluation: One 3-hour theory paper 65%

Course Work 35%

Consisting of Insect collection 20%
Laboratory reports (5 x 3%) 10%
Oral presentation 5%

Prescribed text:
ISBN 0-03-096835-6

Z 32G/ZOOL3021 PEST MANAGEMENT
(4 credits) Semester 1 Level III

Aim: To equip students with a general knowledge of arthropod and other pests of economic importance in the region and the appropriate management strategies of these pests.

Objectives: At the end of the course students will display knowledge of:
• the biology and behaviour of selected agriculture and urban pests of economic importance to the Caribbean;
• assessing the economic importance of these pests;
• past and present control strategies of these pests;
• techniques of formulating suitable pest management strategies.

Pre-requisite: BL 20N/BIOL2014

Course Content:

• Definition and evolution of arthropod and other pests
• Historical perspective of pest problems and the attempts by man to deal with them
• Pest identification techniques and the nature of damage associated with insect pests of tropical importance
• The biology, behaviour and economic importance of pests in tropical ecosystems like Jamaica
• Assessing pest populations and related loss
• Determination of Economic Injury Levels (EIL), and Action or Economic Thresholds (AT or ET)
• The pest control options available (legislative, physical, cultural, biological and chemical control).
• The principles of Integrated Pest Management (IPM)
• IPM of selected tropical pests

Mode of Delivery:

24 hours of lectures 4 hours of interactive tutorial sessions, 36 hours of practicals involving the collection of 20 economically important insect species, field and laboratory exercises on, pest identification and diagnostics, loss and damage assessment, determination of EIL and ET, assessment of the efficiency of different control strategies and the development of IPM programmes for selected pests.

Evaluation:

One 3-hour theory paper 65%
Course Work: 35%
   Consisting of laboratory reports 20%
   Insect Collection 10%
   Oral Presentation 5%

## B.Sc. (Agriculture – Tropical Horticulture)

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**Total Credits = 109**
Summary of credits:

- Foundation Courses: 9 credits
- Level I Courses: 36 credits
- Level II Courses: 32 credits
- Level III Courses: 32 credits

**COURSE DESCRIPTIONS (HORTICULTURE)**

**AGSL 2001 (AS21D) SOIL AND WATER MANAGEMENT**
(4 credits) Semester 2 Level II

Prerequisites: AGSL 1000 (AS16B)

Syllabus: Methods of land clearing and their effects on soil structure; soil tillage and the management of soil structure for plant growth; management of soil structure to improve water intake, transmission and storage; water management for salinity control; soil erosion and the management of hillsides; management of dry and wet lands; management of forest soils; management of specific problem soils: soil management and its effects on microbes, microbial activity and soil fertility; soil fertility management; case studies.

Assessment: Coursework 25%
Final Examination 75%

**AGCP 2001 (AC24B) PRINCIPLES OF CROP SCIENCE AND PRODUCTION**
(4 credits) Semester 2 Level II


Assessment: Coursework 40%
Final Examination 60%
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<th>Level</th>
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**Syllabus:**

**AGB U 2002 (AM23B):**

**Assessment:**
- Course work (midterm) 20%
- Final Examination 80%

**AGRI 2001 (AG21C):**

**Assessment:**
- Coursework 40%
- Final Examination 60%

**AGCP 3006 (AC32J):**
- Introduction to the status of fruit crop industry with specific reference to tropical crops. The role of fruits in human nutrition. The scientific principles of fruit crop growth and yield development. Production principles
and technologies used in commercial fruit crop enterprises for selected fruits. Assessment of the commercial potential of minor fruits. Current issues and research needs of tropical fruit crops.

Assessment: Coursework 40%
Final Examination 60%

AGCP 3007 (AC33A)  POST HARVEST TECHNOLOGY
(3 credits)  Semester 1  Level III

Syllabus: The post harvest physiology and biochemistry of selected tropical fruits, vegetables, root crops and grains. The post harvest environment including pathological agents, with particular reference to these crops. Physiological disorders. Post harvest handling systems. Introduction to basic equipment used in evaluation, refrigeration and storage systems, and general post harvest produce management.

Assessment: Coursework 40%
Final examination 60%

AGBU 3007 (AM37A)  NEW VENTURE CREATION AND MANAGEMENT
(4 credits)  Semester 2  Level III

Prerequisites: AGBU 1005 (AM15A), AGBU 1006 (AM15B)

Syllabus: The “hands-on” tools and techniques for launching and managing a sustainable small business. Frameworks and guidelines that can be used to formulate strategies relevant in the contemporary business environment. Emphasis will be placed on real world application of business theory through the building of an effective business plan, case study analysis and interaction with entrepreneurs.

Assessment: Coursework 40%
Final Examination 60%

AGBU 3012 (AM312)  RESEARCH PROJECT
(4 credits)  Semester 1 & 2  Level III
Prerequisites: none

Syllabus: A project within a subject area relevant to the student’s degree option.

Assessment:
- Project Report 80%
- Oral Presentation 20%

*See Project Booklet for detailed guidelines

NOTE: Students will be examined at the end of the semester in which they are registered

**AGCP 2003 (AC26B) MECHANISATION FOR CROP PRODUCTION**
(4 credits) Semester 2 Level III

Prerequisites: AGRI 1003 (AG14C) and AGCP 2000 (AC23A)

Syllabus: Principles of design, construction, operation and maintenance of power units and machinery for crop production. Management of machinery; determination of machinery requirements; machinery selection, performance and costs of use. Machinery for field operations; tillage, seed bed preparation, cultivation seeding and planting, chemical application and harvesting. Analysis and development of mechanised production systems with special reference to crop production in the Caribbean.

Assessment:
- Coursework 20%
- Final Examination 80%

**AGCP 3005 (AC32H) LANDSCAPE AND TURFGRASS MANAGEMENT**
(3 credits) Semester 2 Level III

Prerequisites: AGCP 2001 (AC24B)

Syllabus: The role of plants in human well-being, the importance of the landscape industry and the use of plants in private and public spaces. The history of gardens and garden design. Plant identification techniques. Tree and shrub growth, development selection, establishment and maintenance. Turfgrass and ground cover growth and development, selection, establishment and maintenance. The elements and principles of landscape design, design process; uses of plant materials in landscape design. Landscape installation and maintenance.

Assessment:
- Coursework 40%
- Final Examination 60%
AGBU 3000 (AM30C)  FARM BUSINESS MANAGEMENT
(4 credits)  Semester 2  Level III


Assessment: Coursework 20%
Final Examination 80%

Descriptions for other courses are provided in the course offerings for the respective Departments.
## DEPARTMENT OF MATHEMATICS
### MATHEMATICS COURSES
#### LIST OF UNDERGRADUATE COURSES

<table>
<thead>
<tr>
<th>CODES</th>
<th>TITLES</th>
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<th>SEMESTER OFFERED</th>
<th>Level</th>
<th>PREREQUISITES</th>
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<td>M33Q/ MATH3380</td>
<td>ELEMENTARY NUMBER THEORY</td>
<td>4</td>
<td>Semester 1</td>
<td>3</td>
<td>M20A/MATH2100, M20B/MATH2110, M21Q/MATH2125</td>
</tr>
<tr>
<td>M33R/ MATH3490</td>
<td>COMPLEX ANALYSIS</td>
<td>4</td>
<td>Semester 1</td>
<td>3</td>
<td>M21Q/MATH2125</td>
</tr>
<tr>
<td>MATH3700</td>
<td>INTRODUCTION TO PARTIAL DIFFERENTIAL EQUATIONS</td>
<td>4</td>
<td>Semester 1</td>
<td>3</td>
<td>(MATH2300 and MATH2301) or (M21B/MATH2160)</td>
</tr>
<tr>
<td>MATH3701</td>
<td>PROBABILITY AND STOCHASTIC MODELLING</td>
<td>4</td>
<td>Semester 1</td>
<td>3</td>
<td>M25A/MATH2140</td>
</tr>
<tr>
<td>M34Q/ MATH3310</td>
<td>LIFE CONTINGENCIES</td>
<td>4</td>
<td>Semester 2</td>
<td>3</td>
<td>M25A/MATH2140, M25B/MATH2150, M27B/MATH2320</td>
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<tr>
<td>M34R/ MATH3320</td>
<td>RISK THEORY</td>
<td>4</td>
<td>Semester 2</td>
<td>3</td>
<td>M21Q/MATH2125, M21B/MATH2160 (or MATH2300), M25A/MATH2140, M25B/MATH2150</td>
</tr>
<tr>
<td>M35R/ MATH3321</td>
<td>PRINCIPLES OF ASSET/LIABILITY MANAGEMENT FOR ACTUARIAL SCIENCE</td>
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<td>Semester 2</td>
<td>3</td>
<td>M27A/MATH2210, MS28D/MGMT2023, MS38H/MGMT3048</td>
</tr>
<tr>
<td>M33D/ MATH3280</td>
<td>INTRODUCTION TO MATHEMATICAL MODELLING I</td>
<td>4</td>
<td>Semester 2</td>
<td>3</td>
<td>MATH2300 or M21B/MATH2160, M21Q/MATH2125</td>
</tr>
<tr>
<td>M33A/ MATH3250</td>
<td>FLUID DYNAMICS I</td>
<td>4</td>
<td>Semester 2</td>
<td>3</td>
<td>MATH 2120 (M 21A) or M21Q/MATH2125, MATH 2160 (M 21B) or MATH 2300</td>
</tr>
<tr>
<td>M36Q/ MATH3390</td>
<td>METRIC SPACES AND TOPOLOGY</td>
<td>4 Credits</td>
<td>Semester 2</td>
<td>3</td>
<td>M21Q/MATH2125, M20B/MATH2110</td>
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</table>
# ACTUARIAL SCIENCE OPTION

## Part I

<table>
<thead>
<tr>
<th>Code</th>
<th>Names</th>
<th>Credits</th>
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<tbody>
<tr>
<td>M10A/MATH1140</td>
<td>Basic Introductory Mathematics</td>
<td>6</td>
</tr>
<tr>
<td>M10B/MATH1150</td>
<td>Functions of Real Variables</td>
<td>6</td>
</tr>
<tr>
<td>CS11Q/COMP1110</td>
<td>Introduction to Computer Science (I)</td>
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<tr>
<td>CS11R/COMP1120</td>
<td>Introduction to Computer Science (II)</td>
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<td>EC10C/ECON1001</td>
<td>Introduction to Microeconomics</td>
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<tr>
<td>EC10E/ECON1002</td>
<td>Introduction to Macroeconomics</td>
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<tr>
<td>MS15D/ACCT1005</td>
<td>Introduction to Financial Accounting</td>
<td>3</td>
</tr>
<tr>
<td>MS15B/ACCT1003</td>
<td>Introduction to Cost &amp; Management Accounting</td>
<td>3</td>
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## Part II Compulsory

<table>
<thead>
<tr>
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<th>Names</th>
<th>Credits</th>
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<tr>
<td>M20A/MATH2100</td>
<td>Abstract Algebra</td>
<td>4</td>
</tr>
<tr>
<td>M20B/MATH2110</td>
<td>Linear Algebra</td>
<td>4</td>
</tr>
<tr>
<td>M21Q/MATH2125</td>
<td>Introduction to Mathematical Analysis</td>
<td>4</td>
</tr>
<tr>
<td>MATH2300</td>
<td>Introduction to Ordinary Differential Equations</td>
<td>4</td>
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<tr>
<td>or</td>
<td>M21B/ MATH2160 Analysis and Mathematical Methods II</td>
<td>4</td>
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<tr>
<td>M25A/MATH2140</td>
<td>Probability Theory</td>
<td>4</td>
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<tr>
<td>M25B/MATH2150</td>
<td>Statistical Inference</td>
<td>4</td>
</tr>
<tr>
<td>M27A/MATH2210</td>
<td>Mathematics of Finance</td>
<td>4</td>
</tr>
<tr>
<td>M27B/MATH2320</td>
<td>Introduction to Actuarial Mathematics</td>
<td>4</td>
</tr>
<tr>
<td>MS28D/MGMT2023</td>
<td>Financial Management I</td>
<td>3</td>
</tr>
<tr>
<td>MS38H/MGMT3048</td>
<td>Financial Management II</td>
<td>3</td>
</tr>
<tr>
<td>M31E/MATH3341</td>
<td>Applied Statistics</td>
<td>4</td>
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<tr>
<td>M34Q/MATH3310</td>
<td>Life Contingencies</td>
<td>4</td>
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<tr>
<td>M34R/MATH3320</td>
<td>Risk Theory</td>
<td>4</td>
</tr>
<tr>
<td>M35R/MATH3321</td>
<td>Principles of Asset/Liability Management</td>
<td>4</td>
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A minimum of eleven (11) additional credits should be selected from:

<table>
<thead>
<tr>
<th>Code</th>
<th>Names</th>
<th>Credits</th>
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<tbody>
<tr>
<td>M30Q/MATH3360</td>
<td>Matrix Theory</td>
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<td>M32A/MATH3120</td>
<td>Numerical Analysis</td>
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<tr>
<td>M32B/MATH3130</td>
<td>Optimization Theory</td>
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<tr>
<td>M32C/MATH3370</td>
<td>Topics in Operation Research</td>
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<tr>
<td>M33R/MATH3490</td>
<td>Complex Analysis</td>
<td>4</td>
</tr>
<tr>
<td>MATH3700</td>
<td>Introduction to Partial Differential Equations</td>
<td>4</td>
</tr>
<tr>
<td>MATH3701</td>
<td>Probability and Stochastic Modelling</td>
<td>4</td>
</tr>
<tr>
<td>M34T/MATH3311</td>
<td>Survival Models/Construction of Tables</td>
<td>4</td>
</tr>
<tr>
<td>M36Q/MATH3390</td>
<td>Metric Spaces and Topology</td>
<td>4</td>
</tr>
<tr>
<td>CS22Q/COMP2140</td>
<td>Software Engineering</td>
<td>4</td>
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<td>CS35Q/COMP3110</td>
<td>Information Systems</td>
<td>4</td>
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<tr>
<td>SY35B/SOCI3018</td>
<td>Demography I (Population Trends and Policies)</td>
<td>3</td>
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</table>
Double Major in Mathematics and Modelling Processes

A double major in Mathematics and Modelling Processes requires a total of 64 credits from Part II these must include 32 credits from level II and 32 credits from level III courses, these must include the following courses:

**Level II**

<table>
<thead>
<tr>
<th>Semester I</th>
<th>Semester II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linear algebra (M20B/MATH2110)</td>
<td>Abstract Algebra (M20A/MATH2100)</td>
</tr>
<tr>
<td>Introduction to Mathematical Analysis (M21Q/MATH2125)</td>
<td>Introduction to Ordinary Differential Equations (MATH2300)</td>
</tr>
<tr>
<td>Probability Theory (M25A/MATH2140)</td>
<td>Statistical Inference (M25B/MATH2150)</td>
</tr>
<tr>
<td>Linear Programming (MATH2302)</td>
<td>Mathematical Methods (MATH2301)</td>
</tr>
</tbody>
</table>

**Level III**

<table>
<thead>
<tr>
<th>Semester I</th>
<th>Semester II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partial Differential Equations (MATH3700)</td>
<td>Numerical Methods (M32A/MATH3120)</td>
</tr>
<tr>
<td>Metric Spaces and Topology (M36Q/MATH3390)</td>
<td>Complex Analysis (M33R/MATH3490)</td>
</tr>
<tr>
<td>Probability and Stochastic Modeling (MATH3701)</td>
<td>Fluid Dynamics I (MATH3250)</td>
</tr>
<tr>
<td>Topics in Operations Research (M32C/MATH3370)</td>
<td>Mathematical Modeling I (MATH3280)</td>
</tr>
<tr>
<td>Elementary Number Theory (M33Q/MATH3380)</td>
<td>Applied Algebra II (MATH3350/MATH3350)</td>
</tr>
<tr>
<td>Matrix theory (M30Q/MATH3360)</td>
<td>Research Project In Mathematics (MATH3702)</td>
</tr>
</tbody>
</table>

| 204 |
The Mathematics Major

A major in Mathematics requires passes in:

- M20A/MATH2100 Abstract Algebra 4 credits
- M20B/MATH2110 Linear Algebra 4 credits
- M21Q/MATH2125 Introduction to Mathematical Analysis 4 credits
- MATH2300 Introduction to Ordinary Differential Equations 4 credits
  (which replaces M21B/MATH2160 Analysis and Mathematical Methods II)

as well as sixteen (16) credits from other Part II Mathematics courses. At least eight (8) of these sixteen credits must be obtained at Level III. Certain courses, as noted individually, cannot count towards the major.

- M30B/MATH3350 Applied Algebra II 4
- M30Q/MATH3360 Matrix Theory 4
- M31E/MATH3341 Applied Statistics 4
- M32A/MATH3120 Numerical Analysis 4
- M32B/MATH3130 Optimization Theory 4
- M32C/MATH3370 Topics in Operation Research 4
- M33A/MATH3250 Fluid Dynamics I 4
- M33D/MATH3280 Introduction to Mathematical Modelling I 4
- M33Q/MATH3380 Elementary Number Theory 4
- M33R/MATH3320 Complex Analysis 4
- M34Q/MATH3310 Life Contingencies 4
- M34R/MATH3320 Risk Theory 4
- M34T/MATH3311 Survival Models/Construction of Tables 4
- M35R/MATH3321 Principles of Asset/Liability Management 4
- M36Q/MATH3390 Metric Spaces and Topology 4
- MATH3700 Introduction to Partial Differential Equations 4
- MATH3701 Probability and Stochastic Modelling 4
- MATH3280 Mathematical Modeling I

And any other level 3 Mathematics courses

The Mathematics Minor

A minor in Mathematics requires:

Eight (8) credits in any Level II Mathematics courses and
Eight (8) credits in any Level III Mathematics courses

*Please see course listing
MATHEMATICS WITH EDUCATION
with
Initial Teacher Training

YEAR 1

Semester 1

Mathematics Courses

M10A/MATH1140 Basic Introductory Mathematics 6 credits
MATH1180 Engineering Mathematics I 6 credits

Education Courses

ED10T/EDTL1020 Introduction to Teaching and Learning 3 credits
ED10C/EDPS1003 Psychological Issues in the Classroom 3 credits

Core

ED20Y/EDTK2025 Introduction to Computer Technology in Education 3 credits

University Foundation Courses

FD10A/FOUN1001 English for Academic Purposes
or
FD14A/FOUN1401 Writing in the Disciplines
and
FD13A/FOUN1301 Law, Governance, Economy & Society
and
FD11A/FOUN1101 Caribbean Civilization 3 credits

Semester 2

Mathematics Courses

M10B/MATH1150 Functions of Real Variables 6 credits
M10C Mathematics for Pure and Applied Sciences 6 credits

Education Courses

ED10U/EDTL1021 Planning for Teaching 3 credits

University Foundation Courses

and
FD10A/FOUN1001 English for Academic Purposes
and
FD14A/FOUN1401 Writing in the Disciplines
or
FD13A/FOUN1301 Law, Governance, Economy & Society
or
FD11A/FOUN1101 Caribbean Civilization 3 credits
### YEAR 2

#### Semester 1

**Mathematics Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>M20B/MATH2110</td>
<td>Linear Algebra</td>
<td>4 credits</td>
</tr>
<tr>
<td>M21Q/MATH2125</td>
<td>Introduction to Mathematical Analysis</td>
<td>4 credits</td>
</tr>
</tbody>
</table>

**Education Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED22M/EDMC2213</td>
<td>Children Learning Mathematics</td>
<td>3 credits</td>
</tr>
<tr>
<td>ED22N/EDMC2214</td>
<td>The Nature and Scope of Mathematics</td>
<td>3 credits</td>
</tr>
<tr>
<td>ED20U/EDTL2021</td>
<td>School Based Experience I</td>
<td>3 credits</td>
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</table>

**Core**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED20M/EDCU2013</td>
<td>Introduction to Curriculum Studies</td>
<td>3 credits</td>
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<td></td>
<td>or</td>
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</tr>
<tr>
<td>ED30D/EDTK3004</td>
<td>Educational Technology</td>
<td>3 credits</td>
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</table>

**University Foundation Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>FD10A/FOUN1001</td>
<td>English for Academic Purposes</td>
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</tr>
<tr>
<td></td>
<td>or</td>
<td></td>
</tr>
<tr>
<td>FD14A/FOUN1401</td>
<td>Writing in the Disciplines</td>
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</tr>
<tr>
<td></td>
<td>and</td>
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</tr>
<tr>
<td>FD13A/FOUN1301</td>
<td>Law, Governance, Economy &amp; Society</td>
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</tr>
<tr>
<td></td>
<td>and</td>
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</tr>
<tr>
<td>FD11A/FOUN1101</td>
<td>Caribbean Civilization</td>
<td>3 credits</td>
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#### Semester 2

**Mathematics Courses**

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>M20A/MATH2100</td>
<td>Abstract Algebra</td>
<td>4 credits</td>
</tr>
<tr>
<td>M21B/MATH2160</td>
<td>Analysis and Mathematical Methods II</td>
<td>4 credits</td>
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</table>

**Education Courses**

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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED22P/EDMA2216</td>
<td>Analysis &amp; Teaching of Mathematics</td>
<td>3 credits</td>
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</table>

**University Foundation Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>FD10A/FOUN1001</td>
<td>English for Academic Purposes</td>
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<td>or</td>
<td></td>
</tr>
<tr>
<td>FD14A/FOUN1401</td>
<td>Writing in the Disciplines</td>
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</tr>
<tr>
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<td>and</td>
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<tr>
<td>FD13A/FOUN1301</td>
<td>Law, Governance, Economy &amp; Society</td>
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</tbody>
</table>
and

FD11A/FOUN1101 Caribbean Civilization 3 credits

YEAR 3

Semester 1

Mathematics Courses

Two Level II or III Mathematics Courses * * 8 credits

Education Courses

ED32F/EDMA3206 Investigations and Problem Solving 3 credits
ED32Q/EDMA3217 Pedagogical Issues in the Teaching of Mathematics 3 credits
ED30Q/EDTL3017 School Based Experience II 3 credits

University Foundation Courses

FD10A/FOUN1001 English for Academic Purposes
or
FD14A/FOUN1401 Writing in the Disciplines
and
FD13A/FOUN1301 Law, Governance, Economy & Society
and
FD11A/FOUN1101 Caribbean Civilization 3 credits

Semester 2

Mathematics Courses

Two Level II or III Mathematics Courses * * 8 credits

Education Courses

ED32E/EDME3205 Teaching Mathematics in Grades 3 credits
ED30S/EDRS3019 Report 3 credits

University Foundation Courses

FD10A/FOUN1001 English for Academic Purposes
or
FD14A/FOUN1401 Writing in the Disciplines
and
FD13A/FOUN1301 Law, Governance, Economy & Society
and
FD11A/FOUN1101 Caribbean Civilization 3 credits
**TWO OF THE FOUR MATHS CONTENT COURSES MUST BE AT LEVEL 3**

**Summary of credits:**

<table>
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<tr>
<th>Course Type</th>
<th>Credits</th>
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<tbody>
<tr>
<td>Education Courses</td>
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<tr>
<td>Mathematics courses</td>
<td>56</td>
</tr>
<tr>
<td>Core</td>
<td>6</td>
</tr>
<tr>
<td>University Foundation courses (FD10A and 2 others)</td>
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<tr>
<td><strong>TOTAL</strong></td>
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**MATHEMATICS WITH EDUCATION**

**Teacher Trained**

**YEAR 1**

**Semester 1**

*Mathematics Courses*

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>M10A/MATH1140</td>
<td>Basic Introductory Mathematics</td>
<td>6</td>
</tr>
<tr>
<td>MATH1180</td>
<td>Engineering Mathematics I</td>
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</tbody>
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*Education Courses*

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
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<td>Children Learning Mathematics</td>
<td>3</td>
</tr>
<tr>
<td>ED22N/EDMC2214</td>
<td>The Nature and Scope of Mathematics</td>
<td>3</td>
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</tbody>
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*Core*

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>ED20Y/EDTK2025</td>
<td>Introduction to Computer Technology in Education</td>
<td>3</td>
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*University Foundation Courses*

<table>
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<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
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<tr>
<td>FD14A/FOUN1401</td>
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<tr>
<td>and</td>
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<tr>
<td>FD13A/FOUN1301</td>
<td>Law, Governance, Economy &amp; Society</td>
<td></td>
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<tr>
<td>and</td>
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<tr>
<td>FD11A/FOUN1101</td>
<td>Caribbean Civilization</td>
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**Semester 2**

*Mathematics Courses*

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<tbody>
<tr>
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<td>Functions of Real Variables</td>
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<td>M10C</td>
<td>Mathematics for Pure and Applied</td>
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<td>Sciences</td>
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<tr>
<td><strong>Education Courses</strong></td>
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<tr>
<td>ED22P/EDMA2216</td>
<td>Analysis and Teaching of Mathematics</td>
<td>3 credits</td>
</tr>
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<td><strong>University Foundation Courses</strong></td>
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</tr>
<tr>
<td>FD10A/FOUN1001</td>
<td>English for Academic Purposes</td>
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<td>or</td>
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<td>FD14A/FOUN1401</td>
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<tr>
<td>FD13A/FOUN1301</td>
<td>Law, Governance, Economy &amp; Society</td>
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<tr>
<td>and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FD11A/FOUN1101</td>
<td>Caribbean Civilization</td>
<td>3 credits</td>
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</table>

**YEAR 2**

**Semester 1**

<table>
<thead>
<tr>
<th>Mathematics Courses</th>
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<tbody>
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<td>M20B/MATH2110</td>
<td>Linear Algebra</td>
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<tr>
<td>M21Q/MATH2125</td>
<td>Introduction to Mathematical Analysis</td>
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<tbody>
<tr>
<td>ED32F/EDMA3206</td>
<td>Investigations and Problem Solving</td>
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<tr>
<td>ED32Q/EDMA3217</td>
<td>Pedagogical Issues in the Teaching of Mathematics</td>
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**Core**

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<tr>
<td>ED20M/EDCU2013</td>
<td>Introduction to Curriculum Studies</td>
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<td>ED30D/EDTK3004</td>
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**University Foundation Courses**

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Semester 2

**Mathematics Courses**

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<tr>
<td>M21B/MATH2160</td>
<td>Analysis and Mathematical Methods II</td>
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**Education Courses**

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YEAR 3

Semester 1

**Mathematics Courses**

Two Level II or III Mathematics Courses **8 credits**

**Education Courses**

<table>
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<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<td>Caribbean Civilization</td>
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Semester 2

Mathematics Courses

Two Level II or III Mathematics Courses ** 8 credits

Education Courses

ED30S/EDRS3019 Report 3 credits

University Foundation Courses

FD10A/FOUN1001 English for Academic Purposes or
FD14A/FOUN1401 Writing in the Disciplines and
FD13A/FOUN1301 Law, Governance, Economy & Society and
FD11A/FOUN1101 Caribbean Civilization 3 credits

**TWO OF THE FOUR MATHS CONTENT COURSES MUST BE AT LEVEL 3

Summary of credits:

Education Courses 27
Mathematics Courses 56
Core 6
University Foundation courses (FD10A and 2 others) 9
TOTAL 98

COURSE DESCRIPTIONS

PRELIMINARY COURSES

Throughout the preliminary sequence, topics will be treated with a minimum of rigour, but with an emphasis on the understanding of the concepts involved.

M08B/MATH0100  PRE-CALCULUS
(6 P-Credits) Semester 1 Level 0
Pre-requisite: CSEC Mathematics or equivalent

Syllabus: Algebra: Real numbers, surds; complex numbers; linear, quadratic, and polynomial equations; inequalities; functions and their graphs; transformations and periodic functions; inverse functions; logarithms and exponentials.

Trigonometry: The six trigonometric functions and their interrelations; the addition formulas; the double- and half-angle formulas; trigonometric identities; the inverse trigonometric functions; the solution of triangles.

Evaluation: One 3-hour paper 70%
Two Midterm Exams 30%

M08C/MATH0110 CALCULUS AND ANALYTICAL GEOMETRY
(6 P-Credits) Semester 2 Level 0

Pre-requisite: CSEC Mathematics or equivalent

Syllabus: Function theory: limits, continuity; implicitly defined functions; review of inverse function theory;

Differentiation: Definition of the derivative, examples; the derivative of a sum, difference, product, and quotient of two functions; the chain rule; derivatives of polynomials, the trigonometric functions, logs, exponentials, and the inverse trigonometric functions; higher-order derivatives; first-order separable differential equations.

Applications of the derivative: Local maxima and minima; the second-derivative test; global maxima and minima; maximization on a closed interval; curve sketching.

The Definite Integral: Definition of the integral, examples; the Fundamental Theorem of Calculus; antiderivatives; u-du substitutions; integration by parts; changes of variable for the definite integral.

Applications of the integral: Volumes by cross sections and cylindrical shells; arc-length; surface areas of revolution.

Evaluation: One 3-hour paper 70%
Two Midterm Exams 30%

Successful completion of M08B/MATH0100 and M08C/MATH0110 is not sufficient for entry to the BSc Degree programme in Engineering. Students can apply for a transfer to the Faculty of Engineering on the successful completion of M10A/MATH1140 and M10B/MATH1150.
LEVEL I COURSES

M10A/MATH1140  BASIC INTRODUCTORY MATHEMATICS  
(6 credits)  Semester 1  Level I 

Pre-requisites:  CAPE or GCE A-Level Mathematics, or M08B/MATH0100 and M08C/MATH0110, or equivalent.

Syllabus:  Logic: Elementary set theory; basic concepts in logic, logical arguments and proofs.

Algebra: Binary operations; relations; functions; injective, bijective, and invertible functions; 

Real numbers: The natural numbers; induction; the axioms of the real number system; solving inequalities. 

Complex numbers: Complex arithmetic, the polar form of a complex number; Argand diagrams; powers and roots of a complex number.

Vectors, Matrices, and Linear Algebra: Vectors in 2 and 3 dimensions; vector equations of lines and planes; dot products, cross products; solutions of systems of linear equations, the Gaussian elimination algorithm; matrices and matrix algebra; determinants, computing determinants.

Evaluation:  One 3-hour paper  60% 
Two Midterm Exams  40%

M10B/MATH1150  FUNCTIONS OF REAL VARIABLES  
(6 credits)  Semester 2  Level I 

Pre-requisites:  CAPE or GCE A-Level Mathematics, or M08B/MATH0100 and M08C/MATH0110 or equivalent.

Syllabus:  Sequences and series: criteria for convergence; techniques of integration, the Fundamental Theorem of Calculus; properties of differentiable functions; Taylor series; ordinary differential equations; an introduction to partial derivatives; parametric representation of curves.

Evaluation:  One 3-hour paper  60% 
Two Midterm Exams  40%

Both M10A/MATH1140 and M10A/MATH1150 must be successfully completed before the student can proceed to Part II Mathematics courses.
### M10C  MATHEMATICS FOR PURE AND APPLIED SCIENCES
(6 credits)  Semester 2  Level I

**Pre-requisite:** CAPE or GCE A-Level Mathematics, or M08B/MATH0100 and M08C/MATH0110, or equivalent

**Syllabus:**
One and two-variable calculus, convergence of series; solutions of ordinary differential equations; elementary vector analysis in $\mathbb{R}^3$; coordinates Systems in $\mathbb{R}^2$ and $\mathbb{R}^3$

**Evaluation:**
- One 3-hour paper 85%
- In-course test 15%

### MATH 1180  ENGINEERING MATHEMATICS I
(3 credits)  Semester 1  Level I

**Pre-requisite:** CAPE or GCE A-Level Mathematics, or M08B/MATH0100 and M08C/MATH0110, or equivalent

**Syllabus:**
- Calculus and Algebra -- functions of one variable: limits, continuity, differentiation, integration, mean value theorems; Taylor and Maclaurin expansions. Functions of two variables.

**Evaluation:**
- One 2-hour paper 75%
- Two Midterm Exams 25%

This course is designed for students majoring in Electronics Engineering only.

### LEVEL II COURSES

### M20A/MATH2100  ABSTRACT ALGEBRA
(4 credits)  Semester 2  Level II

**Pre-requisites:** M10A/MATH1140/MATH1140, M10B/MATH1150

**Syllabus:**
- Elements of set theory: elements of proof theory, relations and functions; groups, including finite permutation groups; rings and the Euclidean algorithm; homomorphisms; fields.
<table>
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<tr>
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<td>4</td>
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<td>ANALYSIS AND MATHEMATICAL METHODS II</td>
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<td>II</td>
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<td>M21Q/MATH2125</td>
<td>INTRODUCTION TO MATHEMATICAL ANALYSIS</td>
<td>4</td>
<td>1</td>
<td>II</td>
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### M20B/MATH2110 LINEAR ALGEBRA

- **Semester 1**
- **Level II**
- **Pre-requisites:** M10A/MATH1140, M10B/MATH1150
- **Syllabus:** Matrices: rank and nullity; vector spaces and bases; linear transformations; determinants; inner product spaces; eigenvalues and eigenvectors.
- **Evaluation:**
  - One 2-hour written paper 80%
  - One in-course test 20%

### M21B/MATH2160 ANALYSIS AND MATHEMATICAL METHODS II

- **Semester 2**
- **Level II**
- **Pre-requisite:** M10A/MATH1140, M10B/MATH1150
- **Syllabus:** Ordinary linear differential equations: Existence and uniqueness theorems (no proofs), Wronskians; solution in series for first and second order non-singular and regular singular equations; methods of Frobenius.
  - Fourier Series: two-dimensional separable linear partial differential equations; solutions by separation of variables and Fourier series.
  - Functions of a Single Complex Variable: Continuity, differentiability, Cauchy-Riemann equations; analyticity, power series; Cauchy's Theorem and applications to evaluation of integrals.
- **Evaluation:**
  - One 2-hour written paper 80%
  - One in-course test 20%

### M21Q/MATH2125 INTRODUCTION TO MATHEMATICAL ANALYSIS

- **Semester 1**
- **Level II**
- **Pre-requisites:** M10A/MATH1140/MATH1140, M10B/MATH1150
- **Syllabus:** Sequences: Convergence, limit theorems; monotone sequences; Cauchy sequences.
  - Continuity: Limits and limit laws; continuity; the intermediate-
value theorem; uniform continuity.

Differentiability: The derivative and its properties; Rolle’s theorem, the Mean-Value theorem.

Integration: Introduction to the theory of the Riemann integral; Riemann sums; the Fundamental theorem of Calculus; improper integrals; functions defined by integrals.

Series: Comparison, ratio, root, etc., tests; absolute convergence; alternating series; Cauchy criterion for convergence.

Series of functions: Uniform convergence of sequences and series of functions; convergence of power series; Abel’s and Weierstrass’s tests; functions defined by power series; Taylor series.

**Evaluation:**
- One 2-hour written paper 60%
- Two Midterm Exams 20%
- Five Written Assignments 20%

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**MATH2300**  
**INTRODUCTION TO ORDINARY DIFFERENTIAL EQUATIONS**  
(4 credits) Semester 2 Level II

**Pre-requisites:** M10A/MATH1140, M10B/MATH1150

**Syllabus:** Differential equations and classifications - First order differential equations – The existence and uniqueness theorem - Second and higher order differential equations - Power series solutions - Legendre polynomials – Bessel functions - Numerical methods.

**Evaluation:**
- One 2-hour written paper 60%
- Two Midterm Exams 20%
- Five Written Assignments 20%

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**MATH2301**  
**MATHEMATICAL METHODS**  
(4 credits) Semester 2 Level II

**Pre-requisites:** M10A/MATH1140, M10B/MATH1150

**Syllabus:** Fourier series - Vector Calculus - Laplace transforms – Fourier transforms - Special functions.
M25A/MATH2140  PROBABILITY THEORY
(4 credits) Semester 1 Level II
Pre-requisite: M10A/MATH1140, M10B/MATH1150
Syllabus: Basic probability theory: Laws of probability, conditional probability, independence, Bayes formula, random variables, discrete and continuous distributions, expectations, moments, moment generating functions, functions of random variables.

Special distributions: binomial, geometric, negative binomial, Poisson, hypergeometric, uniform, exponential, gamma, normal, Laws of large numbers, the Central Limit Theorem.

Evaluation: One 2-hour written paper 80%
One in-course test 20%

M25B/MATH2150  STATISTICAL INFERENCE
(4 credits) Semester 2 Level II
Pre-requisite: M25A/MATH2140
Syllabus: Sampling distributions including $\chi^2$, $t$ and $F$; order statistics; estimation of parameters, likelihood, sufficiency, significance tests, simple linear regression and correlation; analysis of variance; non-parametric procedures, elementary principles of experimental design.

Evaluation: One 2-hour written paper 80%
One in-course test 20%

M27A/MATH2210  MATHEMATICS OF FINANCE
(4 credits) Semester 1 Level II
Pre-requisites: M10A/MATH1140 and M10B/MATH1150 This course is available only to final-year students or those in the Actuarial Science Option.
Syllabus: Introduction to actuarial science; measurement of interest; solutions of problems in interest, basic annuities; more general annuities, yield rates, amortization schedules and sinking funds, bonds and other securities, practical
applications.

Evaluation:  
- One 2-hour written paper 80%
- Course work (or in-course test) 20%

**M27B/MATH2320  INTRODUCTION TO ACTUARIAL MATHEMATICS**  
(4 credits)  
Semester 2  
Level II

Pre-requisites:  
M21Q/MATH2125(which replaces M21A/MATH2120),  
M25A/MATH2140 and M27A/MATH2210

Syllabus:  
Survival distributions and life tables, utility theory, life insurance, life annuities, commutation functions, net premiums and premium reserves, introduction to multiple life functions.

Evaluation:  
- One 2-hour written paper 80%
- Course work (or in-course test) 20%

**MATH 2230  ENGINEERING MATHEMATICS II**  
(3 credits)  
Semester I  
Level II

Pre-requisite:  
MATH 1180

Syllabus:  

Evaluation:  
- One 2-hour paper 75%
- Two Midterm Exams 25%

This course is designed for students majoring in Electronics Engineering only.

**M30B/MATH3350  APPLIED ALGEBRA II**  
(4 credits)  
Semester 2  
Level III

Pre-requisite:  
M20A/MATH2100

Syllabus:  
Finite fields, shift registers, algebraic coding theory.
Evaluation: One 2-hour written paper 80%
One in-course test 20%

M30Q/MATH3360  MATRIX THEORY
(4 credits) Semester 1 Level III
Pre-requisites: M20A/MATH2100, M20B/MATH2110
Syllabus: Projections in R^n and C^n; the adjoint of a matrix; special classes of matrices (Hermitian, positive definite, normal and unitary); polynomials of matrices; the Jordan canonical form; the singular value decomposition.
Evaluation: One 2-hour paper 80%
One in-course test 20%

M31E/MATH3341  APPLIED STATISTICS
(4 credits) Semester 1 Level III
Pre-requisites: M20B/MATH2110, M25A/MATH2140 and M25B/MATH2150
Syllabus: Study is continued on the applied aspects of M25B/MATH2150 such as analysis of variance, regression analysis, design of experiments and categorical data analysis, time series analysis, stochastic processes and decision theory.
Evaluation: One 2-hour written paper 80%
Course work (or in-course test) 20%

M32A/MATH3120  NUMERICAL ANALYSIS
(4 credits) Semester 2 Level III
Pre-requisites: M21Q/MATH2125
Syllabus: Types of error, finite differences and interpolation, numerical evaluation and integrals, numerical solution of differential equations; roots of equations; linear systems and matrices; construction of algorithms for computation.
Evaluation: One 2-hour written paper 70%
One in-course test 30%

M32B/MATH3130  OPTIMIZATION THEORY
(4 credits) Semester 1 Level III
Pre-requisites: M20B/MATH2110

Note: cannot be credited with EC337 or its equivalent

Syllabus: Linear programming and duality; mathematical Modeling, mathematical structure of the primal programme; equivalent linear programmes; the simplex tableau and revised simplex techniques, dual linear programmes; complimentary slackness, the duality theorem; networks; computations involving computers and software; sensitivity analysis.

Evaluation: One 2-hour written paper 70%
Two in-course tests 30%

M32C/MATH3370 TOPICS IN OPERATIONS RESEARCH
(4 credits) Semester I Level III

Pre-requisite: M21Q/MATH2125

Note: cannot be credited with EC34L/ECON3037 or EC34M/ECON3038 or its equivalent

Syllabus: Theory of inventory, replacement, sequencing, queuing theory, decision theory and theory of games, simulation, discussion and use of computer software.

Evaluation: One 2-hour written paper 80%
One Midterm Exam 20%

M32Q/MATH3340 SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS
(4 credits) Semester I Level III

Pre-requisite: M21Q/MATH2125, M20B/MATH2110, M21B/MATH2160

Syllabus: First order differential equations, separable and homogeneous types; Pfaffian forms in 2 variables; Bernoulli and Riccati types; existence and uniqueness theorems for the initial-value problem; higher-order equations; Theory of the Wronskian and linear independence of solutions of higher order linear equations. The Euler equation; First order linear systems; Matrix formulation of first order systems for both normal and defective matricies. Fundamental matricies, matrix valued functions and computation of eA; The Laplace Transform;

**Evaluation:**
- One 2-hour written paper: 80%
- Course work: 20%

**M33A / MATH FLUID DYNAMICS I**
(4 credits) Semester 2 Level III

**Pre-requisites:**
MATH 2120 (M 21A) or M21Q/MATH2125 and MATH 2160 (M 21B) or MATH 2300

**Syllabus:**
Vector analysis: gradient, divergence, curl, Orthogonal curvilinear coordinates: Cartesian, Cylindrical and spherical. Line, surface, volume integrals, Introduction to tensors, kinematics and equations of motion for inviscid fluids, simple inviscid fluids, viscous flows

**Evaluation:**
- One 2-hour paper: 75%
- Course work: 25%

**M33D/ MATH 3280 INTRODUCTION TO MATHEMATICAL MODELLING I**
(4 credits) Semester 2 Level III

**Pre-requisites:**
MATH2300 or M21B/MATH2160, M21Q/MATH2125

**Syllabus:**
Idea of modelling real life situations using Mathematics. Theory of ordinary differential equations (eigenvalues and eigenvectors) and the linear stability. Application to Medicine (e.g. testing of diabetics). Predator-Prey models (struggle for survival between two species). Epidemiology (e.g. model of the spread of gonorrhoea). A theory of war.

**Evaluation:**
- One 2-hour paper: 75%
- Course work: 25%

**M33Q/MATH3380 ELEMENTARY NUMBER THEORY**
(4 credits) Semester 1 Level III

**Prerequisite:**
M20A/MATH2100, M20B/MATH2110, M21Q/MATH2125

**Syllabus:**
Prime numbers; Unique Factorization in $\mathbb{Z}$ and $k[x]$; arithmetic functions, m, d, w and lattice points;
congruence; chinese remainder theorem; quadratic reciprocity law; algebraic numbers and algebraic integers; transcendental numbers; finite fields; diophantine equations; distribution of prime numbers; Chebyshev Theorem; the Riemann-Zeta Function.

Evaluation: One 2-hour written paper 70%
Two in-course tests 30%

**M33R/MATH3490**  
**COMPLEX ANALYSIS**  
(4 credits) Semester 1 Level III

Pre-requisites: M21Q/MATH2125

Syllabus: Differentiability, analyticity; contour integrals, Cauchy's Theorem and its consequences; Taylor series, Laurent series; residue calculus.

Evaluation: One 2-hour paper 80%
One in-course test 20%

**MATH3700**  
**INTRODUCTION TO PARTIAL DIFFERENTIAL EQUATIONS**  
(4 credits) Semester 1 Level III

Pre-requisites: (MATH2300 and MATH2301) or (M21B/MATH2160)


Evaluation: One 2-hour written paper 60%
Two Midterm Exams 20%
Five Written Assignments 20%

**MATH3701**  
**PROBABILITY AND STOCHASTIC MODELING**  
(4 credits) Semester 1 Level III

Pre-requisites: M25A/MATH2140

Syllabus: Stochastic processes: definition and classification. Modelling
with stochastic processes. Markov chains and applications, Theoretical aspects of stochastic simulation, Counting processes and applications, Queues and applications, Practical aspects of stochastic simulation.

Evaluation: One 2-hour paper 60%
One in-course test 20%
One group project 20%

M34Q/MATH3310 LIFE CONTINGENCIES
(4 credits) Semester 1 Level III

Pre-requisites: M25A/MATH2140, M25B/MATH2150, M27B/MATH2320

Syllabus: Multiple life functions, multiple decrement model; insurance models including expenses; nonforfeiture, benefits and dividends; valuation theory for pension plans.

Evaluation: One 2-hour paper 80%
One in-course test 20%

M34R/MATH3320 RISK THEORY
(4 credits) Semester 2 Level III

Pre-requisites: M21Q/MATH2125, M21B/MATH2160 or MATH2300, M25A/MATH2140, M25B/MATH2150

Syllabus: Review of earlier statistical work; individual risk theory; other frequency distributors; mixed distributions; stoploss insurance; ruin theory.

Evaluation: One 2-hour paper 80%
One in-course test 20%

M35R/MATH3321 PRINCIPLES OF ASSET/LIABILITY MANAGEMENT FOR ACTUARIAL SCIENCE
(4 credits) Semester 2 Level III

Pre-requisites: M27AMATH2210, MS28D/MGMT2023, MS38H/MGMT3048

Credits from this course cannot count towards the 16 non-core credits required for a major in Mathematics

Syllabus: Review of Macroeconomics; characteristics of the various types of investments used to fund financial security programmes; traditional techniques of financial analysis used in selecting and managing investment portfolios.
The course builds on the material in courses MS28D and MS38H/MGMT3048, introducing further tools and techniques of asset/liability management, general product design, as well as issues of pricing and valuation and asset management.

Evaluation:
- One 2-hour written paper 80%
- Course work (or in-course test) 20%

**M36Q/MATH3390  METRIC SPACES AND TOPOLOGY**
(4 credits)  Semester 2  Level III

Pre-requisites: M21Q/MATH2125, M20B/MATH2110

Syllabus: Metric spaces, examples; continuity; completeness; topological spaces; compactness; Hausdorffness; connectedness.

Evaluation:
- One 2-hour paper 72%
- One in-course test 28%
# DEPARTMENT OF PHYSICS

## LIST OF UNDERGRADUATE COURSES

<table>
<thead>
<tr>
<th>CODES</th>
<th>TITLES</th>
<th>CREDIT</th>
<th>SEMESTER</th>
<th>PREREQUISITES</th>
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<td>PRELIMINARY PHYSICS A</td>
<td>6-P</td>
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<td>CXC/CSEC Physics or GCE &quot;O&quot; Level Physics</td>
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<td>6-P</td>
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<td>CXC/CSEC Physics or GCE &quot;O&quot; Level Physics</td>
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<td>INTRODUCTORY PHYSICS A</td>
<td>6</td>
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<td>CAPE/A-Level Physics or PHYS0410 and PHYS0420 or CXC Physics with CAPE/ A-Level Maths or MATH0100 and MATH0110</td>
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<td>INTRODUCTION TO ELECTRONICS</td>
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<td>2</td>
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<td>PRACTICES IN BASIC ELECTRONICS</td>
<td>3</td>
<td>2</td>
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<td><strong>LEVEL 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P23E/PHYS2350</td>
<td>MODERN PHYSICS I</td>
<td>4</td>
<td>1</td>
<td>PHYS1410 and PHYS1420 and MATH0100, MATH0110 or Equivalent</td>
</tr>
<tr>
<td>P23I/PHYS2385</td>
<td>ELECTRICITY, MAGNETISM AND OPTICS</td>
<td>4</td>
<td>2</td>
<td>PHYS1410 and PHYS1420 and MATH0100, MATH0110or Equivalent</td>
</tr>
<tr>
<td>P23J/PHYS2395</td>
<td>COMPUTER APPLICATIONS IN PHYSICS</td>
<td>3</td>
<td>2</td>
<td>PHYS1410 and PHYS1420 and MATH0100, MATH0110 or Equivalent</td>
</tr>
<tr>
<td>ELET2405</td>
<td>PRACTICES IN ELECTRONICS I</td>
<td>3</td>
<td>1</td>
<td>ELET1400 and ELET1405</td>
</tr>
<tr>
<td>ELET2415</td>
<td>PRACTICES IN ELECTRONICS II</td>
<td>3</td>
<td>2</td>
<td>ELET1400 and ELET1405</td>
</tr>
<tr>
<td>P24F/ELET2460</td>
<td>SIGNALS AND SYSTEMS</td>
<td>3</td>
<td>1</td>
<td>PHYS1410 and PHYS1420 and MATH0100, MATH0110 or Equivalent</td>
</tr>
<tr>
<td>P24G/ELET2470</td>
<td>ELECTRICAL CIRCUIT ANALYSIS</td>
<td>3</td>
<td>2</td>
<td>PHYS1410 and PHYS1420 and MATH0100, MATH0110 or Equivalent</td>
</tr>
<tr>
<td>P24H/ELET2480</td>
<td>MODERN COMMUNICATIONS SYSTEMS</td>
<td>3</td>
<td>1</td>
<td>PHYS1410 and PHYS1420 and MATH0100, MATH0110 or Equivalent</td>
</tr>
<tr>
<td>P24J/ELET2410</td>
<td>ANALOG ELECTRONICS</td>
<td>3</td>
<td>2</td>
<td>PHYS1410 and PHYS1420 and MATH0100, MATH0110or Equivalent</td>
</tr>
<tr>
<td>P24K/ELET2430</td>
<td>DIGITAL ELECTRONICS</td>
<td>3</td>
<td>1</td>
<td>PHYS1410 and PHYS1420 or COMP1110 and COMP1120</td>
</tr>
<tr>
<td>ELET2450</td>
<td>EMBEDDED SYSTEMS</td>
<td>3</td>
<td>2</td>
<td>ELET2430 or COMP2120</td>
</tr>
<tr>
<td>P24L/ELET2420</td>
<td>SOLID STATE ELECTRONIC DEVICES</td>
<td>3</td>
<td>2</td>
<td>PHYS1410 and PHYS1420 and MATH0100, MATH0110 or Equivalent</td>
</tr>
<tr>
<td>P25F/PHYS2560</td>
<td>MATERIALS SCIENCE I</td>
<td>4</td>
<td>1</td>
<td>PHYS1410 and PHYS1420 and MATH0100, MATH0110 or Equivalent</td>
</tr>
<tr>
<td>P26A/PHYS2670</td>
<td>FLUID DYNAMICS</td>
<td>4</td>
<td>1</td>
<td>PHYS1410 and PHYS1420 and MATH0100, MATH0110 or Equivalent</td>
</tr>
<tr>
<td>P29A/PHYS2290</td>
<td>INTRODUCTION TO MEDICAL PHYSICS AND BIOENGINEERING</td>
<td>4</td>
<td>1</td>
<td>PHYS1410 and PHYS1420 and MATH0100, MATH0110 or Equivalent</td>
</tr>
<tr>
<td><strong>LEVEL 3</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P33E/PHYS3350</td>
<td>MODERN PHYSICS II</td>
<td>4</td>
<td>2</td>
<td>PHYS2350</td>
</tr>
<tr>
<td>P33K/PHYS3385</td>
<td>ELECTROMAGNETISM</td>
<td>4</td>
<td>2</td>
<td>ELET2480 or PHYS2385</td>
</tr>
<tr>
<td>P33L/PHYS3395</td>
<td>ASTRONOMY &amp; COSMOLOGY</td>
<td>4</td>
<td>1</td>
<td>PHYS1410 and PHYS1420 and MATH0100, MATH0110 or Equivalent</td>
</tr>
<tr>
<td>P33M/PHYS3399</td>
<td>RESEARCH PROJECT (NON ELECTRONICS)</td>
<td>4</td>
<td>1 or 2</td>
<td>HOD Permission</td>
</tr>
<tr>
<td>P34F/ELET3460</td>
<td>DIGITAL SIGNAL PROCESSING</td>
<td>4</td>
<td>2</td>
<td>ELET2460</td>
</tr>
<tr>
<td>P34G/ELET3480</td>
<td>WIRELESS COMMUNICATION SYSTEMS</td>
<td>4</td>
<td>2</td>
<td>ELET2480</td>
</tr>
<tr>
<td>P34H/ELET3150</td>
<td>DIGITAL COMMUNICATIONS</td>
<td>4</td>
<td>1</td>
<td>ELET2460 and ELET2480</td>
</tr>
<tr>
<td>CODES</td>
<td>TITLES</td>
<td>CREDIT</td>
<td>SEMESTER</td>
<td>PREREQUISITES</td>
</tr>
<tr>
<td>------------</td>
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<td>--------</td>
<td>----------</td>
<td>---------------------------------------------------------</td>
</tr>
<tr>
<td>P34K/ ELET3420</td>
<td>MICROPROCESSORS</td>
<td>4</td>
<td>1</td>
<td>ELET2430 or COMP2120</td>
</tr>
<tr>
<td>P34L/ ELET3412</td>
<td>INSTRUMENTATION</td>
<td>4</td>
<td>2</td>
<td>ELET2450</td>
</tr>
<tr>
<td>P34P/ ELET3490</td>
<td>ELECTRONICS PROJECT</td>
<td>4</td>
<td>1 and 2</td>
<td>ELET2410 or ELET2430 or ELET2450</td>
</tr>
<tr>
<td>P36E/ ELET3610</td>
<td>INTEGRATING ALTERNATIVE ENERGY</td>
<td>4</td>
<td>2</td>
<td>ELET2420; Co-requisites: PHYS3670 and PHYS3680</td>
</tr>
<tr>
<td>P35F/ PHYS3560</td>
<td>MATERIALS SCIENCE II</td>
<td>4</td>
<td>2</td>
<td>PHYS2560</td>
</tr>
<tr>
<td>P35G/ PHYS3570</td>
<td>MATERIALS SCIENCE III</td>
<td>4</td>
<td>2</td>
<td>PHYS2560</td>
</tr>
<tr>
<td>P36C/ PHYS3670</td>
<td>SOLAR POWER</td>
<td>4</td>
<td>1</td>
<td>PHYS3660</td>
</tr>
<tr>
<td>P36D/ PHYS3680</td>
<td>WIND AND HYDRO POWER</td>
<td>4</td>
<td>1</td>
<td>PHYS2670 and PHYS3660</td>
</tr>
<tr>
<td>P39A/ PHYS3390</td>
<td>FURTHER MEDICAL PHYSICS AND BIOENGINEERING</td>
<td>4</td>
<td>2</td>
<td>PHYS2290</td>
</tr>
<tr>
<td>PHYS3397</td>
<td>MEDICAL RADIATION PHYSICS AND IMAGING</td>
<td>4</td>
<td>2</td>
<td>PHYS2290</td>
</tr>
<tr>
<td>P36B/ PHYS3660</td>
<td>ATMOSPHERE AND CLIMATE</td>
<td>4</td>
<td>2</td>
<td>PHYS1410, PHYS1420 and MATH0100, MATH0110 or Equivalent; Co-requisite (recommended): PHYS2670</td>
</tr>
</tbody>
</table>
## Requirements for Majors and Minors

<table>
<thead>
<tr>
<th>Major</th>
<th>Minor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Core</strong></td>
<td><strong>Electives</strong></td>
</tr>
<tr>
<td><strong>General Physics</strong></td>
<td>PHYS2350, PHYS2385, PHYS2395, PHYS3350, PHYS3385</td>
</tr>
<tr>
<td></td>
<td>PHYS2560, PHYS2670, PHYS3395, PHYS3399, PHYS3660, PHYS3670</td>
</tr>
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</tr>
<tr>
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<td>PHYS2290, PHYS2350, PHYS2385, PHYS3390, PHYS3397, PHYS3399</td>
</tr>
<tr>
<td></td>
<td>PHYS2560, ELET2420, ELET2460, ELET2430, ELET3412, PHYS2395</td>
</tr>
<tr>
<td><strong>Environmental Physics</strong></td>
<td>PHYS2350, PHYS2385, PHYS2670, PHYS3660, PHYS3350</td>
</tr>
<tr>
<td></td>
<td>PHYS2350, PHYS2385, **GEO3203, PHYS2395, PHYS3385, PHYS3395, PHYS3399</td>
</tr>
<tr>
<td><strong>Alternative Energy</strong></td>
<td>*ELET3610, PHYS2670, PHYS3660, PHYS3670, PHYS3680</td>
</tr>
<tr>
<td></td>
<td>PHYS2290, PHYS2350, PHYS2385, PHYS3390, PHYS3397, PHYS3399</td>
</tr>
<tr>
<td><strong>Medical Physics</strong></td>
<td>PHYS2290, PHYS2350, PHYS2385, PHYS3390, PHYS3397, PHYS3399</td>
</tr>
<tr>
<td></td>
<td>PHYS2560, ELET2420, ELET2460, ELET2430, ELET3412, PHYS2395</td>
</tr>
<tr>
<td>Materials Science</td>
<td>PHYS2350, PHYS2385, PHYS2560, PHYS3399, PHYS3560, PHYS3570</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------------------------------------------</td>
</tr>
<tr>
<td>Electronics</td>
<td>ELET2405, ELET2415, ELET2470, ELET2430, ELET2410, ELET3405, ELET3490</td>
</tr>
</tbody>
</table>

*Note that ELET2420 is a pre-requisite for ELET3610*

**GGEO3203 - Climate Change in the Tropics may require HOD Permission**
All students desirous of registering for any level 2 ELET courses must have passes in ELET1400 and ELET1405. These are strict prerequisites for all level 2 electronics courses.

Some of the new level 3 ELET courses will not be offered in 2010/2011 and will only come on stream in the following year.

The changes to the requirement for a Major in Electronics will come into effect in 2011.

For the laboratory components of Preliminary and Level 1 courses, candidates are required to present their practical notebooks for inspection by the examiners at the end of the semester.

Candidates are required to obtain a passing grade for practical work as well as a passing grade for theory for all courses except PHYS3399/P33M and ELET3490/P34P which are projects. Candidates who do not obtain a passing grade for practical work during the semester will be required to sit a practical exam at the end of the semester. The mark obtained in the practical exam will be combined with the practical course work mark to arrive at the final practical mark.
COURSE DESCRIPTIONS

PRELIMINARY COURSES

P04A/PHYS0410  PRELIMINARY PHYSICS A
(6 P-Credits) Semester 1 Level 0

Pre-requisite: CXC/CSEC Physics or GCE "O" Level Physics

Syllabus: This is a pre-calculus course covering fundamental topics in Mechanics and Heat.

MECHANICS (24 lectures)

**Physical Quantities & Units**
Physical quantities and their units with mass, length, time and temperature as fundamental (base) quantities. The nature of physical quantities: scalars and vectors, components of a vector, addition and subtraction of vectors by means of components.

**Kinematics in One Dimension**
Definitions of displacement, speed (average and instantaneous), velocity (average and instantaneous), acceleration (average and instantaneous). Displacement-time and velocity-time graphs. Graphical interpretation of velocity and acceleration. Distance travelled as area under the velocity-time graph. Derivation of kinematic equations for constant acceleration and their application to solving problems.

**Projectile Motion**
Introduction to projectile motion as a combination of two one-dimensional motions. Derivation of range, maximum height and time of flight. Derivation of the equation for the parabolic path. Application of the equations for projectile motion.

**Forces & Newton's Laws of Motion**
Dynamics of Uniform Circular Motion
Introduction to the concept of centripetal acceleration and force. Centripetal force and motion around a curve. Satellites in circular orbits.

Work and Energy
Concepts of work and power. Kinetic and potential energies. Work-Energy theorem. Definition of conservative force. The principle of conservation of mechanical energy. Concepts of energy conversion and applications with special reference to renewable energy sources such as solar, wind, geothermal and wave.

Impulse and Momentum
Definition of impulse and linear momentum. Impulse-Momentum theorem. The principle of conservation of linear momentum including the derivation using the impulse-momentum theorem. Application to collisions.

Simple Harmonic Motion
Introduction to Hooke's law and definition of simple harmonic motion. Treatment of light spring-mass system as simple harmonic oscillator. The displacement-time graph for SHM and the application of $x = A\cos(\omega t)$ or $x = A\sin(\omega t)$ to interpret the results. Expressions for velocity, acceleration and period for SHM. Energy considerations and conservation for SHM. The simple pendulum.

HEAT (12 lectures)

Temperature and Thermometers

Evaluation:  
One 3-hour theory examination paper 70%  
Two 1-hour in-course tests or equivalent 20%  
Practical work 10%
PRELIMINARY PHYSICS B
(6 P-Credits) Semester 2 Level 0

Pre-requisite: CXC/CSEC Physics or GCE “O” Level Physics

Syllabus: This is a pre-calculus course covering fundamental topics in Electricity, Magnetism, Optics and Nuclear Physics

ELECTRICITY & MAGNETISM (22 lectures)
Definition of point charge. Coulomb's law. The electric field E. Force on a charge q in electric field E. Electric potential. Charge q traversing electric potential $\Delta V$. Definition of the electron volt. Electric potential energy. Charge q in a conducting sphere. Resulting E and V.

Capacitors. $Q = CV$. Capacitance of the parallel plate capacitor and the electric field between charged plates. Dielectrics. Energy stored in a charged capacitor and energy density in terms of E. Capacitors in series and parallel.


Logic gates and their truth tables. P-type and n-type semiconductors. Diodes.

OPTICS (9 lectures)

Angular magnification. Simple and compound microscopes their angular magnification. Astronomical and Galilean telescope and angular magnification.

NUCLEAR PHYSICS (5 lectures)

Nuclear Model of the Atom

Radioactivity

Evaluation:
One 3-hour theory examination paper 70%
Two 1-hour in-course tests or equivalent 20%
Practical work 10%

LEVEL I COURSES

P14A/PHYS1410 INTRODUCTORY PHYSICS A
(6 credits) Semester 1 Level I

Pre-requisites: CAPE/A-Level Physics or PHYS0410/P04A and PHYS0420/P04B, or CXC Physics with CAPE/A-Level Maths or MATH 0100/M08B and MATH 0110/M08C

This is a calculus-based course covering the basic laws and phenomena in Mechanics, Thermodynamics, Waves and Optics.

Syllabus:
MECHANICS (16 lectures)
Scalars and Vectors
Scalar and vector products. Vectors and their components.
Unit vectors. Vector algebra in terms of their components.

Vector Treatment of Motion
Position vector and particle trajectory. Average and instantaneous acceleration. Application to uniform circular motion. Derivation of \( \mathbf{a} = -\omega^2 \mathbf{r} \). Relative velocity.

Work and Kinetic Energy
General definition of work. Work done by a variable force.
One-dimensional analysis. Interpretation of work as area under graph of \( F \) vs. \( x \). Proof of Work-Kinetic Energy Theorem.
Conservation of Energy
Conservative forces. General definition of potential energy and examples of its calculation. Mechanical energy.

System of Particles

Rotation

Rolling

Simple Harmonic Motion
Equation of (linear) SHM in differential form and solution as x = A sin (ω t - θ).
Definition of angular SHM in terms of torque and angular displacement. Differential equation of motion and its solution. Examples such as physical pendulum (and limiting case of simple pendulum) and suspended oscillating disc.

WAVES & OPTICS (12 lectures)
Waves on a String
HEAT & THERMODYNAMICS (8 lectures)
Temperature, Heat and the First Law
Measurement of thermodynamic temperature.
Absorption of heat by solids and liquids. Molar specific heat.
Heat and work. Calculation of work done by an ideal gas at constant temperature.
Differential form of First Law of Thermodynamics and application to selected cases. Kinetic Theory of Gases
RMS speed, pressure, translational kinetic energy and temperature. Adiabatic equation of an ideal gas.

Entropy and the Second Law

Evaluation:
One 3-hour theory examination paper 70%
Two 1-hour in-course tests or equivalent 20%
Practical work 10%

P14B/PHYS1420 INTRODUCTORY PHYSICS B
(6 credits) Semester 2 Level I

Pre-requisites: CAPE/A Level Physics or PHYS0410 and PHYS0420 or CXC Physics with CAPE/A Level Maths or MATH0100 and MATH0110.

Description: This is a calculus-based course covering the basic laws and phenomena in Electricity and Magnetism and Modern Physics. It revises and expands on the CAPE Unit 2 Physics topics so as to widen students understanding and appreciation of this area of Physics.

Syllabus:
ELECTRICITY & MAGNETISM (20 lectures)

Electric Field and Potential
Electric field E due to extended charge distributions (eg. line, ring and arc).
Integral and differential expressions relating the electric potential V to the field E. Potential due to a dipole and other extended charge distributions.

Gauss's Law
Application to problems with spherical, cylindrical and rectangular symmetry.

Capacitance
Calculation of the capacitance of various capacitors.
Energy stored in a capacitor. RC circuits. Time Constant.
**Magnetism**
Magnetic force on a current carrying wire and its application to cases needing calculus treatment.
Magnetic torque on a current loop.
Magnetic moment of a current loop.
The Hall Effect. Biot-Savart Law and Ampere's Law; their application to long current-carrying wire, loop and solenoid.

**Electromagnetic Induction**
Faraday's Law and Lenz's Law.
Electromagnetic Induction and its application.
Self induction. Inductance. RL circuits.

**Electromagnetic Oscillations & Alternating Currents**
LC Oscillations; Damped Oscillations in an RLC circuit.
Alternating current. Forced Oscillation. RLC Circuits.
Power in AC circuits. The Transformer.
Introduction to the Electromagnetic wave.

**MODERN PHYSICS (16 lectures)**

**Bohr Atom**
Derivation of energy levels, blackbody radiation and quantized energy levels (qualitative).

**Wave and Corpuscles**
Wave particle duality. Photo-electric effect. Compton effect.

**Special Relativity**
Time dilation. Length contraction. Derivation of velocity transformations.
The equation $E^2 = p^2c^2 + m_0^2 c^4$ and its application.

**Particle Physics and the Big Bang**
Elementary particles; Three groups; Conservation Laws; Eightsfold way; Quarks. Fundamental interactions and their unification. The Standard model. The history of the Universe

**Evaluation:**
One 3-hour theory examination paper 70%
Two 1-hour in-course tests or equivalent 20%
Practical work 10%
ELET1400 PRACTICES IN BASIC ELECTRONICS I
(3 credits) Semester 2 Level I

Pre-requisites: CAPE/A-Level Physics or PHYS0410/P04A and PHYS0420/P04B or CSEC Physics with CAPE/A-Level Mathematics or MATH0100/M08B and MATH0110/M08C

Syllabus: ELECTRICITY AND MAGNETISM (20 Lectures)

Electric field and potential
The electric field $E$ due to extended charge distributions; Integral and differential expressions relating the electric potential $V$ to the $E$ field; Potential due to a dipole and other extended charge distributions.

Gauss’ Law
Application to problems with spherical, cylindrical and rectangular symmetry.

Capacitance
Calculation of the capacitance of various capacitors; Energy stored in a capacitor; RC circuits; Time constant.

Magnetism
Magnetic force on current-carrying wire and its application to cases needing calculus treatment; Magnetic torque on a current loop; Magnetic moment of a current loop; The Hall-Effect; Biot-Savart Law and Ampere’s Law, and their application to long current-carrying wire, loop, and solenoid.

Electromagnetic Induction
Faraday’s Law and Lenz’s Law; Electro-magnetic induction and its applications; Self Induction; Inductance; RL circuits.

Electromagnetic Oscillations and Alternating Currents
LC Oscillation; Damped oscillation in an RLC circuit; Alternating current; Forced oscillation; RLC circuits; Power in AC circuits; the Transformer; Introduction to the Electromagnetic wave.

MODERN PHYSICS (16 Lectures)

Bohr Atom
Spectral series for hydrogen, Bohr’s postulates, derivation of energy levels, blackbody radiation and quantized energy levels (qualitative).

Waves & Corpuscles
Wave-particle duality; photo-electric effect; Compton-effect; energy, momentum and wavelength of a photon, deBroglie’s equation, wave function, particle in a box.
Special Relativity
Galilean relativity; Einstein postulates; Lorentz transformation; simultaneity; time dilation; length contraction; derivation of velocity transformations, the equation $E^2 = p^2c^2 + m_0^2c^4$ and its applications.

Particle Physics and the Big Bang
Elementary particles; Three groups; Conservation Laws; Eightfold way; Quarks; Fundamental interactions and their unification; The standard model; The history of the universe.

Evaluation:
One 3-hour theory examination paper 70%
Two 1-hour in-course tests 20%
Laboratory Report 10%

ELET1405 PRACTICES IN BASIC ELECTRONICS II
(3 credits) Semester 2 Level I

Pre-requisites: CAPE/A-Level Physics or PHYS0410/P04A and PHYS0420/P04B or CSEC Physics with CAPE/A-Level Mathematics or MATH0100/M08B and MATH0110/M08C

Syllabus:
Week 1: Measuring electronic circuit parameters using oscilloscopes and multimeters.
Week 2: Determining the characteristics curve of a p-n junction diode and the half wave rectifier.
Week 3: Evaluating the operation of Full Wave rectifiers and Zener diodes on Voltage regulation
Week 4: Investigating Transistor circuits: Logic operation; LED drivers
Week 5: Semiconductor circuit design project. (in-class)
Week 6: Verifying truth tables of logic gates and combinational circuits
Week 7: Designing combinational circuit for special applications
Week 8: Digital circuit design project (in-class)
Week 9: Investigating circuit theorems
Week 10: Investigating Op Amp Circuits
Week 11: Investigating AM and FM communication circuits / systems
Week 12: Analog Circuit Design Project (in-class)

Evaluation:
Nine Laboratory reports (equal weighting) 15%
Three design projects (3 x 15%) 45%
One 2-hour final examination paper 40%
LEVEL II COURSES

P23E/PHYS2350 MODERN PHYSICS I
(4 credits) Semester 1 Level II

Pre-requisites: PHYS1410/P14A and PHYS1420/P14B and MATH0100/M08B, MATH0110/M08C or Equivalent

Syllabus: 
Quantum Mechanics (12 Lectures)
Operators & Eigenfunctions.
Sch. Equation.
Wave Function $\psi$. Meaning of $\psi$. Properties of $\psi$.
Solution of Sch. Equation: Infinite Potential Well.
Step Potential.
Potential Barrier & Tunneling.
Finite Square Well Potential Well.

Nuclear Physics (12 Lectures)
Basic Properties of the Nucleus.
Liquid Drop Model of the Nucleus.
$\alpha$ Decay & QM Tunneling.
Nuclear Reactions
Interactions of Particles with Matter
Radiation Detectors
Radioactive Dating

Evaluation:
One 2-hour Final Exam 60%
5 Surprise Quizzes 10%
2 Pre-announced Tests 10%
Practicals (6 experiments + lab test) 20%

P23I/PHYS2385 ELECTRICITY, MAGNETISM AND OPTICS
(4 credits) Semester 2 Level II

Pre-requisites: PHYS1410/P14A, PHYS1420/P14B and MATH0100/M08B, MATH0110/M08C or Equivalent

Syllabus: 
Electricity and Magnetism
Electric fields in matter.
D and P vectors
Displacement current, Integral form of charge conservation.
Magnetism in matter
H and M vectors
Maxwell’s equations in integral form.
Electromagnetic waves
The plane wave equation.
Poynting vector.
Optics
Polarization of electromagnetic waves
Temporal and spatial coherence.
Visibility of fringes
The diffraction grating.
Resolution of diffraction patterns
Fresnel diffraction and the zone plate.

Evaluation:
One 2-hour theory examination paper 70%
One 1-hour in-course test or equivalent 20%
Practical work 10%

P23J/PHYS 2395 COMPUTER APPLICATIONS IN PHYSICS
(3 credits) Semester 2 Level II
Pre-requisites: PHYS1410/P14A, PHYS1420/P14B and MATH 0100/M08B,
MATH 0110/M08Cor Equivalent

Syllabus: Consists of six sections each of which is an introduction
i. to the chosen programming environment and
language,
ii. to basic computational methods, including roots of
equations, integration and differentiation, the Taylor
series, series approximation and limits of accuracy,
iii. to topics in physics which can be readily solved by
computers including
  • Projectile Motion
  • Radioactive Decay
  • Gravity and Planetary Motion
  • Oscillations and Waves
  • Gas Laws
  
  iv. to the computational analysis of the above topics.
The above topics will require the use of the
aforementioned computational methods and an
introduction to the computational treatment of first
and second order differential equations. For some
topics the computational approach will also permit a
more realistic analysis, e.g., with the introduction of
air friction in projectile motion and 3-body
gravitational interaction,
v. to data analysis,
vi. to modelling of physical systems, such as simple
climate models, Van der Waals gas.
ELET2405  PRACTICES IN ELECTRONICS DESIGNS I  
(3 credits) Semester I Level II

Prerequisites  ELET1400 and ELET1405

Co-Requisite: Any level 2 Semester 1 Electronics or Electronics Engineering course

Syllabus:  
Design and synthesis of digital circuits and microprocessor systems using a hardware descriptive language such as VHDL. 
Verification of circuit network theorems and their applications to circuit designs for maximum power transfer and impedance matching. 
Application of circuit simulation tools (PSPICE, Workbench, Multisim) to the design and analysis of electronic circuits. 
Exploration of interface circuit designs for microcontrollers and their application to embedded system. 
Exploration of the behavior of various signals and systems using Matlab software tool.

Evaluation: One Design Project 70% 
6 Laboratory Reports 30%

ELET2415  PRACTICES IN ELECTRONICS DESIGNS II  
(3 credits) Semester I Level II

Prerequisites  ELET1400 and ELET1405

Co-Requisite: Any level 2 Semester 1 Electronics or Electronics Engineering course

Syllabus:  
Design and analysis of analogue circuits via hardware designs and software simulations; 
An interactive web-based design and analysis of a motor controller to perform a specific task. 
Application of mathematical modeling to the design of control circuits. 
Design and analyses of digital communication circuits and systems. 
The use of spectrum analyzers and oscilloscopes to analyze electrical communication signals. 
Development and verification of electrical models for semiconductor devices.
Performance analyses of semiconductor devices and circuits via simulation software (PSPICE) and hardware designs.

Evaluation: Six Laboratory reports (equal weighting) 30%
One major design project 70%

P24F/ELET2460 SIGNALS AND SYSTEMS
(3 credits) Semester 1 Level II
Pre-requisites: ELET1400 and ELET1405 and MATH0100/ M08B, MATH0110/ M08C or Equivalent


The frequency response of systems. System stability. Application to filters. State space representation of continuous time systems.

Evaluation: One 2-hour theory examination paper 60%
One 1-hour in-course test or equivalent 20%
Practical work 20%

P24G/ELET2470 ELECTRICAL CIRCUIT ANALYSIS
(3 credits) Semester 2 Level II
Pre-requisites: ELET1400 and ELET1405 and MATH0100/M08B, MATH0110/M08C or Equivalent

Syllabus: Techniques of Circuit Analysis

Response of Electrical Circuits
Natural and forced response of RL and RC circuits.
The source-free parallel RLC circuit and its properties.
Overdamping, underdamping and critical damping.
The source-free series RLC circuit and its properties.

Evaluation: One 2-hour theory examination paper 60%
One 1-hour in-course test or equivalent 20%
Practical work 20%

P24H/ELET2480 COMMUNICATIONS SYSTEMS
(3 credits) Semester 1 Level II

Pre-requisites: ELET1400 and ELET1405 and MATH0100/M08B,
MATH0110/M08C or Equivalent

Syllabus:

Noise
Noise and Distortion. Noise Temperature and Bandwidth.
Noise Factor and Noise Figure.
Signal to Noise Ratio.

Analog Modulation
Amplitude modulation (AM) and demodulation.
Single sideband systems.
Frequency modulation (FM) and phase modulation.
Carson's rule and its uses.
FM discriminators.
The Phase Locked Loop (PLL).
FM transmitters and receivers.

Digital Modulation
Sampling and Bit rates.
Bandwidth requirements.
Pulse Code Modulation (PCM).
Pulse Width Modulation (PWM).
Delta Modulation (DM).
Time Division Multiplexing.

Wireless Communication
Propagation loss in a simple wireless link.

Evaluation: One 2-hour theory examination paper 60%
One 1-hour in-course test or equivalent 20%
Practical work 20%
P24J/ELET2410  DESIGN AND ANALYSIS OF ANALOG ELECTRONICS  
(3 credits)  Semester 2  Level II

Pre-requisites:  ELET1400 and ELET1405 and MATH0100/M08B,  
MATH0110/M08C or Equivalent

Syllabus:  
**Amplifiers**  
Review of amplifier characteristics.  
Design and analysis of op-amp circuits including inverting, non-inverting and buffer amplifiers. Integrating and differentiating amplifiers. Logarithmic and exponential amplifiers.

**Comparators**  
Design and use of zero-crossing and level-sensing comparator circuits. Schmitt trigger and window-detecting circuits.

**Active Filters**  
Frequency and phase response of different filter types.  
Design and use of multiple Butterworth low-pass and high-pass filters. Design and analysis of both low-Q and high-Q bandpass and band-rejection filters.

**Power Supplies**  
Design of simple linear power supplies with capacitor filtering.  
Simple regulator circuits using op-amps. Principle, design and analysis of switch-mode power supplies.

**Oscillators**  
Conditions for oscillation in a circuit. Design and analysis of oscillators using devices such as timers and PLLs.

Evaluation:  
One 2-hour theory examination paper 60%  
One 1-hour in-course test or equivalent 20%  
Practical work 20%

P24K/ELET2430  DIGITAL CIRCUITS AND MICROPROCESSORS  
(3 credits)  Semester 1  Level II

Pre-requisites:  ELET1400 and ELET1405 OR COMP1110/CS11A and  
COMP1120/CS11B

Note:  This course is the same as CS21S. Students will not receive credit for both courses. Course credits can count towards a major in either Computer Science or Electronics, not both.
Syllabus:   **Number Systems and Codes**  
Binary, Decimal, Octal and Hexadecimal Systems and their Conversion.  
Binary-Coded-Decimal (BCD) code.  
Alphanumeric Codes. ASCII.

**Combinational Logic Circuits**  
Sum-of-products expression used in designing logic circuits.  
Boolean Algebra and the Karnaugh Map used to simplify and design logic circuits.  
Parity generation and checking. Enable-disable circuits.

**Flip-Flops and their Applications**  
RS flip-flops, JK flip-flops, D flip-flops.  
Timing Waveforms.  
Synchronous and Asynchronous Systems.  
Counters and Registers and their uses.

**Memory and Programmable Devices**  
ROM Architecture and Timing.  
Programmable ROM.  
Flash Memory.  
Programmable Logic Devices.  
RAM Architecture and Timing.

Evaluation:  
One 2-hour theory examination paper 60%  
One 1-hour in-course test or equivalent 20%  
Practical work 20%

**ELET 2450**  
**EMBEDDED SYSTEMS**  
(3 credits) Semester 2 Level III

Pre-requisite:  
ELET2430/P24K or COMP2120/CS21Q or CS21S

Syllabus:  
Introduction to the micro-controller.  
Digital control with the micro-controller.  
Programmer's model and block diagram of the micro-controller.  
Programming for real time applications. Assembly language.  
Instructions set. Data testing and Bit manipulation instructions.  
Real time interrupt handling instructions.  
Software tools. Hardware simulation programme.  
Interfacing analog and control signals to the micro-controller.  
Selected Instrumentation modules.  
Selected Communication modules.  
Selected Robotics modules.
P24L/ELET 2420  SOLID STATE ELECTRONIC DEVICES
(3 credits)  Semester 2  Level II
Pre-requisites:  ELET1400 and ELET1405 and MATH0100/M08B, MATH0110/M08C or Equivalent
Syllabus:  The Bipolar Junction Transistor (BJT)
Physical Structure and modes of operation.
Analysis of BJT Amplifier Circuits.

Field Effect Transistor/(FETs)
Structure and physical properties. I-V characteristics.
MOSFETs and JFETs.
Analysis of FET amplifier circuits.

Regulating Devices
Structure and characteristics of Zener diodes, Schottky diodes and SCRs.

Microwave Diodes
The structure, principle of operation and characteristics of:
Gunn diodes
Impatt diodes
Trapatt diodes
Laser diodes.

Evaluation:  One 2-hour theory examination paper  60%
One 1-hour in-course test or equivalent  20%
Practical work  20%

P25F/PHYS2560  MATERIALS SCIENCE I
(4 credits)  Semester 1  Level II
Pre-requisites:  PHYS1410/P14A, PHYS1420/P14B and MATH0100/M08B, MATH0110/M08C or Equivalent
Syllabus:  Classification of materials. Modern materials needs.

Atomic Structure & Inter-Atomic Bonding
Atomic structure. Electron configurations.
Periodic table and the concepts of electro-negativity and electro-positivity. Bonding forces and energies.
Primary inter-atomic bonds: ionic, covalent and metallic.
Secondary bonding or Van der Waal’s bonding. Fluctuating induced dipole bonds, polar molecule-induced dipole bonds, permanent dipole bonds.

**Crystalline Structure**
Concept of unit cells. Metallic crystal structures, face-centred cubic structure, body-centred cubic structure, hexagonal close-packed structure.
Crystal systems and lattice parameters. Crystallographic directions and planes.
Crystalline and non-crystalline materials.
X-ray diffraction. Bragg’s law and diffraction techniques.
Imperfections in solids: point defects, impurities, dislocations, linear defects.
Diffusion: steady-state diffusion and Fick’s First Law.
Factors influencing diffusion.

**Theory of Elasticity**
Anelasticity (qualitative). Plastic deformations.
Tensile properties: yield strength, tensile strength, ductility, resilience, toughness.

**Evaluation:**
One 2-hour theory examination paper 70%
One 1-hour in-course test or equivalent 20%
Practical work 10%

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**P26A/PHYS 2670**  
**FLUID DYNAMICS**  
(4 credits)  
Semester I  
Level II

**Pre-requisites:**
PHYS1410/P14A, PHYS1420/P14B and MATH0100/M08B, MATH0110/M08C or Equivalent

**Syllabus:**
**Vector Analysis and Basic Mathematical Tools**
Physical characteristics of the fluid state. Introduction to laminar and turbulent flows.

**Kinematics and Dynamics of Fluid Motion: Equation of Continuity**
moisture and pollutants. Atmospheric dynamics—Apparent forces (Coriolis and centrifugal) in rotating coordinate systems and their effects. Geostrophic flows. Qualitative introduction to Ekman layer. Basic treatment of Rossby waves and Kelvin waves.

Evaluation:
One 2-hour theory examination paper 60%
One 1-hour in-course Test or equivalent 20%
Practical work 20%

P29A/PHYS2290  INTRODUCTION TO MEDICAL PHYSICS AND BIOENGINEERING
(4 credits) Semester 2 Level II

Pre-requisites: PHYS1410/P14A, PHYS1420/P14B and MATH0100/M08B, MATH0110/M08C or Equivalent

Syllabus:
Bone: skeleton, properties, structure, biomechanics.
Muscle: function, structure, contraction, biomechanics.
Cardiovascular system: structure, function, biomechanics of the heart.
Nervous system: structure, function, biophysics of conduction.
Feedback: control system in the body, homeostasis.
Biomedical potentials, electrocuglomer, electroencephalogram and electromyogram, recording, amplification, equivalent circuits, sensing, visual and auditory systems.
Medical radiation sources: application of radionuclide sources and radioisotope generators in medicine.
Radiation interaction and energy loss with matter. Attenuation of gamma and X-rays.
Radiation safety.

Evaluation:
One 2-hours theory examination paper 60%
One 1-hour in-course test or equivalent 20%
Practical coursework 20%

LEVEL III COURSES

P33E/PHYS3350  MODERN PHYSICS II
(4 credits) Semester 2 Level III

Pre-requisite: PHYS2350/P23E

Syllabus:
Relativity
Einstein’s postulates.
Derivation of Lorentz transformation equations.
Events in relativity. Simultaneity, time dilation, length


**Quantum Mechanics**

Evaluation: One 2-hour theory examination paper  70%
One 1-hour in-course test or equivalent  20%
Practical work  10%

**P33K/PHYS 3385  ELECTROMAGNETISM**
(4 credits) Semester 2 Level III

Pre-requisites: ELET2480/P24H or PHYS2385/P23I

Syllabus: **Review of Vector Analysis and Vector Calculus**

Evaluation: (Overall Theory and Practical to be passed separately):
One 2-hour theory examination paper  70%
One 1-hour in-course test or equivalent  20%
Practical work  10%
P33L/PHYS3395  ASTRONOMY & COSMOLOGY
(4 credits)  Semester 1  Level III

Pre-requisites:  PHYS1410/P14A, PHYS1420/P14B and MATH0100/M08B, MATH0110/M08C or Equivalent


Evaluation:  (Overall Theory and Practical to be passed separately):

One 2-hour theory examination paper  70%
One 1-hour in-course test or equivalent  20%
Practical work  10%

P33M/PHYS3399  RESEARCH PROJECT (NON ELECTRONICS)
(4 credits)  Semester 1 or 2  Level III

Pre-requisites:  Students must (i) qualify for one of the Physics Majors offered by the department; (ii) get permission from the Head, and (iii) satisfy any additional criteria deemed necessary by the department.

Syllabus:  Students will consult staff members with whom they wish to work about possible topics. If pre-requisites are met and permission granted, the staff member will be assigned to supervise the student. Staff member will assign reading list and meet weekly with the student. Staff members may assign research tasks to teach particular skills. Written report and oral presentation as a seminar on the approved topic are required at end of course.

Evaluation:  Course Work (Assignments)  30%
Oral Presentation  10%
Written Report  60%
P34F/ELET3460 DIGITAL SIGNAL PROCESSING
(4 credits) Semester 2 Level III

Pre-requisite: ELET 2460/P24F

Syllabus: Overview of a Digital Signal Processor.
Transfer Functions of Filters.
FIR vs. IIR. Linear phase FIR.
All Pass filters.
Implementing FIR filters.
Window approach.
Linear phase types 1-4.
Optimal fit Algorithms.
Implementing IIR filters.
Bi-linear and Impulse Invariant Transforms.
Direct Form 1 & 2 Structures.
Effects of Finite Number Operations.
Use of second order sections.
Noise and instability.
Generating signals with DSPs.
Structure use of Adaptive Filters.
Implementing of FFT on a Digital Signal processing platform.

Evaluation: One 2-hour theory examination paper 60%
One 1-hour in-course test or equivalent 20%
Practical work 20%

P34G/ELET3470 EM TRANSMISSION AND PROPAGATION
(4 credits) Semester 2 Level III

Pre-requisite: ELET2420/P24L or ELET2480/P24H

Syllabus: Transmission Lines
Distributed circuit co-efficients. EM waves on a line.
Half-Wave and Quarter-Wave Transformers. Matching stubs.

Wave-Guides
**Antennas**
Matching antenna and transmission line. T match, Gamma match and Delta match.

**Propagation**
The structure of the ionosphere and its effect on propagation.
The need for satellite communication.

**Evaluation:**
- One 2-hour theory examination paper 60%
- One 1-hour in-course test or equivalent 20%
- Practical work 20%

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**P34H/ELET3150**
**DIGITAL COMMUNICATIONS**
(4 credits) Semester 1 Level III

**Pre-requisites:** ELET2460/P24F and ELET2480/P24H

**Syllabus:**
**Source Coding**
Discrete information source.
Source entropy.
Huffman coding.
LZW and other coding methods.
Continuous information source.
Sampling and quantization.
Companding.
Linear predictive coding.
Model coding.
Transform coding.
Channel coding.
Run length coding.
Error correction coding.

**Waveform Generation**
Binary vs. M-ary waveforms.
Bandpass vs. baseband waveforms.
Modulation schemes.
BPSK and MPSK. QAM. BFSK and MFSK. MSK.
Channel Properties
Noise. Bandwidth and inter-symbol interference.
Frequency and delay distortion.

Detection and Decision
Envelope detection.
Coherent detection.
Hard and soft decisions.
Run length and error decoding.

Spread Spectrum Methods
Direct sequence spread spectrum.
Frequency hopped spread spectrum.
Multiple access methods TDMA and CDMA.

Practical Applications of Digital Communications
The global telephone network.
Data modems.
Cable modems.
ADSL systems.
Terrestrial microwave networks.
Satellite networks.
Optical fibre networks.
Computer LANs and WANs.

Evaluation:
One 2-hour theory examination paper 60%
One 1-hour in-course test or equivalent 20%
Practical work 20%

P34K/ELET3420 MICRO-PROCESSORS
(4 credits) Semester 1 Level III
Pre-requisite: ELET2430/P24K or COMP2120/CS21Q or CS21S
Syllabus: Classification of micro-processors. CISC processors, RISC processors, Superscalar processors, Multi-threaded processors and Data flow processors.
The Central Processor.
Processor Organization.
Processor Architecture.
Real Architectures.
Intel Processors.
Motorola Processors.
Other Processors.
Evaluation: One 2-hour theory examination paper 60%
One 1-hour in-course test or equivalent 20%
Practical work 20%

P34L/ELET3430  INSTRUMENTATION
(4 credits) Semester 2 Level III

Pre-requisite: ELET 2410/P24J

Syllabus: Industrial measuring systems.
Analog and Digital Signal conditioning.
Data acquisition:
The principle, structure and use of
– Thermal sensors
– Pressure sensors
– Load cells and Strain gauges
– Position sensors
– Flow sensors
– Optical sensors
– Intelligent sensors.

Evaluation: One 2-hour theory examination paper 60%
One 1-hour in-course test or equivalent 20%
Practical work 20%

P34P/ELET 3490  ELECTRONICS PROJECT
(4 credits) Semesters 1 and 2 Level III

Pre-requisite: ELET2410/P24J or ELET2411/P24K or ELET2450

Syllabus: Projects will normally be selected from a list approved by the academic staff.
A supervisor is assigned to each project which requires about 100 hours of work done over two semesters. Design, testing and construction of selected electronics hardware and/or software may be included in the work.

Evaluation: On-the-job performance 60%
Written report 30%
Oral presentation 10%

P35F/PHYS3560  MATERIALS SCIENCE II
(4 credits) Semester 2 Level III

Pre-requisite: PHYS2560/P25F
Syllabus: Fracture Mechanics

Thermodynamics of Solids

Evaluation:
One 2-hour theory examination paper 70%
One 1-hour in-course test or equivalent 20%
Practical work 10%

P35G/PHYS3570 MATERIALS SCIENCE III
(4 credits) Semester 2 Level III

Pre-requisite: PHYS2560/P25F

Syllabus: Metal Physics

Ceramics, Polymeric Materials and Composites

Evaluation:
One 2-hour theory examination paper 70%
One 1-hour in-course test or equivalent 20%
Practical work 10%
ATMOSPHERE AND CLIMATE

Pre-requisites: PHYS1410/P14A, PHYS1420/P14B and MATH0100/M08B, MATH0110/M08C or Equivalent

Co-requisite (recommended): PHYS2670/P26A

Syllabus:

Survey of the Atmosphere

Atmospheric Thermodynamics
Dry air-adiabatic processes, potential temperature, entropy, equation of state. Moist air-Clausius-Clapeyron equation, virtual temperature, vapours pressure, relative humidity, condensation. Atmospheric aerosols, clouds-formation and growth.

Radiative Transfer

Atmospheric Dynamics (qualitative derivations)

General Circulation of the Tropics

Evaluation:
One 2-hour theory examination paper 60%
One 1-hour in-course test or equivalent 20%
Practical work 10%
Term paper 10%
P36C/PHYS3670  SOLAR POWER
(4 credits)  Semester 1  Level III

Pre-requisite:  PHYS3660/P36B

Syllabus:

Solar Radiation
Solar Spectrum.
Measurements.
Global Distribution.
Solar Radiation distribution in Jamaica, seasonal variation.
Effect of Tilt Angle.

Flat Plate Collection and Systems
Passive Solar Design.

Photovoltaic Cells
Semi-conductor Physics.
Spectral response of Solar Cells.
PV Cell Characteristics.
Single Cell Design, Construction and Efficiency.
Amorphous Silicon Cells.
Thin Film Technologies.
Multi-junction Cells.
Modules and Arrays.
Manufacturing Techniques and Costs.
Applications.
System Sizing.
System Performance.
Electrical Integration.
Building Integration.
Feasibility Study.

Other Applications
OTEC.
Absorption Refrigeration.

Evaluation:
One 2-hour theory examination paper  55%
One 1-hour in-course test or equivalent  15%
Practical work  10%
Project report & presentation  20%
WIND AND HYDRO POWER

Pre-requisites: PHYS2670/P26A and PHYS3660/P36B

Syllabus:

Wind Power
Brief overview of global wind power.
Introduction to boundary layer. Turbulence, roughness length and wind velocity profiles (without proof).
Origin and nature of atmospheric winds. Wind types (breezes and relief). Beaufort wind scale and wind classes.
Wind resource assessment: Anemometry and site prospecting.
Introduction to basic statistics: Weibull and Rayleigh distributions.
Wind energy and power density calculations.
Components and basic operation of WEC (Wind Energy Conversion) systems and turbine types.
Introduction to conversion of wind power to electrical power.

Turbine Performance
Planning aspects of wind farms: Investment strategies. Estimation of cost of electricity from a typical stand alone turbine or wind farm.
Environmental assessment: Noise, visual impact, and other environmental impacts.
Grid and rural power: large and small turbines.
Introduction to wind hybrid systems (solar, diesel, hydro) for small communities.
Application of wind power to water pumping and irrigation.

Energy Storage: Batteries and flywheels.

Basics of Hydro-Power
Introduction to hydrologic (water) cycle, and a brief overview of global hydro-power.
Hydro-resource assessment.
Brief treatment of the principle of Pelton, Francis and Kaplan Turbines.
Introduction to conversion of hydro-power to electrical power.
Turbine characteristics, losses.

Energy Storage: Pumped storage facilities.

Evaluation:
One 2-hour theory examination paper 60%
One 1-hour in-course test or equivalent 15%
Practical work 15%
Case study (hydro-power) 10%
Syllabus:

**Stand Alone versus Grid Connected Power Generation**

Integrating problems.
Structure of electrical energy systems.
Requirement for multiple voltages.

**Generator Characteristics and Usage**

Synchronous generator (SG) operating range and control capabilities.
Active power characteristic of SGs and stability.
The induction generator equivalent circuit and operating range.
Comparison between synchronous and induction generators for renewable energy (RE) applications.

**Networking**

Apparent, active and reactive power in alternating current (AC) systems.
Transmission line characteristics and equivalent circuits.
Transfer of power over high and low voltage transmission lines.
The load angle.
Connection of alternative energy (AE) Sources to Large Networks.

**Control**

Load flow analysis.
Frequency control of large and of stand alone systems.
Reactive power and voltage control.
Automatic voltage regulators.
Reactive power management.
The control of AE generators.

**Power Electronic Interfaces**

Power semi-conductor devices.
Diode bridge rectifier.
Thyristor bridge.
Three-phase converters.
DC-DC converters.
Converter control systems.
Inverters.

**Introduction to Policies**

Laws regulating supply of electricity.
Environmental Impact Assessment.
The Kyoto Protocol and Emission Targets.
Carbon Trading.
Energy scenarios.
Energy generation and distribution in Jamaica.

**Introduction to Economics**
Life Cycle Analysis.
Economic tools and valuation.
Wholesale and Retail Prices.
Tracking Energy Costs.

**Evaluation:**
- One 2-hour theory examination paper 60%
- One 1-hour in-course test or equivalent 15%
- Field trip reports 15%
- Practical work 10%

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**P39A/PHYS3390  FURTHER MEDICAL PHYSICS AND BIOENGINEERING**

(4 credits) Semester 2 Level III

**Prerequisite:** PHYS2290/P29A

**Syllabus:**

**Biomechanics in Orthopaedics**
Examination of the action of forces on Bone and Tissue with a heavy focus on the Spine.
Mechanical aspects of Fractures: Occurrence and Repair
Joint Replacement
Analysis of Gait
Biomechanics and Orthopaedic Disorders

**Biomechanics in Cardiology**
The role of Biomechanics in Cardiology
Mechanics of Blood Vessels and Cardiac Muscles
Artificial Heart Valves

**Biomaterials**
The need for biomaterials and their use
Properties of different biomaterials
Preparation of biomaterials for implantation

**Radiation**
Interaction with matter. Medical radiation sources and their applications in diagnosis and therapy (focus on detectors, scanners and image processing in the medical environment)

**Nuclear medicine** - radioisotope tracer studies and system modelling.
Radiation safety. Kinetic and blood flow studies.

**Evaluation:**
- One 2-hour theory examination paper
- One 1-hour in-course test or equivalent
- Practical work
PHYS 3397  MEDICAL RADIATION PHYSICS AND IMAGING
(4 credits)  Semester 2  Level III

Pre-requisites: PHYS2290/P29A

Syllabus:  
**Physics of X-ray Diagnostic Radiology:**
X-ray Production and interaction with matter
Operation and diagnostic of X-ray tubes, Instrumentation for X-ray imaging,
X-ray Computed Tomography,

**Radioactivity and Nuclear Medicine:**
Physics of Nuclear medicine,
Radioactivity and radionuclides,
Single Photon Emission Computed Tomography,
Positron Emission Tomography

**Physics and Instrumentation of diagnostic medical ultrasonography:**
Principles of ultrasonic imaging,
Instrumentation for diagnostic ultrasonography,
Image characteristics,
Medical applications of ultrasound.

**Physics of Magnetic Resonance imaging:**
Quantum mechanics and nuclear magnetism,
Instrumentation,
Magnetic Resonance Imaging,
Magnetic resonance angiography,
Medical applications.

**Radiation dosimetry and protection:**
Principles of radiation protection,
Units of exposure and dose,
Radiation detection and measurement.

Evaluation:

One 2-hour paper  50%
One 1-hour Theory Coursework  10%
Practical Coursework  40%
BACHELOR OF SCIENCE IN ELECTRONICS ENGINEERING

Years of Study: 3 years

Minimum number of credits for graduation: 103 credits (including 9 credits from 3 FD courses)

Admission Requirements:
In addition to fulfilling general requirements for admission into the Faculty of Pure and Applied Sciences, applicants must have passes in both units of Mathematics and Physics at CAPE or Advanced level with no less than a Grade 3 or C; or passes in PHYS0410/P04A, PHYS0420/P04B, MATH0100/M08B and MATH0110/M08C with no less than a B; or equivalent qualification from a community college, CASE, UTECH or another university with GPA of 3 or higher.

GPA Requirements
As is consistent with the Faculty of Pure and Applied Sciences, upon completion of the required courses for the degree, candidates must possess a GPA of 1 or greater in order to satisfy the graduation requirements. The GPA for this engineering option is calculated from ALL COURSES from Level 1 to Level III that constitute the candidate’s degree. The actual GPA will determine the class of degree received and is consistent with the other programmes within the Faculty of Pure and Applied Sciences.

Overview of the Programme:
The Bachelor of Science degree in Electronics Engineering is designed to serve students who are desirous of pursuing a career path in Telecommunications and Industrial Instrumentation. This three (3) year programme is structured in such a way that during the first year, students are exposed to foundation courses in electronics and electrical engineering, physics, computer science, engineering mathematics, ethics and professional practices. The second year courses provide the core courses required for this engineering discipline. All students are required to complete a 1-year extensive project during the final year along with the introduction to engineering management and accounting systems course, and electromagnetism. Students must select only one option - Telecommunications or Industrial Instrumentation.

During each semester of this 3-year program, a teaching laboratory and project design course must be taken by each student. The practical application and testing of the concepts presented in the theoretical classes for that semester will be explored in these lab sessions. Engineering students learn through a combination of design and lab work. This mix of theory and practical application allows students to think things through and then apply their ideas in a variety of real life situations. Students also learn to diagnose problems and develop a variety of solutions.
Definition Course Codes
ECNG  Electrical and Computer Engineering (St Augustine Campus)
E LNG  Electronics Engineering (Mona)
ENGR  Faculty of Engineering (St. Augustine)
ELET  Electronics (Mona)
COMP  Computer Science (Mona)
MATH  Mathematics
PHYS  Physics (Mona)
MGMG  (Management Studies (Mona)

Note: The letter ‘E’ or ‘C’ preceding the credit allocation indicates Examination by written papers or by course work, respectively.

COURSE OUTLINE

LEVEL 1

Semester 1  (16 Credits)
Course Code  Title  Number of credits
ECNG 1000  Electrical Circuits  E 3
ECNG 1009  Introduction to Programming  C 3
ECNG 1012  Engineering Science and Technology  C 4
MATH 1180  Engineering Mathematics 1  E 3
FOUN 1001  English for academic Purposes  E 3

Semester 2  (16 Credits)
Course Code  Title  Number of credits
ENGR 1000  Introduction to Engineering  E 3
ELET 1400  Introduction to Electronics  E3
ELET 1405  Practices in basic Electronics  C/E 3
ELNG 1101  Physics for Engineers  E3
COMP 2160  Object Oriented Programming  E4

Note: The other Foundation Courses may be taken at any time during the undergraduate course of study.

LEVEL 2

Semester 1  (15 Credits)
Course Code  Title  Number of credits
ELET 2405  Practices in Electronics 1  C3
ELET 2430  Digital Circuits and Microprocessors  E3
ELET 2450  Embedded Systems  E3
ELET 2460  Signals and Systems  E3
MATH 2230  Engineering Mathematics 2  E3
Semester 2  (15 Credits)

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<tr>
<td>ELET 2415</td>
<td>Practices in Electronics 2</td>
<td>C3</td>
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<tr>
<td>ELET 2410</td>
<td>Analysis and Design of Analogue Circuits</td>
<td>E3</td>
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<tr>
<td>ELET 2420</td>
<td>Semiconductor Devices</td>
<td>E3</td>
</tr>
<tr>
<td>ELET 2480</td>
<td>Modern Communications</td>
<td>E3</td>
</tr>
<tr>
<td>ECNG 2009</td>
<td>Control Systems</td>
<td>E3</td>
</tr>
</tbody>
</table>

Summer Apprenticeship Internship in Approved Industry (between Level 2 and Level 3)

Summer Apprenticeship is meant to expose students to the practical applications of the concepts learnt in classes and is expected to be a source of motivation and inspiration. It also provides an opportunity to identify potential projects.

LEVEL 3  (35 credits)

Students taking Level 3 courses must

1. Register for all courses listed as compulsory and core (for chosen option).
2. Select one of the following options: Telecommunications or Industrial Instrumentation

COMPULSORY COURSES

**YEAR-LONG  (6 Credits)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Number of credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELNG 3010</td>
<td>Special Project</td>
<td>C6</td>
</tr>
</tbody>
</table>

**One Semester (11 Credits)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Number of credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECNG 3021</td>
<td>Introduction to Engineering Management and Accounting Systems</td>
<td>E4</td>
</tr>
<tr>
<td>MGMG</td>
<td>New Venture Creation and Entrepreneurship</td>
<td>E3</td>
</tr>
<tr>
<td>PHYS3385</td>
<td>Electromagnetism</td>
<td>E4</td>
</tr>
</tbody>
</table>

Core Courses (12 credits)

**Option 1:  Telecommunications**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Number of credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELET 3480</td>
<td>Wireless Communication Systems</td>
<td>E3</td>
</tr>
<tr>
<td>ELET 3470</td>
<td>Wireless Transmission &amp; Fiber-Optics</td>
<td>E3</td>
</tr>
<tr>
<td>ELNG 3050</td>
<td>Broadband Networks</td>
<td>E3</td>
</tr>
<tr>
<td>ELNG3015</td>
<td>Practical Analysis of Telecommunication Circuits and Systems</td>
<td>C3</td>
</tr>
</tbody>
</table>
Option 2: Industrial Instrumentation

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Number of credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELET 3412</td>
<td>Instrumentation and measurements</td>
<td>E 3</td>
</tr>
<tr>
<td>ELNG 3030</td>
<td>Power Electronics and Protection Circuits</td>
<td>E 3</td>
</tr>
<tr>
<td>ELNG 3040</td>
<td>Industrial Automation</td>
<td>E 3</td>
</tr>
<tr>
<td>ELNG 3025</td>
<td>Practical Analysis of Industrial Controllers</td>
<td>C 3</td>
</tr>
</tbody>
</table>

Electives (6 credits)

Choose any two of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Title</th>
<th>Number of credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELET 3485</td>
<td>Introduction to Robotics</td>
<td>E 3</td>
</tr>
<tr>
<td>ECNG 3016</td>
<td>Advanced Digital Electronics</td>
<td>E 3</td>
</tr>
<tr>
<td>ELET 3460</td>
<td>Digital Signal Processing</td>
<td>E 3</td>
</tr>
<tr>
<td>ELNG 3060</td>
<td>Power Plant Instrumentation</td>
<td>E 3</td>
</tr>
<tr>
<td>ECNG 3028</td>
<td>Introduction to Process Control</td>
<td>E 3</td>
</tr>
<tr>
<td>ELET 3450</td>
<td>Satellite Communication &amp; Global Navigation Satellite Systems</td>
<td>E 3</td>
</tr>
</tbody>
</table>

Some Rules and Regulations:

i. In addition to other requirements, all three (3) Foundation courses must be passed before the student is allowed to graduate

ii. A minimum of 104 credits (including 9 credits from the three foundation courses) is required to graduate from the Electronics Engineering BSc. Programme

iii. The maximum course loading normally allowed per semester is 18 credits

iv. Registration for Level 3 courses will not be approved until credits for all level 1 courses and have been attained. Additionally, all required prerequisite level 2 courses must be completed (passed).
COURSE DESCRIPTIONS

LEVEL I COURSES

ECNG1000  ELECTRICAL CIRCUITS  (3 credits)     Level I
Prerequisites:  

Syllabus:  Introduction to signals and systems, modeling of electrical systems and devices, network theorems, nodal and loop analysis, circuits with reactances. Transient response, AC steady state, phasor analysis of single phase systems. Lab exercises will be assigned in the ECNG1012 electrical laboratory sessions.

Evaluation:  One 3hr final exam  90%
One in-course exam  10%

ENGR 1000  INTRODUCTION TO ENGINEERING  (3 credits)     Level I
Prerequisites:  

Syllabus:  An introduction to the following: historical development of engineering; formation of the engineer; roles and functions of engineers and professional organizations; creative and critical thinking; technical communication; Ethics; liability; safety; legal forms of association; contracts, company law; intellectual property; engineering economics and business operations; infrastructure; energy systems and economics, environment and sustainable development; approaches to design.

ECNG 1009  INTRODUCTION TO PROGRAMMING  (3 credits)     Level I
Prerequisites:  

Syllabus:  Standard algorithms and general problem-solving using algorithms. Number representations and binary number manipulation. Algorithm coding on a language independent platform and in C++

Evaluation:  Six (6) lab base course work  24%
Two (2) in-course assessment  46%
Ten (10) tutorials/assignment  30%
ECNG 1012  ENGINEERING SCIENCE AND TECHNOLOGY
(4 credits)    Level I

Prerequisites:

Syllabus: Engineering Science and Technology is a partial-laboratory course and is assessed solely through coursework. This course has five modules:

- Electrical Labs and Design Project:
  Four lab exercises (with simulations) and a design project based around the ECNG1000 course.

- Science of Materials:
  Metals, polymers, ceramics and composites, semiconductor and superconductors, piezoelectrics

- Engineering Graphics:
  Use of instruments, orthographic projections, pictorial views, and freehand sketching.

- Mechanical Workshop Technology:
  Safety orientation, screw driver design project – cutting of material, hot forging, marking off and filing, construction of handle and collar, assembly, pinning and fastening of collar, handle and stainless steel blade, testing; Arc welding training – construction of a T-joint.

- Mechanics of Fluids:
  Properties of fluids, hydrostatics, fluid dynamics – types of fluid flow, continuity equation, Bernoulli’s equations and its applications, momentum equation; Laminar and turbulent flow; rotational machines – pump characteristics, centrifugal pumps under system load, pumps in series and in parallel; one laboratory exercise.

Evaluation:

Four (4) Electrical Lab exercises with reports  20%
One Electrical Circuit design (Practical Exam & report)  20%
Six in-class Engineering Graphics exercises  10%
One mechanics of Fluids in-course exam  15%
One mechanics of Fluids Lab Exercise & Report  5%
One Science of Materials In-Class Exam  10%
Mechanical Workshop Technology  20%
MATH 1180  ENGINEERING MATHEMATICS 1
(3 credits)  Semester I  Level I

Prerequisites:

Syllabus: Functions of one variable: Limits, continuity, differentiation and integration; common functions and inverse functions. Mean value theorems; Taylor and Maclaurin expansions.

Function of two variables: Limits, continuity and differentiations.

Vectors: Dot, cross and mix products; geometrical problems - lines, planes.


Ordinary Differential Equations: Introductions: First order equations, separation of variables, equation of homogeneous coefficients, integrating factors; Second order linear equations and its general solution; Second order equations with constant coefficients, undetermined coefficients, variations of parameters.

The Laplace Transform: Transforms of elementary functions, step functions and derivatives; Derivatives of transforms; The inverse transform; Shift theorems.

ELNG 1101  PHYSICS FOR ENGINEERS
(3 credits)  Level I

Prerequisites:

Syllabus: Mechanics : Scalars and Vector, Rotation; Rotational inertia and its calculation for some symmetrical objects; Parallel and perpendicular axis theorem. Torque; work done by torque. Simple Harmonic Motion; Angular SHM in terms of torque and angular displacement; Differential equation of motion and its solution; application to pendulum and rotating disc.

Waves and Optics: Waves on Strings; the wave equation; phase velocity, the sine wave; power transmission; superposition principle; interface; standing waves and resonance.

Sound Waves: Wave speed; displacement and pressure waves; beats; Doppler effect. Optics: Huygen’Principle; the electromagnetic wave; coherence; Young’s experiment; Thin
film interference: Single and double slit diffraction; the phasor method; the diffraction grating.

Lasers: What are lasers? Introduction to the basic principle of operation; laser application in engineering.

Electricity and Magnetism: Electric field and potential: The electric field E due to extended charge distributions; Integral and differential expressions relating the electric potential V to the E field; Potential due to a dipole and other extended charge distributions.

Gauss’ Law: Application to problems with spherical, cylindrical and rectangular symmetry.

Capacitance: Calculation of the capacitance of various capacitors; Energy stored in a capacitor; RC circuits; Time constant, Magnetism: Magnetic force on current-carrying wire and its application to cases needing calculus treatment; Magnetic torque on a current loop; Magnetic moment of a current loop; The Hall-Effect; Biot-Savart Law and Ampere’s Law, and their application to long current-carrying wire, loop, and solenoid.

Electromagnetic Induction: Faraday’s Law and Lenz’s Law; Electro-magnetic induction and its applications; Self Induction; Inductance; RL circuits. Electromagnetic Oscillations and Alternating Currents: LC Oscillation; Damped oscillation in an RLC circuit; Alternating current; Forced oscillation; RLC circuits; Power in AC circuits; the Transformer; Introduction to the Electromagnetic wave.

Modern Physics: Bohr Atom: Spectral series for hydrogen, Bohr’s postulates, derivation of energy levels, blackbody radiation and quantized energy levels (qualitative).

Waves & Corpuscles: Wave-particle duality; photo-electric effect; Compton-effect; energy, momentum and wavelength of a photon, DeBroglie’s equation, wave function, particle in a box, nanocrystallites and quantum dots.

Electrical Conduction in Solids: Energy Levels in Crystalline solids; Insulators; Conductors; Semi-conductors; Doped Semiconductors; p-n junction.

Evaluation: One 3-hour theory examination paper 70%
Two 1-hour in-course tests (15 % each) 30%
COMP 2160  OBJECT ORIENTED PROGRAMMING  
(4 credits)  Semester 1  Level II 

Prerequisites:  ECNG1009 

Syllabus:  Class of objects; methods; members; message passing; encapsulation and information hiding; separation of behavior and implementation. Imperative control structures, assignment state, parameter passing models. Inheritance; polymorphism; class hierarchies. Interface vs. multiple inheritance. Templates/generics. Using APIs; class libraries. Module/packages; name space solution; primitive types; array, string processing; I/O processing; pointers and references; linked structures; strategies for choosing the right data. Collection classes and iteration protocols; event-driven and concurrent programming; exception handling; Introduction to GUI programming; thread programming. OO testing; debugging tools. 

Object-Oriented Methods: analysis and design, design for re-use; modeling tools, comparison of OOD and top-down/bottom-up design; intro to the concept and use of design patterns. 

Evaluation:  One 2-hour written exam  60%  
One in-course test  10%  
Assignments  30%  

ELET1400  INTRODUCTION TO ELECTRONICS  
(3 credits)  Semester 2  Level I  

Prerequisites:  

Course Structure:  Introduction to Semiconductor Theory and the P-N Junction (13 Hrs): Review of the atomic structure and bonding; Energy level diagrams; Intrinsic and Extrinsic semiconductors; Electrical properties; the Fermi Dirac Distribution function; The P-N Junction and the diode; light emitting diodes (LED); The Bipolar Junction Transistor (BJT); the Field Effect transistor; Biasing the transistor circuit; DC Transistor circuits. 

Introduction to Digital Electronics (13 Hrs): Analog and digital concepts; binary digits and logic levels; digital waveforms; logic gates and truth tables; Boolean algebra and logic simplification; DeMorgan’s theorem; Circuit minimization; Terminologies used in logic designs; Combinational logic circuits: BCD; Latches, Flip-Flops;
Memory circuits and devices; Simple programmable arrays: ADC and DAC Circuits.

Introduction to Analog Electronics and Communication Systems (13 hrs):
Introduction to alternating current (AC); Frequency dependent RLC circuits; Bandwidth and half-power. The Operational Amplifier and its applications; Fundamentals of analog and digital Communication Systems;

Evaluation:
One 2-hour theory examination paper 60%
Two 1-hour in-course tests (2 x 20%) 40%

ELET1405  PRACTICES IN BASIC ELECTRONICS
(3 credits) Semester 2 Level I

Co-Requisite: ELET1400

Course Structure:
Week 1: Using lab equipment, resistor colour codes, lab safety.
Week 2: Diode characteristics and application to power supply circuits
Week 3: Transistor characteristics and circuit applications
Week 4: Optical semiconductor devices and their circuit application
Week 5: Semiconductor circuit design test. (in-class)
Week 6: TTL Logic and Boolean algebra
Week 7: Functions of Combinational Logic Circuit: Decoders
Week 8: Flip Flop and the 555 Timers
Week 9: Digital circuit design test (in-class)
Week 10: AC operation of RLC Circuits
Week 11: Op Amp Circuits
Week 12: Investigating AM and FM communication circuits / systems
Week 13: Analogue Circuit Design test (in-class)

Evaluation:
Nine Laboratory reports (equal weighting) 15%
Three design projects (3 x 15%) 45%
One 2-hour final examination paper 40%
LEVEL II COURSES

ECNG 2009 CONTROL SYSTEMS

Prerequisites: ELET2460 Signal and Systems; MATH1180 Engineering Mathematics I

Syllabus: Classical control of dynamic linear systems; solutions of linear differential equations using Laplace transform, transfer function system representation, system response characteristics, error performance and tracking, the Evans root locus method for design of PID, lead and lag compensators, frequency response method using Bode, Nyquist and Nichols plots and stability margin issues.

Lab exercise in ELET2415.

MATH 2230 ENGINEERING MATHEMATICS 2

(3 credits) Level II

Prerequisites: MATH1180 Engineering Mathematics I

Ordinary differential equations; power series solution, Legendre’s equation, Bessel equation. Laplace transform: convolution theorem; application to simple initial value problems and integral equations; periodic function.

Fourier series: Euler’s formulae; even and odd functions; half range expressions; solutions to some ordinary differential equation.

Partial differential equation: classification; tehone-dimension wave equation, the heat conduction and diffusion equation; Laplace’s equation in cylindrical and spherical polar coordinates.

Vector calculus: scalar and vector fields; vector calculus; curves; arc length, tangent, curvature and torsion; directional derivatives, divergences and curl of a vector field; line integrals; surface integrals; Stoke’s theorem and divergence theorem.
ELET2405 PRACTICES IN ELECTRONICS DESIGNS I
(3 credits) Semester I Level II

Prerequisites: ELET1400 and ELET1405

Co-Requisite: Any level 2 Semester 1 Electronics or Electronics Engineering course

Course Structure:
*Investigative labs*: Six lab exercises will be assigned that are consistent with the electronics courses that the student has undertaken for semester 1. A report of the results, analyses and discussions must be handed in at the end of each lab session.

*Design Project*: A major electronics design project will be assigned to each student during the first two lab sessions. In some cases students will be required to work in pairs. In addition to working on their project during the assigned lab sessions, students are also expected to do the necessary background/research work outside of classes. A complete project report and demonstration of prototype must be formally presented at the end of the semester.

Evaluation: Six Laboratory reports (equal weighting) 30%
One major design project 70%

ELET2415 PRACTICES IN ELECTRONICS DESIGNS II
(3 credits) Semester 2 Level II

Prerequisites: ELET1400 and ELET1405

Co-Requisite: Any level 2 Semester 2 Electronics or Electronics Engineering course

Course Structure:
*Investigative labs*: Six lab exercises will be assigned that are consistent with the electronics courses that the student has undertaken for semester 2. A report of the results, analyses and discussions must be handed in at the end of each lab session.

*Design Project*: A major electronics design project will be assigned to each student during the first two lab sessions. Students will be required to work in groups of 2 or 3. In addition to working on their project during the assigned lab sessions, students will be required to do the necessary background/research work outside of class times. A complete project report and demonstration of prototype must be formally presented at the end of the semester.
ELET2410  ANALYSIS AND DESIGN OF ANALOG CIRCUITS
(3 credits)  Semester 2  Level II

Prerequisites: PHYS1410 and PHYS1420 (or equivalent), ELET1400, and CAPE Mathematics (or equivalent)

Syllabus: Basic Concepts of Analog Circuits and Signals
Review of Diodes and their applications
Transistor circuits: AC analysis of transistor amplifiers, Feedback, multistage, RF, and Audio amplifiers; Differential amplifiers; Voltage regulation and regulator circuits
Operational Amplifiers: Op-Amp Responses, Op-Amp Circuits, Active Filters, instrumentation amplifiers
Linear integrated circuits: The phase lock loop, the 555 timer IC, Other linear ICs
Oscillators: Principles of oscillation, types of oscillators
Special-Purpose Amplifiers
Data conversion circuits

Evaluation: One 2-hour final exam 60%
One 1-hour in-course tests 20%
Take home assignments 10%
One technical paper 10%

ELET2420  SEMICONDUCTOR DEVICES
(3 credits)  Semester 2  Level II

Prerequisites: PHYS1410 and PHYS1420 (or equivalent), ELET1400, and CAPE Mathematics (or equivalent)

Syllabus: Semiconductor Fundamentals: General introduction to semiconductor; Carrier modeling, energy quantization and probability concepts; energy bands structure, density of states, statistical mechanics; Semiconductor in equilibrium; Carrier transport and excess carrier phenomenon; Carrier Modeling; Carrier Action; Basics of device fabrications.
PN Junctions: PN Junction electrostatics; PN Junction Diode, I-V Characteristics, small signal admittance, Transient response; Optoelectronic Devices; microwave diodes – tunnel, IMPATT, Gunn. Bipolar Junction Transistors (BJT): BJT fundamentals, static characteristics, dynamic response modeling- equivalent circuits, transient response. PNPN Devices: Silicon controlled rectifiers (SCRs); TRIACS, DIACS. Metal Semiconductor contacts and the Schottky Diode. Circuit application examples for PN junction devices

Field Effect Devices: The JFET and the MESFET; The Metal Oxide Semiconductor Field Effect Transistor (MOSFET)-theory of operation, ID-VD relationships, Threshold considerations; Non Ideal MOSFETs, Modern FET structures. Circuit application examples for Field Effect Devices

Evaluation:
One 2-hour final exam  60%
One 1-hour in-course tests  20%
Take home assignments  10%
One technical paper  10%

ELET2430  DIGITAL CIRCUITS AND MICROPROCESSORS
(3 credits)  Semester I  Level II

Prerequisites:  PHYS1410 and PHYS1420 (or equivalent), ELET1400, and CAPE Mathematics (or equivalent)

Syllabus:  Digital Logic Design: Brief review of Combinational logic; Flip-Flops and Latches: Synchronous, Asynchronous, Single bit Memory elements, Counters & Shift Registers and Timing; System specification using State Diagrams; System design using state diagrams and flip-flops; The design of multidimensional memory arrays using flip-flops

Computer Arithmetic: Unsigned and Signed Integer Representation; Signed Magnitude Representation; One’s Complement Representation; Two’s Complement Representation; Floating-Point Representation; Fractions; Floating-Point Addition, Multiplication and Division

Processor Organization: Overview – RISC, CISC, Data Path, Control Unit; Operand Types; Addressing Modes; Instruction Types; Instruction Formats– zero, one, two and three address machines; Micro-program Control - Hardware and Software implementation, Data Path manipulation
Cache memory: Cache Design Basics; Mapping Function - Direct Mapping, Associative Mapping and Set-Associative Mapping; Policies; Write Policies; Cache management - Locating a Block and Replacement Policies

Parallelism: Pipeline - Basic Concepts; Handling Resource Conflicts; Hazards; Register Forwarding; Register Interlocking; Handling Branches - Delayed Branch Execution, Branch Prediction and Performance Enhancements; Superscalar Processors; Superpipelined Processors; Very Long Instruction Word Architectures; Example Implementations - Pentium and SPARC Processors; Vector processors

Interrupts: A Taxonomy of Pentium Interrupts; Hardware and Software Interrupts; Example implementations – Pentium and SPARC Processors

Evaluation:
One 2-hour final exam 60%
One 1-hour in-course tests 20%
Take home assignments 10%
One technical paper 10%

ELET2450 EMBEDDED SYSTEMS
(3 credits) Semester I Level II

Prerequisites: PHYS1410 and PHYS1420 (or equivalent), ELET1400, and CAPE Mathematics (or equivalent)

Syllabus: Embedded Systems Overview: Introduction and Background; Embedded System-On-Chip (SOC) and in VLSI Circuits.
Microcontroller Overview: Basic Layout; Components; Memory and Register; Instruction Set; The AVR 8-Bits Microcontrollers.

Assembly Programming & Simulation: Assembly Language Structure; Branch, Call and time delay loops; AVR Studio: Editor, Assembler, Simulator, Debugger and Hex Programmer; Simulation of Written Code; STK500 Hardware: Description and Operation; Actual Microcontroller Programming.

Digital & Analog Capabilities: Digital Input/Output Capabilities; Configuration and Operation of I/O Ports; Digital I/O Port Programming; Analog Input/Output Capabilities; Configuration and Operation of I/O Pins/Ports; Analog-to-Digital Conversion; Analog Peripheral Programming.
Interrupt Subsystem; Timing Subsystem; Serial Communication Subsystem. C Language for Embedded Systems: Operating Parameters & Interfacing:

Design & Development: Design Plans (Project Specifications, etc.; Sourcing and Selection of Controllers and Components; Designing Circuits; Flowcharts and Programs; Implementation and Packaging; Documentation. Communication Technology: Introduction to IrDA; Introduction to USB; USB Packets; USB Physical Interface; Implementing USB Interface

Evaluation:

One 2-hour final exam 60%
One 1-hour in-course tests 20%
Take home assignments 10%
One technical paper 10%

ELET2460 SIGNALS AND SYSTEMS
(3 credits) Semester I Level II

Prerequisites: PHYS1410 and PHYS1420 (or equivalent), ELET1400, and CAPE Mathematics (or equivalent)

Syllabus:
CONTINUOUS-TIME SIGNALS AND SYSTEMS
Continuous-Time Elementary Signals: The Unit Step, the Unit Impulse, the Unit Ramp, Sinusoidal Signal. Signal Transformations: Continuity, Piece-wise continuity; Time shifting, time scaling, time reversal; Convolution; Convolution and Impulse Response. Introduction to systems; Frequency Domain Representation of Signals and Systems. Transform Domain Representation of Systems; Time Domain Analysis of Systems.

DISCRETE-TIME SIGNALS AND SYSTEMS

Evaluation:

One 2-hour final exam 60%
One 1-hour in-course tests 20%
Take home assignments 10%
One technical paper 10%
ELET2470  CIRCUIT ANALYSIS
(3 credits)  Semester 1  Level II

Prerequisites:  PHYS1410 and PHYS1420 (or equivalent), ELET1400, and CAPE Mathematics (or equivalent)

Syllabus:  Concepts in basic electrical quantities: electronic charge, current, voltage, power, energy; Introduction to circuit theory; Simple circuits; Kirchhoff’s voltage and current laws. Series and parallel circuit networks; Structured Circuit Theory.

Network theorems: Superposition, Thevenin’s, Norton’s; Solution using structured approach; Network analysis: branch, loop, node; Source types; Maximum power transfer theorem

Capacitive and inductive circuits; Laplace models; Steady state and dynamic responses of simple networks; AC steady state analysis; Circuit Theory in Laplace domain

Transient and steady state solutions Complex number models; Complex power; Power factor correction

Evaluation:
One 2-hour final exam  60%
One 1-hour in-course tests  20%
Take home assignments  10%
One technical paper  10%

ELET2480  MODERN COMMUNICATION SYSTEMS
(3 credits)  Semester 2  Level II

Prerequisites:  PHYS1410 and PHYS1420 (or equivalent), ELET1400, and CAPE Mathematics (or equivalent)

Syllabus:  Modulation Techniques: Amplitude Modulation; Angle Modulation; Sampling & Digital Modulation.

Baseband Data Transmission: Baseband transmission of digital data; Inter-symbol Interference (ISI); The Nyquist Channel; Baseband transmission of M-ary Data; The Eye Pattern; Bandpass modulation techniques; Binary Amplitude-Shift Keying; Phase-Shift Keying; Frequency-Shift Keying; M-ary digital modulation schemes

Random Signals and Noise: Probability and random variables; Gaussian random variables; Random processes; Gaussian processes; White noise; Narrowband noise Noise in Analog Communications; Noise in Digital Communications:
Wireless Communication: Propagation loss in a simple wireless link; Principles of Radio and Television; Facsimile; Cellular technology and Global Positioning Systems (GPS); Brief Introduction to GSM technology

Evaluation: One 2-hour final exam 60%
One 1-hour in-course tests 20%
Take home assignments 10%
One technical paper 10%

LEVEL III COURSES

Please note that all Level III courses will be offered in the 2011/2012 academic year.

Prerequisites will be announced at a later date

ELNG 3010  SPECIAL PROJECT
6 credits  Year-Long  Level III

Prerequisites:

Syllabus: Special project will be undertaken by all students under the supervision and direction of academic staff in conjunction with an engineering supervisor from an associated Industry. The project will be Industry based and students work very closely with their industrial partners. Project details are provided in the Project Handbook.

ECNG 3021  INTRODUCTION TO ENGINEERING MANAGEMENT AND ACCOUNTING SYSTEMS
4 credits  Level III

Prerequisites:

Syllabus: Accounting and finance: Introduction to finance accounting, financial statements and analysis; time values of money; NPV and DCF; capital budgeting cash flows and techniques. Management and Organizational Theory: Theory of organization; motivation; leadership; communication; human resource development/strategic planning; organizational development and change. Production management, planning and control; project management, PERT, CPM, project evaluation; quality management. Introduction to Business Law:
Formation of companies and general legal requirements; general principles of Contract and Tort; Law of Agency; Sale of goods and Hire Purchase Act.

**MGMG 3136 NEW VENTURE CREATION AND ENTREPRENEURSHIP**
3 credits Level III

Prerequisites: 

Syllabus: This course deals with one of the most challenging issues confronting developing countries. It focuses on understanding and appreciating the entrepreneurial mindset in relation to the ability to create new ventures successfully. The course also focuses on “intrapreneurship” or in the reinvigoration of existing enterprises with an attitude of innovation, responsiveness and receptivity to change, and it considers entrepreneurship in an international context.

**PHYS 3385 ELECTROMAGNETISM**
4 credits Level III

Prerequisites: ELNG1101 and MATH2230


**ELET 3480 WIRELESS COMMUNICATION**
3 credits Level III

Prerequisites: ELET2480

Syllabus: Introduction to wireless communication systems; Modern Wireless communication systems: 2G, 2.5G and 3G technologies; intro to 4G technologies; The cellular concept: system design fundamentals. Mobile radio propagation: Large
scale path loss; small scale fading and multi-path. Modulation techniques for mobile radio; Equalization, Diversity and Channel coding; Speech Coding; Multiple access techniques for wireless communications; Wireless networking; Wireless systems and standards. (Text: Wireless Communications: Principles and Practice – by T.S Rapaport; Prentice Hall Publications, 2002)

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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Level</th>
</tr>
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<tbody>
<tr>
<td>ECNG 3016</td>
<td>ADVANCED DIGITAL ELECTRONICS</td>
<td>3</td>
<td>III</td>
</tr>
<tr>
<td>Prerequisites:</td>
<td>ELET2430</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Syllabus:</td>
<td>Master timing issues in digital systems. Rationale for techniques employed in implementing digital systems on FPGAs. Arithmetic circuits in digital systems. VHDL in IP cores, effective use of Xilinx ISE and Modelsim in FPGA implementations.</td>
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<th>Credits</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELNG 3050</td>
<td>BROADBAND NETWORKS</td>
<td>3</td>
<td>III</td>
</tr>
<tr>
<td>Prerequisites:</td>
<td>ELET2480</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Syllabus:</td>
<td>Orthogonal Frequency Division multiplexing and other block based transmissions; Multiple input – multiple output antenna systems (MIMO); Ultrawideband systems; Medium Access control; Mobility Resource Management; Routing protocols for multi-hop wireless broadband networks; Radio resource management foe wireless broadband networks; Quality of service for multimedia services; Long tern evolution of Cellular networks; Wireless broadband networking with WIMAX; Wireless Local Area Network; Convergence of networks (Text: Wireless Broadband Networks – by David Tung Chong Wong, et al; Wiley and Sons – 2009))</td>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Level</th>
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<tbody>
<tr>
<td>ECNG 3028</td>
<td>INTRODUCTION TO PROCESS CONTROL</td>
<td>3</td>
<td>III</td>
</tr>
<tr>
<td>Pre/Co-Requisites:</td>
<td>ELNG3040</td>
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<tr>
<td>Syllabus:</td>
<td>Process identification: Sizing pumps and control valves to meet plant specifications; model based tuning of PID Controllers; Modeling and control strategies for common industrial operation units; analysis and design of advanced control systems. Feedback control of systems with large deadtime and inverse response; feed forward and ratio control;</td>
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inferential control; design of control systems for multivariable processes. Synthesis of alternative control configuration for multiple-input, multiple-output processes. Interaction and decoupling of control loops; design of control schemes for complete plants; computer simulation of open- and closed-loop systems

**ELNG 3040  INDUSTRIAL AUTOMATION**

3 credits  Level III

**Prerequisites:** ECNG2009 and ELET2450

**Syllabus:**

**ELNG 3060  POWER PLANT INSTRUMENTATION**

3 credits  Level III

**Pre/Co-Requisites:** ELNG3040

**Syllabus:**
Power plant: Unit, overview, Types of boiler, Exhaust Gas Boilers and Incinerators, turbine generators, condensers, material handling systems. Comparison of thermal power plant, hydroelectric power plant, Nuclear power plant, solar power plant, Wind power plant. Boiler Instrumentation: Control and optimization, Combustion control, air to fuel ratio control, 3-element drum level control, steam temperature and pressure control, oxygen/CO2 in flue gases, furnace draft, boiler interlocks, sequence event recorder, supervisor control, data acquisition controls, burner management systems and
FACULTY SCHOLARSHIPS AND AWARDS

DEPARTMENT OF CHEMISTRY

THE CHEMISTRY DEPARTMENT PRIZE
THE CEDRIC HASSALL PRIZE
THE WILFRED CHAN AWARD
THE GARFIELD SADLER AWARD
THE L. J. HAYNES AWARD
THE PAVELICH/HONKAN PRIZE
THE GERALD LALOR SCHOLARSHIP
THE KENNETH MAGNUS SCHOLARSHIP
THE EARLE ROBERTS SCHOLARSHIP
THE TARA DASGUPTA SCHOLARSHIP

DEPARTMENT OF GEOGRAPHY AND GEOLOGY

GEOGRAPHY

THE BARRY FLOYD PRIZE FOR LEVELS 1 and 2 GEOGRAPHY

GEOLOGY

THE GEOLOGICAL SOCIETY OF JAMAICA SCHOLARSHIP
THE HARRY KUARSINGH MEMORIAL PRIZE

DEPARTMENT OF LIFE SCIENCES

PRELIMINARY LEVEL LIFE SCIENCES DEPARTMENTAL PRIZE
INTRODUCTORY LEVEL LIFE SCIENCES DEPARTMENTAL PRIZE
SECOND YEAR ZOOLOGY PRIZE
DON SKELDING PRIZE
L. B. COKE PRIZE IN PLANT PHYSIOLOGY
VINCENT HUGH McKIE PRIZE

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCES

MERVILLE CAMPBELL PRIZE (LEVELS 1 and 2)
UNIVERSITY LODGE/EUCLID KING PRIZE

DEPARTMENT OF PHYSICS

JOHN LODENQUAI PRIZE (LEVEL 1)
LEVEL 2 DEPARTMENTAL AWARD
FRANCIS BOWEN BURSARY
MICHAEL THARMANATHAN PHYSICS BURSARY
PROJECT PRIZE (FINAL YEAR)