FACULTY OF SCIENCE AND TECHNOLOGY

OPTIONS OFFERED WITHIN THE FACULTY

- Chemistry and Management
- Chemistry with Education
- Special Chemistry Degree
# DEPARTMENT OF CHEMISTRY

## OPTIONS

### CHEMISTRY AND MANAGEMENT

<table>
<thead>
<tr>
<th>Course Codes</th>
<th>Courses Names</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LEVEL 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM1901</td>
<td>Introductory Chemistry A</td>
<td>6</td>
</tr>
<tr>
<td>CHEM1902</td>
<td>Introductory Chemistry B</td>
<td>6</td>
</tr>
<tr>
<td>ECON1000</td>
<td>Principles of Economics</td>
<td>3</td>
</tr>
<tr>
<td>ECON1012</td>
<td>Principles of Economics II</td>
<td>3</td>
</tr>
<tr>
<td>SOCI1002</td>
<td>Sociology for the Caribbean</td>
<td>3</td>
</tr>
<tr>
<td>PSYC1002</td>
<td>Introduction to Industrial &amp; Organisational Psychology</td>
<td>3</td>
</tr>
<tr>
<td>ACCT1005*</td>
<td>Financial Accounting</td>
<td>3</td>
</tr>
<tr>
<td>ACCT1003*</td>
<td>Introduction to Cost and Management Accounting</td>
<td>3</td>
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</table>

*Students entering after 2010/2011 and who have passed CAPE Accounting Units I & II with Grade IV or better will receive credit exemptions from ACCT1003 and ACCT1005.

All students are required to successfully complete six credits of Level I Mathematics prior to entering the Advanced Chemistry courses. Recommended Mathematics courses are **MATH1185** (Calculus for Scientists and Engineers, offered in Semester 1) **AND STAT1001** (Statistics for Scientists, offered in Semesters 1 and 2).

<table>
<thead>
<tr>
<th>Course Codes</th>
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<tbody>
<tr>
<td><strong>LEVEL II</strong></td>
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<tr>
<td>CHEM2010</td>
<td>Chemical Analysis A</td>
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<tr>
<td>CHEM2011</td>
<td>Chemical Analysis Laboratory I</td>
<td>2</td>
</tr>
<tr>
<td>CHEM2110</td>
<td>Inorganic Chemistry A</td>
<td>3</td>
</tr>
<tr>
<td>CHEM2111</td>
<td>Inorganic Chemistry Laboratory I</td>
<td>2</td>
</tr>
<tr>
<td>CHEM2210</td>
<td>Organic Chemistry A</td>
<td>3</td>
</tr>
<tr>
<td>CHEM2211</td>
<td>Organic Chemistry Laboratory I</td>
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</tr>
<tr>
<td>CHEM2310</td>
<td>Physical Chemistry A</td>
<td>3</td>
</tr>
</tbody>
</table>
CHEM2311 Physical Chemistry Laboratory I 2
CHEM3110 Inorganic Chemistry B 3
CHEM3210 Organic Chemistry B 3
CHEM3310 Physical Chemistry B 3
MGMT2003 Principles of Marketing 3
MGMT2005 Computer Applications 3
MGMT2008 Organizational Behaviour 3
MGMT2012 Introduction to Quantitative Methods 3
MGMT2021 Business Law 3
MGMT2023 Financial Management I 3
MGMT2026 Production and Operations Management 3
MGMT3031 Business Strategy and Policy 3
MGMT3136 Entrepreneurship and New Venture Creation 3

Plus:
Three additional credits from Level III Chemistry courses approved by the Department, to be taken along with three additional credits from Levels 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 which must include CHEM1901, CHEM1902 and six (6) credits of Level I Mathematics. Recommended Mathematics courses are MATH1185 (Calculus for Scientists and Engineers, offered in Semester 1) AND EITHER MATH1141 (Introduction to Linear Algebra & Analytical Geometry, offered in Semesters 1 and 2) OR STAT1001 (Statistics for Scientists, offered in Semesters 1 and 2).

Trained Teachers with the New Double Option Science (since 2004) with Chemistry as one of their majors and who have a GPA of at least 2.9 may be granted exemption 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 FST.
LEVELS II AND III
All students are required to successfully complete SIX credits of Level 1 Mathematics prior to entering the Advanced Chemistry courses.

Thirty-two (32) Credits from Level II and Level III Chemistry courses are required. These must include:

<table>
<thead>
<tr>
<th>Course Codes</th>
<th>Courses Names</th>
<th>Credits</th>
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<tr>
<td>CHEM2010</td>
<td>Chemical Analysis A</td>
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<tr>
<td>CHEM2011</td>
<td>Chemical Analysis Laboratory I</td>
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<td>CHEM2110</td>
<td>Inorganic Chemistry A</td>
<td>3</td>
</tr>
<tr>
<td>CHEM2111</td>
<td>Inorganic Chemistry Laboratory I</td>
<td>2</td>
</tr>
<tr>
<td>CHEM2210</td>
<td>Organic Chemistry A</td>
<td>3</td>
</tr>
<tr>
<td>CHEM2211</td>
<td>Organic Chemistry Laboratory I</td>
<td>2</td>
</tr>
<tr>
<td>CHEM2310</td>
<td>Physical Chemistry A</td>
<td>3</td>
</tr>
<tr>
<td>CHEM2311</td>
<td>Physical Chemistry Laboratory I</td>
<td>2</td>
</tr>
<tr>
<td>CHEM3110</td>
<td>Inorganic Chemistry B</td>
<td>3</td>
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<tr>
<td>CHEM3210</td>
<td>Organic Chemistry B</td>
<td>3</td>
</tr>
<tr>
<td>CHEM3310</td>
<td>Physical Chemistry B</td>
<td>3</td>
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</table>

Plus:
Three additional Credits from Level III Chemistry courses approved by the Department to complete the course of study.

EDUCATION COURSES

Please consult the Faculty of Humanities & Education regarding the selection of Education Courses.
<table>
<thead>
<tr>
<th>CODES</th>
<th>TITLES</th>
<th>CREDIT</th>
<th>SEMESTER OFFERED</th>
<th>LEVEL</th>
<th>PRE-REQUISITES (CO-REQUISITE)</th>
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<tr>
<td>PRELIMINARY/ LEVEL 0</td>
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<tr>
<td>CHEM0901</td>
<td>PRELIMINARY CHEMISTRY A</td>
<td>6-P</td>
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<td>0</td>
<td>CSEC (CXC) Chemistry Grade III or better</td>
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<tr>
<td>CHEM0902</td>
<td>PRELIMINARY CHEMISTRY B</td>
<td>6-P</td>
<td>2</td>
<td>0</td>
<td>CSEC (CXC) Chemistry Grade III or better</td>
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<tr>
<td>LEVEL 1</td>
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<tr>
<td>CHEM1901</td>
<td>INTRODUCTORY CHEMISTRY A</td>
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<td>1</td>
<td>1</td>
<td>CHEM0901 and CHEM0902, or CAPE Chemistry, or GCE A-level Chemistry.</td>
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<tr>
<td>CHEM1902</td>
<td>INTRODUCTORY CHEMISTRY B</td>
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<td>CHEM0901 and CHEM0902, or CAPE Chemistry OR GCE A-level Chemistry.</td>
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<tr>
<td>LEVEL 2</td>
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<tr>
<td>CHEM2010</td>
<td>CHEMICAL ANALYSIS A</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>CHEM1901 and CHEM1902; FOUN1401 or FOUN1001 with HOD approval;</td>
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<td>CHEM2011</td>
<td>CHEMICAL ANALYSIS LABORATORY I</td>
<td>2</td>
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<td>2</td>
<td>CHEM1901 and CHEM1902; FOUN1401 or FOUN1001 with HOD approval; (CHEM2010)</td>
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<tr>
<td>CHEM2110</td>
<td>INORGANIC CHEMISTRY A</td>
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<td>2</td>
<td>2</td>
<td>CHEM1901 and CHEM1902</td>
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<td>CREDIT</td>
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<td>LEVEL</td>
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<td>CHEM2111</td>
<td>INORGANIC CHEMISTRY LABORATORY I</td>
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<td>2</td>
<td>2</td>
<td>CHEM1901 and CHEM1902 (CHEM2110)</td>
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<td>CHEM2210</td>
<td>ORGANIC CHEMISTRY A</td>
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<td>CHEM1901 and CHEM1902</td>
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<td>CHEM1901 and CHEM1902 (CHEM2210)</td>
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<td>2</td>
<td>CHEM1901 and CHEM1902</td>
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<td>CHEM1901 and CHEM1902 (CHEM2310)</td>
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<tr>
<td>CHEM2402</td>
<td>CHEMISTRY IN OUR DAILY LIVES</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>CHEM1901 and CHEM1902</td>
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<td>CHEM2410</td>
<td>WATER TREATMENT</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>CHEM1901 and CHEM1902 and Permission of HOD</td>
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<td>CHEM2510</td>
<td>FOOD PROCESSING PRINCIPLES I</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>CHEM1901 and CHEM1902 and Permission of HOD</td>
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<td>FOOD PROCESSING LABORATORY</td>
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<td>1</td>
<td>2</td>
<td>CHEM1901 and CHEM1902 and Permission of HOD</td>
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<tr>
<td>CHEM2512</td>
<td>FOOD PROCESSING PRINCIPLES II</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>CHEM1901 and CHEM1902 and Permission of HOD</td>
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<tr>
<td>CHEM2601</td>
<td>ENVIRONMENTAL CHEMISTRY</td>
<td>8</td>
<td>1</td>
<td>2</td>
<td>CHEM1901 and CHEM1902 and Permission of HOD. This course is not available to students pursuing other Environmental Chemistry courses.</td>
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<td>CREDIT</td>
<td>SEMESTER OFFERED</td>
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<tr>
<td>CHEM3010</td>
<td>CHEMICAL ANALYSIS B</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>CHEM2010</td>
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<tr>
<td>CHEM3011</td>
<td>CHEMICAL ANALYSIS LABORATORY II</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>CHEM2010 and CHEM2011 Pass or Fail, but not Fail Absent. CHEM3010.</td>
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<tr>
<td>CHEM3110</td>
<td>INORGANIC CHEMISTRY B</td>
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<td>1</td>
<td>3</td>
<td>CHEM2110</td>
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<tr>
<td>CHEM3111</td>
<td>INORGANIC CHEMISTRY LABORATORY II</td>
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<td>2</td>
<td>3</td>
<td>Permission of HOD</td>
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<tr>
<td>CHEM3112</td>
<td>BIO-INORGANIC CHEMISTRY</td>
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<td>2</td>
<td>3</td>
<td>CHEM2110, CHEM2111 and CHEM3110</td>
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<td>ORGANIC CHEMISTRY B</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>CHEM2210 Pass or Fail but not Fail Absent</td>
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<tr>
<td>CHEM3211</td>
<td>ORGANIC CHEMISTRY LABORATORY II</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>Permission of HOD</td>
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<tr>
<td>CHEM3212</td>
<td>APPLICATIONS OF ORGANIC CHEMISTRY IN MEDICINE &amp; AGRICULTURE</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>CHEM2210, CHEM2211 and CHEM3210</td>
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<tr>
<td>CHEM3213</td>
<td>NATURAL PRODUCTS CHEMISTRY</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>CHEM2210, CHEM2211 and CHEM3210</td>
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<tr>
<td>CHEM3310</td>
<td>PHYSICAL CHEMISTRY B</td>
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<td>2</td>
<td>3</td>
<td>CHEM2310</td>
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<td>CODES</td>
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<td>PRE-REQUISITES (CO-REQUISITE)</td>
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<tr>
<td>CHEM3311</td>
<td>PHYSICAL CHEMISTRY LABORATORY II</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>Permission of HOD</td>
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<tr>
<td>CHEM3312</td>
<td>CHEMISTRY OF MATERIALS</td>
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<td>1</td>
<td>3</td>
<td>CHEM2310 and CHEM2110 or CHEM2301 and CHEM301 from the old curriculum</td>
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<tr>
<td>CHEM3313</td>
<td>TOPICS IN ADVANCED PHYSICAL CHEMISTRY</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>CHEM2310 and CHEM3310 or CHEM2301 and CHEM301 from the old curriculum</td>
</tr>
<tr>
<td>CHEM3401</td>
<td>PROJECT EVALUATION AND MANAGEMENT FOR SCIENCE BASED INDUSTRIES</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>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. CHEM2510 + CHEM2511 or CHEM3403.</td>
</tr>
<tr>
<td>CHEM3403</td>
<td>CHEMICAL PROCESSING PRINCIPLES</td>
<td>8</td>
<td>2</td>
<td>3</td>
<td>CHEM2301 or CHEM3301 from the old curriculum or CHEM2310 and CHEM2311 from the new curriculum and Permission of HOD.</td>
</tr>
<tr>
<td>CHEM3510</td>
<td>FOOD CHEMISTRY I</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>CHEM2010 + CHEM2011 and CHEM2210 + CHEM2211 and Permission of HOD.</td>
</tr>
<tr>
<td>CHEM3511</td>
<td>FOOD CHEMISTRY LABORATORY</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>Permission of HOD; CHEM3510 and CHEM3512</td>
</tr>
<tr>
<td>CODES</td>
<td>TITLES</td>
<td>CREDIT</td>
<td>SEMESTER OFFERED</td>
<td>LEVEL</td>
<td>PRE-REQUISITES (CO-REQUISITE)</td>
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<tr>
<td>CHEM3512</td>
<td>FOOD CHEMISTRY II</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>CHEM2010 + CHEM2011 and CHEM2210 + CHEM2211 and Permission of HOD.</td>
</tr>
<tr>
<td>CHEM3513</td>
<td>FOOD SAFETY &amp; QUALITY ASSURANCE</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>CHEM2510 OR CHEM2512 and Permission of HOD.</td>
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<tr>
<td>1CHEM3610</td>
<td>MARINE AND FRESHWATER CHEMISTRY</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>CHEM2010, CHEM2011 and any one of the following: CHEM2110, CHEM2210, CHEM2310 or CHEM3010</td>
</tr>
<tr>
<td>1CHEM3611</td>
<td>ENVIRONMENTAL CHEMISTRY LABORATORY</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>Co-requisite; CHEM3610; Permission of HOD</td>
</tr>
<tr>
<td>1CHEM3612</td>
<td>ATMOSPHERIC CHEMISTRY &amp; BIOGEOCHEMICAL CYCLES</td>
<td>6</td>
<td>2</td>
<td>3</td>
<td>CHEM3610 and HOD permission</td>
</tr>
<tr>
<td>1CHEM3621</td>
<td>MARINE AND FRESHWATER CHEMISTRY FIELD COURSE</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>CHEM3610 and HOD permission</td>
</tr>
<tr>
<td>CHEM3711</td>
<td>CHEMISTRY RESEARCH PROJECT</td>
<td>6</td>
<td>1, 2 &amp; 3</td>
<td>3</td>
<td>Majoring in Chemistry; 20 Advanced Credits in Chemistry and Permission of HOD.</td>
</tr>
</tbody>
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1 Available as of Academic Year 2014/15
LIST OF UNDERGRADUATE COURSES AVAILABLE
DEGREE OFFERINGS

The following programmes are available to students taking Level II Chemistry courses for the first time in 2013/14.

Majors
General Chemistry
Applied Chemistry
Food Chemistry
Environmental Chemistry

Options
Chemistry with Education
Chemistry and Management
Special Chemistry

Minors
General Chemistry
Environmental Chemistry
Food Chemistry
Food Processing
Industrial Chemistry

GENERAL CHEMISTRY MAJOR
A major in General Chemistry requires forty (40) credits from Level II and Level III Chemistry courses and must include:

(a) CHEM2010 Chemical Analysis A (3 Credits)
CHEM2011 Chemical Analysis Laboratory I (2 Credits)
CHEM2110 Inorganic Chemistry A (3 Credits)
CHEM2111 Inorganic Chemistry Laboratory I (2 Credits)
CHEM2210 Organic Chemistry A (3 Credits)
CHEM2211 Organic Chemistry Laboratory I (2 Credits)
CHEM2310 Physical Chemistry A (3 Credits)
CHEM2311 Physical Chemistry Laboratory I (2 Credits)

(b) At least six (6) credits from:
CHEM3010 Chemical Analysis B (3 Credits)
CHEM3110 Inorganic Chemistry B (3 Credits)
CHEM3210 Organic Chemistry B (3 Credits)
CHEM3310 Physical Chemistry B (3 Credits)

(c) At least four (4) credits from:
CHEM3011 Chemical Analysis Laboratory II (2 Credits)
CHEM3111  Inorganic Chemistry Laboratory II  (2 Credits)
CHEM3211  Organic Chemistry Laboratory II  (2 Credits)
CHEM3311  Physical Chemistry Laboratory II  (2 Credits)

(d) Ten (10) additional credits which may include courses listed in (b) and (c) above and those listed below:

CHEM2410  Water Treatment*  (4 Credits)
CHEM3402  Chemistry in Industry*  (4 Credits)
CHEM2510  Food Processing Principles I  (3 Credits)
CHEM2511  Food Processing Laboratory*  (3 Credits)
CHEM2512  Food Processing Principles II  (3 Credits)
CHEM2601  Environmental Chemistry  (8 Credits)
CHEM3112  Bio-Inorganic Chemistry  (3 Credits)
CHEM3212  Applications of Organic Chemistry in Medicine and Agriculture  (3 Credits)
CHEM3213  Natural Products Chemistry  (3 Credits)
CHEM3312  Topics in Advanced Physical Chemistry 1: Materials Science  (3 Credits)
CHEM3313  Topics in Advanced Physical Chemistry II: Structure, Dynamics and Computational Methods  (3 Credits)
CHEM3403  Chemical Process Principles*  (8 Credits)
CHEM3510  Food Chemistry I  (3 Credits)
CHEM3511  Food Chemistry Laboratory*  (3 Credits)
CHEM3512  Food Chemistry II  (3 Credits)
CHEM3513  Food Safety & Quality Assurance*  (3 Credits)
1CHEM3610  Marine & Freshwater Chemistry*  (3 credits)
1CHEM3611  Environmental Chemistry Laboratory*  (2 credits)
1CHEM3612  Atmospheric Chemistry & Biogeochemical Cycles*  (6 credits)
1CHEM3621  Marine and Freshwater Chemistry Field Course*  (2 credits)

*  ~Spaces may be limited in these courses
1  ~Available as of Academic Year 2014/15
APPLIED CHEMISTRY MAJOR

A major in Applied Chemistry requires forty-seven (47) credits comprised of the following Level II and Level III Chemistry courses:

(a) CHEM2010 Chemical Analysis A (3 Credits)
    CHEM2011 Chemical Analysis Laboratory I (2 Credits)
    CHEM2310 Physical Chemistry (3 Credits)
    CHEM2311 Physical Chemistry Laboratory I (2 Credits)
    CHEM3402 Chemistry in Industry (4 Credits)
    CHEM2601 Environmental Chemistry (8 Credits)
    CHEM3010 Chemical Analysis B (3 Credits)
    CHEM3011 Chemical Analysis Laboratory II (2 Credits)
    CHEM3401 Project Evaluation & Management
        For Science-based Industries (4 Credits)
    CHEM3403 Chemical Process Principles (8 Credits)

(b) Eight (8) additional credits selected from any Level II or Level III Chemistry courses.

Suggested schedule of courses leading to a major in Applied Chemistry

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<tr>
<th>Year</th>
<th>Semester 1</th>
<th>Semester 2</th>
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<tbody>
<tr>
<td>Introductory</td>
<td>CHEM1901 + a minimum of 3 Credits Mathematics</td>
<td>CHEM1902 + a minimum of 3 Credits Mathematics</td>
</tr>
<tr>
<td>1st Advanced Year</td>
<td>CHEM2010 (3)</td>
<td>CHEM2311 (2)</td>
</tr>
<tr>
<td>(2012-13)</td>
<td>CHEM2011 (2)</td>
<td>CHEM3010 (3)</td>
</tr>
<tr>
<td></td>
<td>CHEM2310 (3)</td>
<td>CHEM3011 (2)</td>
</tr>
<tr>
<td>2nd Advanced Year</td>
<td>CHEM3401 (4)</td>
<td>CHEM3403 (8)</td>
</tr>
<tr>
<td>(2013-14)</td>
<td>CHEM2601 (8)</td>
<td></td>
</tr>
</tbody>
</table>
FOOD CHEMISTRY MAJOR

A major in Food Chemistry requires forty-seven (47) credits comprised of the Level II and Level III courses listed below:

- CHEM2010 Chemical Analysis A (3 Credits)
- CHEM2011 Chemical Analysis Laboratory I (2 Credits)
- CHEM2210 Organic Chemistry A (3 Credits)
- CHEM2211 Organic Chemistry Laboratory I (2 Credits)
- CHEM2310 Physical Chemistry A (3 Credits)
- CHEM3010 Chemical Analysis B (3 Credits)
- CHEM3011 Chemical Analysis Laboratory II (2 Credits)
- CHEM2410 Water Treatment (4 Credits)
- CHEM2510 Food Processing Principles I (3 Credits)
- CHEM2511 Food Processing Laboratory (3 Credits)
- CHEM2512 Food Processing Principles II (3 Credits)
- CHEM3401 Project Evaluation & Management for Science-based Industries (4 Credits)
- CHEM3510 Food Chemistry I (3 Credits)
- CHEM3511 Food Chemistry Laboratory (3 Credits)
- CHEM3512 Food Chemistry II (3 Credits)
- CHEM3513 Food Safety & Quality Assurance (3 Credits)

Suggested schedule of courses leading to a major in Food Chemistry

<table>
<thead>
<tr>
<th>Year</th>
<th>Semester 1</th>
<th>Semester 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introductory</td>
<td>CHEM1901 + a minimum of 3 Credits Mathematics</td>
<td>CHEM1901 + a minimum of 3 Credits Mathematics</td>
</tr>
</tbody>
</table>
| 1st Advanced Year | CHEM2010 (3)  
                 | CHEM2011 (2)  
                 | CHEM2210 (3)  
                 | CHEM2211 (2)  
                 | CHEM2510 (3)  
                 | CHEM2511 (3)  
                 | CHEM2512 (3)  |                  |
| 2nd Advanced Year | CHEM2310 (3)  
                   | CHEM2410 (4)  
                   | CHEM3401 (4)  |                  |
|                | CHEM3510 (3)  
                | CHEM3511 (3)  
                | CHEM3512 (3)  
                | CHEM3513 (3)  |                  |
ENVIRONMENTAL CHEMISTRY MAJOR

A major in Environmental Chemistry requires forty-seven (47) credits from Level II and Level III courses which must include:
(a) all the following (38 credits):
   - CHEM2010 Chemical Analysis A (3 credits)
   - CHEM2011 Chemical Analysis Laboratory I (2 credits)
   - CHEM2110 Inorganic Chemistry A (3 credits)
   - CHEM2210 Organic Chemistry A (3 credits)
   - CHEM2310 Physical Chemistry A (3 credits)
   - CHEM2410 Water Treatment (4 credits)
   - CHEM3010 Chemical Analysis B (3 credits)
   - CHEM3011 Chemical Analysis Laboratory II (2 credits)
   - CHEM3402 Chemistry in Industry (4 credits)
   - CHEM3611 Environmental Chemistry Laboratory (2 credits)
   - CHEM3612 Atmospheric Chemistry & Biogeochemical Cycles (6 credits)

(b) at least SIX (6) credits from:
   - CHEM2111 Inorganic Chemistry laboratory I (2 credits)
   - CHEM2211 Organic Chemistry Laboratory I (2 credits)
   - CHEM2311 Physical Chemistry Laboratory I (2 credits)
   - CHEM3621 Marine and Freshwater Chemistry Field Course (2 credits)

(c) At least THREE additional credits from any Level III Chemistry courses.

Suggested schedule of courses for a major in Environmental Chemistry

<table>
<thead>
<tr>
<th>Year</th>
<th>Semester 1</th>
<th>Semester 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introductory</td>
<td>CHEM1901 + a minimum of 3 Credits Mathematics</td>
<td>CHEM1901 + a minimum of 3 Credits Mathematics</td>
</tr>
<tr>
<td>1st Advanced Year</td>
<td>CHEM2010 (3)</td>
<td>CHEM3010 (3)</td>
</tr>
<tr>
<td></td>
<td>CHEM2011 (2)</td>
<td>CHEM3011 (2)</td>
</tr>
<tr>
<td></td>
<td>CHEM2210 (3)</td>
<td>CHEM3402 (4)</td>
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<tr>
<td></td>
<td>CHEM2310 (3)</td>
<td>CHEM2110 (3)</td>
</tr>
<tr>
<td></td>
<td>CHEM2410 (4)</td>
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</tr>
<tr>
<td>2nd Advanced Year</td>
<td>CHEM3610 (3)</td>
<td>CHEM3612 (6)</td>
</tr>
<tr>
<td></td>
<td>CHEM3611 (2)</td>
<td></td>
</tr>
</tbody>
</table>

1 Available as of Academic Year 2014/15
GENERAL CHEMISTRY MINOR

A minor in General Chemistry requires at least fifteen (15) credits at Level II which must include:

(a) CHEM2010 Chemical Analysis A (3 Credits)  
    CHEM2011 Chemical Analysis Laboratory I (2 Credits)  
    CHEM2211 Organic Chemistry Laboratory I (2 Credits)  
    CHEM2311 Physical Chemistry Laboratory I (2 Credits)

(b) Six (6) credits from:
    CHEM2101 Inorganic Chemistry (4 Credits)  
    CHEM2210 Organic Chemistry A (3 Credits)  
    CHEM2310 Physical Chemistry A (3 Credits)

FOOD CHEMISTRY MINOR

A minor in Food Chemistry requires at least sixteen (16) credits at Level II and Level III which must include:

(a) CHEM3510 Food Chemistry I (3 Credits)  
    CHEM3511 Food Chemistry Laboratory (3 Credits)  
    CHEM3512 Food Chemistry II (3 Credits)

(b) And at least seven (7) credits from:
    CHEM2010 Chemical Analysis A (3 Credits)  
    CHEM2011 Chemical Analysis Laboratory I (2 Credits)  
    CHEM2210 Organic Chemistry A (3 Credits)  
    CHEM2211 Organic Chemistry Laboratory I (2 Credits)  
    CHEM2310 Physical Chemistry A (3 Credits)  
    CHEM2311 Physical Chemistry A Laboratory (2 Credits)  
    CHEM2410 Water Treatment (4 Credits)  
    CHEM3010 Chemical Analysis B (3 Credits)  
    CHEM3011 Chemical Analysis Laboratory II (2 Credits)  
    CHEM3513 Food Safety & Quality Assurance (3 Credits)

FOOD PROCESSING MINOR

A minor in Food Processing requires at least sixteen (16) credits at Level II and Level III which must include:

(a) CHEM2510 Food Processing Principles I (3 Credits)  
    CHEM2511 Food Processing Laboratory (3 Credits)  
    CHEM2512 Food Processing Principles II (3 Credits)
(b) And at least seven (7) credits from:

- CHEM2310 Physical Chemistry A (3 Credits)
- CHEM2311 Physical Chemistry A Laboratory I (2 Credits)
- CHEM2410 Water Treatment (4 Credits)
- CHEM2412 Chemistry in Industry (4 Credits)
- CHEM3401 Project Evaluation & Management for Science-based Industries (4 Credits)
- CHEM3410 Chemical Processing Principles A (4 Credits)
- CHEM3513 Food Safety Quality Assurance (3 Credits)

**INDUSTRIAL CHEMISTRY MINOR**

A minor in Industrial Chemistry requires at least sixteen (16) credits at Level II and Level III which must include the courses listed below.

- CHEM3402 The Chemical Industries (4 Credits)
- CHEM3401 Project Evaluation & Management for Science-based Industries (4 Credits)
- CHEM3403 Chemical Process Principles (8 Credits)

**ENVIRONMENTAL CHEMISTRY MINOR**

A minor in Environmental Chemistry requires at least 16 credits at Level II and Level III courses which must include:

(a) CHEM2601 Environmental Chemistry (8 Credits)

(b) And at least eight (8) credits from:

- CHEM2010 Chemical Analysis A (3 Credits)
- CHEM2011 Chemical Analysis Laboratory I (2 Credits)
- CHEM3010 Chemical Analysis B (3 Credits)
- CHEM3011 Chemical Analysis Laboratory II (2 Credits)
- CHEM3402 The Chemical Industries (4 Credits)

2 Available in Academic Year 2013/14 ONLY

**ENVIRONMENTAL CHEMISTRY MINOR**

As of 2014/15, a minor in Environmental Chemistry will require at least 15 credits at Level II and Level III courses which must include:

(a) the following courses (11 credits)

- CHEM3610 Marine and Freshwater Chemistry (3 credits)
- CHEM3612 Atmospheric Chemistry & Biogeochemical Cycles (6 credits)
- CHEM3611 Environmental Chemistry Lab (2 credits)

1 Available in Academic Year 2014/15 ONLY
(b) and at least 4 credits from:

- CHEM2010 Chemical Analysis A (3 credits)
- CHEM2011 Chemical Analysis laboratory I (2 credits)
- CHEM2410 Water Treatment (4 credits)
- CHEM3010 Chemical Analysis B (3 credits)
- CHEM3011 Chemical Analysis Laboratory II (2 credits)

1 Available as of Academic Year 2014/15

OPTIONS

Three Options involving Chemistry are offered: Chemistry and Management, Chemistry with Education and Special Chemistry.

CHEMISTRY AND MANAGEMENT

The Chemistry and Management Option requires at least thirty-two (32) credits of Level II and Level III Chemistry courses along with the Management courses specified. The courses must include:

LEVEL I

- CHEM1901 Introductory Chemistry A (6 Credits)
- CHEM1902 Introductory Chemistry B (6 Credits)
- ECON1001 Introduction to Microeconomics (3 Credits)
- ECON1002 Introduction to Macroeconomics (3 Credits)
- SOCI1002 Sociology for the Caribbean (3 Credits)
- PSYC1002 Introduction to Industrial & Organisational Psychology (3 Credits)
- ACCT1005# Financial Accounting (3 Credits)
- ACCT1003# Introduction to Cost & Management Accounting (3 Credits)

# Students entering after 2010/2011 and who have passed CAPE Accounting Units I & II with Grade IV or better will receive credit exemptions from ACCT1003 and ACCT1005.

All students are required to successfully complete six Credits of Level I Mathematics prior to entering the advanced Chemistry courses. Recommended Mathematics courses are MATH1185 (Calculus for Scientists and Engineers, offered in Semester 1) AND STAT1001 (Statistics for Scientists, offered in Semesters 1 and 2).
### LEVELS II AND III

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM2010</td>
<td>Chemical Analysis A</td>
<td>(3)</td>
</tr>
<tr>
<td>CHEM2011</td>
<td>Chemical Analysis Laboratory I</td>
<td>(2)</td>
</tr>
<tr>
<td>CHEM2110</td>
<td>Inorganic Chemistry</td>
<td>(3)</td>
</tr>
<tr>
<td>CHEM2111</td>
<td>Inorganic Chemistry Laboratory I</td>
<td>(2)</td>
</tr>
<tr>
<td>CHEM2210</td>
<td>Organic Chemistry A</td>
<td>(3)</td>
</tr>
<tr>
<td>CHEM2211</td>
<td>Organic Chemistry Laboratory I</td>
<td>(2)</td>
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<tr>
<td>CHEM2310</td>
<td>Physical Chemistry A</td>
<td>(3)</td>
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<td>CHEM2311</td>
<td>Physical Chemistry Laboratory I</td>
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<tr>
<td>CHEM3110</td>
<td>Inorganic Chemistry</td>
<td>(3)</td>
</tr>
<tr>
<td>CHEM3210</td>
<td>Organic Chemistry B</td>
<td>(3)</td>
</tr>
<tr>
<td>CHEM3310</td>
<td>Physical Chemistry B</td>
<td>(3)</td>
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<tr>
<td>MGMT2003</td>
<td>Principles of Marketing</td>
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<td>MGMT2005</td>
<td>Computer Applications</td>
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<td>MGMT2008</td>
<td>Organizational Behaviour</td>
<td>(3)</td>
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<tr>
<td>MGMT2012</td>
<td>Introduction to Quantitative Methods</td>
<td>(3)</td>
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<td>MGMT2021</td>
<td>Business Law</td>
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<tr>
<td>MGMT2023</td>
<td>Financial Management I</td>
<td>(3)</td>
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<tr>
<td>MGMT2026</td>
<td>Production and Operations Management</td>
<td>(3)</td>
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<tr>
<td>MGMT3031</td>
<td>Business Strategy and Policy</td>
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</tr>
<tr>
<td>MGMT3136</td>
<td>Entrepreneurship and New Venture Creation</td>
<td>(3)</td>
</tr>
</tbody>
</table>

**Plus:**

Three additional Credits from 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)**

The Chemistry with Education Option requires at least thirty-two (32) credits of Level II and Level III Chemistry courses along with the Education courses specified. The courses must include:

### LEVEL I

Twenty-four (24) Credits which must include CHEM1901, CHEM1902 and six (6) Credits of Level 1 Mathematics. Recommended Mathematics courses are **MATH1185** (Calculus for Scientists and Engineers, offered in Semester 1) **AND EITHER MATH1141** (Introduction to Linear Algebra & Analytical Geometry, offered in Semesters 1 and 2) **OR STAT1001** (Statistics for Scientists, offered in Semesters 1 and 2).
Trained Teachers with the New Double Option (since 2004) with Chemistry as one of their majors and who have a GPA of at least 2.9 may be granted exemption 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 FST.

**LEVEL 2 AND 3**

All students are required to successfully complete SIX credits of Level 1 Mathematics prior to entering the Advanced Chemistry courses.

Thirty-two (32) Credits from Level II and Level III Chemistry courses are required. These must include:

- CHEM2010 Chemical Analysis A Semester I (3 Credits)
- CHEM2011 Chemical Analysis Laboratory I (2 Credits)
- CHEM2110 Inorganic Chemistry A (3 Credits)
- CHEM2111 Inorganic Chemistry Laboratory I (2 Credits)
- CHEM2210 Organic Chemistry A (3 Credits)
- CHEM2211 Organic Chemistry Laboratory I (2 Credits)
- CHEM2310 Physical Chemistry A (3 Credits)
- CHEM2311 Physical Chemistry Laboratory I (2 Credits)
- CHEM3110 Inorganic Chemistry B (3 Credits)
- CHEM3210 Organic Chemistry B (3 Credits)
- CHEM3310 Physical Chemistry B (3 Credits)

Plus:

Three additional Credits from Level III Chemistry courses approved by the Department to complete the course of study.

**EDUCATION COURSES**

Please consult the Faculty of Humanities & Education regarding the selection of Education Courses.

**BSc SPECIAL CHEMISTRY DEGREE**

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

2. The minimum standards for admission to the programme are as follows:
(a) CAPE Physics or Preliminary Physics (PHYS0411, PHYS0412 and PHYS0421, PHYS0422) or the equivalent;
(b) Completion of Level 1 of the BSc degree programme, including passes in:
   - Introductory Chemistry (CHEM1901 and CHEM1902) at the prescribed level;
   - Six credits of Level 1 Mathematics;

3. Candidates with good grades in CHEM1901 and CHEM1902 will be given preference.

4. To be eligible for the award of the BSc. Special Chemistry degree, candidates must obtain:
   (a) Fifty-six (56) credits from Level II and Level III Chemistry courses which must include:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM2010</td>
<td>Chemical Analysis A</td>
<td>3</td>
</tr>
<tr>
<td>CHEM2011</td>
<td>Chemical Analysis Laboratory I</td>
<td>2</td>
</tr>
<tr>
<td>CHEM2110</td>
<td>Inorganic Chemistry A</td>
<td>3</td>
</tr>
<tr>
<td>CHEM2111</td>
<td>Inorganic Chemistry Laboratory I</td>
<td>2</td>
</tr>
<tr>
<td>CHEM2210</td>
<td>Organic Chemistry A</td>
<td>3</td>
</tr>
<tr>
<td>CHEM2211</td>
<td>Organic Chemistry Laboratory I</td>
<td>2</td>
</tr>
<tr>
<td>CHEM2310</td>
<td>Physical Chemistry A</td>
<td>3</td>
</tr>
<tr>
<td>CHEM2311</td>
<td>Physical Chemistry Laboratory I</td>
<td>2</td>
</tr>
<tr>
<td>CHEM3010</td>
<td>Chemical Analysis B</td>
<td>3</td>
</tr>
<tr>
<td>CHEM3011</td>
<td>Chemical Analysis Laboratory II</td>
<td>2</td>
</tr>
<tr>
<td>CHEM3110</td>
<td>Inorganic Chemistry B</td>
<td>3</td>
</tr>
<tr>
<td>CHEM3210</td>
<td>Organic Chemistry B</td>
<td>3</td>
</tr>
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<td>CHEM3310</td>
<td>Physical Chemistry B</td>
<td>3</td>
</tr>
<tr>
<td>CHEM3711</td>
<td>Chemistry Undergraduate Research Project</td>
<td>6</td>
</tr>
</tbody>
</table>

   PLUS:

   (b) sixteen (16) credits of additional Level II and Level III Chemistry courses, four (4) credits of which must be laboratory based.

   (c) an additional eight (8) credits selected from Level II courses in another science subject in the BSc degree programme and approved by the Department.
PRELIMINARY COURSES

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

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

Course Content:  This course covers the following topics:


- 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. 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.
CHEM0902  
PRELIMINARY CHEMISTRY B  
(6 P-Credits)  
Semester 2  
Level 0  
Pre-requisite:  
CSEC (CXC) Chemistry Grade III or better.  

Course Content:  
This course covers the following topics:  

- Properties and Reactivity of Main Group Elements and their compounds. Transition Elements and their compounds. Coordination compounds.  
- A functional group approach to the chemistry of organic compounds: alkyl halides, alcohols, carbonyl compounds, carboxylic acids and their derivatives and amines.  
- 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. 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  

CHEM1901  
INTRODUCTORY CHEMISTRY A  
(6 Credits)  
Semester 1  
Level I  

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

Course Content:  
This course covers the following topics:  

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• 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. 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.

CHEM1902  INTRODUCTORY CHEMISTRY B
(6 Credits)  Semester 2  Level I

Pre-requisites: CHEM0901 and CHEM0902, or CAPE Chemistry or GCE A-level Chemistry

Course Content: This course covers the following topics:

• 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.

- 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. 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 CHEM1901 and CHEM1902 must be successfully completed before students can proceed to Level 2 courses in Chemistry.

**LEVEL II COURSES**

**CHEM2010**

**CHEMICAL ANALYSIS A**

(3 Credits)  Semester I  Level II

Pre-requisites: CHEM1901 and CHEM1902, FOUN1401/FOUN1001 and Permission of HOD

Course Content: This course covers the following topics:
The analytical process and approaches to management of analytical laboratories: identifying and quantifying errors, statistical tests.

Introduction to analytical electrochemistry: redox titrations, electrochemical cells and electrode potentials, the Nernst equation, pH and ion-selective electrodes.

Introduction to chromatography: basic principles and types e.g. planar and column chromatography including high performance liquid chromatography and gas chromatography. Factors affecting separations Instrumental components and sample requirements, techniques for qualitative and quantitative chromatographic analysis.

Introduction to analytical molecular absorption spectroscopy: Beer-Lambert’s law, instrumentation and applications.

Evaluation:
- One 2-hour written examination 60%
- In-course tests 20%
- Course assignment 20%

CHEM2101 CHEMICAL ANALYSIS LABORATORY I
(2 Credits) Semester 1 Level II

Pre-requisites: CHEM1901 and CHEM1902, FOUN1401/FOUN1001 and Permission of HOD

Co-requisite: CHEM2010

Course Content: This course covers the following topics:
- Laboratory experiments designed around some Fundamental conventional and instrumental analytical procedures such as but not limited to redox titrations, spectrophotometric analyses,
analyses with electrodes and chromatographic separations.

• Workshops on effective approaches to scientific and technical writing.

Evaluation:

• Laboratory reports 50%
• Laboratory skills 25%
• Writing exercises 25%

CHEM2110 INORGANIC CHEMISTRY A
(3 Credits) Semester 2 Level II

Pre-requisites: CHEM1901 and CHEM1902

Course Content: This course covers the following topics:

• Chemistry of transition metals.
• Mechanisms of inorganic reactions: Substitution and electron transfer reactions.
• Transition metal organometallics: metal carbonyls, metal alkyls, cyclopentadienyl and arene complexes.
• Catalysis.
• 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. 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.
CHEM2111  INORGANIC CHEMISTRY LABORATORY I
(2 Credits) Semester 2 Level 2

Pre-requisites: CHEM1901 and CHEM1902

Co-requisite: CHEM2110

Course Content: This lecture/laboratory-based course is designed to develop skills in inorganic chemistry, including synthetic reaction procedures, isolation, and employment of spectroscopic techniques for the identification of compounds. It provides students with hands-on training necessary to develop skills in: problem-solving, manipulation of equipment, critical thinking, data collection, processing and analysis, synthesis, experimental design, team work, time management, oral and written communication. In addition it exposes students to international laboratory safety standards. The lectures will cover aspects of UV/Vis spectroscopy of transition metal complexes as well as their magnetic properties.

Evaluation:
- Laboratory reports 80%
- In-course test 20%

CHEM2210  ORGANIC CHEMISTRY A
(3 Credits) Semester 1 Level II

Pre-requisites: CHEM1901 and CHEM1902

Course Content: This course covers the following topics:
- The application of spectroscopic techniques in organic chemistry: electronic, infrared, proton, carbon-13, and carbon-13 magnetic resonance spectroscopy, mass spectrometry. Their utility in elucidating the structure of organic compounds.
- Carbocyclic and heterocyclic aromatic compounds. Review of the concept of 27


Evaluation:
- One 2-hour written examination 70%
- Two In-course tests 30%

**CHEM2211**  
ORGANIC CHEMISTRY LABORATORY I  
(2 Credits)  
Semester I  
Level II

Pre-requisites:  
CHEM1901 and CHEM1902

Co-requisite:  
CHEM2210

Course Content:  
This course covers the following topics:
- Isolation of natural products; synthetic techniques (including chemoselectivity, aldol reactions, electrophilic aromatic substitution, aromatic diazonium chemistry, heterocyclic synthesis, molecular rearrangement); organic stereochemistry; principles of green chemistry; characterisation of unknown organic compounds; thin layer chromatographic analysis.

Evaluation:  
- Laboratory reports 80%

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CHEM2310  PHYSICAL CHEMISTRY A  
(3 Credits)  Semester I  Level II  

Pre-requisites: CHEM1901 and CHEM1902  

Course Content: This course covers the following topics:  

Evaluation:  
- One 2-hour written examination  70%  
- In-course tests  30%
CHEM2311  PHYSICAL CHEMISTRY LABORATORY I
(2 Credits)  Semester 2  Level II

Pre-requisites:  CHEM1901 and CHEM1902

Co-requisite:  CHEM2310

Course Content:  This course covers the following topics:
• This laboratory course is designed to develop laboratory skills in physical chemistry, including proper use of instruments, data collection and analysis, estimation of errors and scientific report writing. Specific areas to be focused on include: Chemical thermodynamics, Electrochemistry, Quantum mechanics, Atomic spectroscopy, Molecular spectroscopy and Chemical kinetics.

Evaluation:
• Laboratory reports 80%
• One In-course test 20%

CHEM2402  CHEMISTRY IN OUR DAILY LIVES
(3 Credits)  Semester I  Level II

Pre-requisites:  CHEM1901 and CHEM1902 and Permission of HOD

Course Content:  This course covers the following topics:
• The role of chemistry in producing consumer products. Chemistry of textiles and, clothing, sport and crime. Applications of chemistry to the arts, crime-fighting and law enforcement, economics and politics. Chemistry and the environment.

Evaluation:
• One 2-hour written examination 50%
• In-course test 20%
• Graded assignments/presentations 30%
This course is open to FST students at the Advanced level who have successfully completed Level 1 (CHEM1901 and CHEM1902) Chemistry courses. It is available as an elective to students doing the Bachelors programme in Education with Chemistry, Chemistry and Education Option and the OESH programme. This course CANNOT be counted towards a major in Chemistry.

**CHEM2410**  
**WATER TREATMENT**  
(4 Credits) Semester 1 Level II

Pre-requisites: CHEM1901 and CHEM1902 and Permission of HOD

Course Content: This course covers the following topics:

- Water for industrial, agricultural, and domestic purposes: distribution, quality, environmental contamination. Water re-use and recycling.
- Water quality standards: regulations for industrial effluents, potable water, sewage effluents and their receiving bodies (river, wells and coastal waters). Water quality monitoring.
- Treatment and disposal of Wastewater, Domestic Sewage and Industrial Wastes. Characterization of potable, raw, waste and receiving waters.
- *A practical course of 48 hours.*

Evaluation:

- One 2-hour written examination 50%
- In-course tests 10%
- Course assignments 10%
- Laboratory Work 20%
- Field Trip Reports 10%
<table>
<thead>
<tr>
<th><strong>CHEM2510</strong></th>
<th><strong>FOOD PROCESSING PRINCIPLES I</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>(3 Credits)</td>
<td>Semester I Level II</td>
</tr>
<tr>
<td>Pre-requisites:</td>
<td>CHEM1901 and CHEM1902 and Permission of HOD. <em>Preference will be given to students majoring in Food Chemistry.</em></td>
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<tr>
<td>Course Content:</td>
<td>This course covers the following topics:</td>
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<tr>
<td></td>
<td>• Basic principles, technologies and applications involved in the processing of foods.</td>
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<td></td>
<td>• Processing at ambient temperatures: Characteristics of raw food, material transfer and fluid flow, heat transfer, spoilage and deterioration mechanisms, food preservation, effect of processing on sensory and nutritional properties, microbial risks and food safety issues.</td>
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<td></td>
<td>• Raw material preparation: size reduction, mixing and forming, separation, fermentation and enzyme technology, pickling and curing.</td>
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<td>• Processing by removal of heat: Refrigeration, chilling and refrigerated storage, freezing, freeze drying and concentration.</td>
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<td>• Modified atmosphere storage and packaging, material handling, storage and distribution.</td>
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<td>Evaluation:</td>
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<tr>
<td></td>
<td>• One 2-hour written examination 60%</td>
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<td></td>
<td>• In-course tests 20%</td>
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<td></td>
<td>• Course assignments 20%</td>
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<thead>
<tr>
<th><strong>CHEM2511</strong></th>
<th><strong>FOOD PROCESSING LABORATORY</strong></th>
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<tbody>
<tr>
<td>(3 Credits)</td>
<td>Semester I Level II</td>
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<tr>
<td>Pre-requisites:</td>
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</tr>
<tr>
<td>Co-requisites:</td>
<td>CHEM2510 and CHEM2512</td>
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Course Content: This course covers the following topics:

- Practical exposure to the skills required to function effectively in a food manufacturing facility.
- Handling, preparation, processing, and packaging of selected food products. Food processing operations involving ambient, thermal and non-thermal unit operations will be carried out and/or observed.
- Laboratory activities will be carried out in teams, and reports will be individually produced.

Evaluation:

- Laboratory and field trip reports 75%
- Research paper assignment 15%
- Oral presentation 10%

CHEM2512  
FOOD PROCESSING PRINCIPLES II  
(3 Credits) Semester 2 Level II

Pre-requisites: CHEM1901 and CHEM1902. Permission of HOD. Preference will be given to students majoring in Food Chemistry.

Course Content: This course covers the following topics:

- Thermal processing (steam, hot air and oil) and packaging operations: blanching; pasteurization. Heat sterilization: retorting; ultra-high temperature (UHT) and aseptic processes.
- Evaporation and Distillation: boiling point elevation types of evaporators, selection of evaporators, vapour compression, simple distillation systems, continuous and batch systems.
- Hot Air Psychrometrics. Properties of dry air, properties of water vapour, air-
vapour mixtures, dew-point, humidity ratio, relative humidity, wet bulb temperature, psychrometric chart.

- Dehydration: drying process, moisture diffusion, drying rate curves, drying time predictions, mass and energy balances, drying systems.
- Other processing methods: frying, irradiation, electric fields and high pressure, packaging operations and principles.

Evaluation:
- One 2-hour written examination  60%
- In-course tests 20%
- Course assignments 20%

CHEM2601 ENVIRONMENTAL CHEMISTRY
(8 Credits) Semester I Level II

Pre-requisites: CHEM1901 and CHEM1902 and Permission of HOD. This course is not available to students entering Level 2 in 2013/14.

Course Content: This course covers the following topics:
A study of the important processes and reactions in the environment by a consideration of:
- the biogeochemical cycles of the major, minor and trace elements showing sources and dispersion processes;
- the divisions into lithosphere, hydrosphere, atmosphere and biosphere; and
- the interactions between man and the environment (including pollution control).
- Acidity and metals: acid-base properties of water bodies: the CO$_3^{2-}$/HCO$_3^-$/$CO_2$ (aq) system, Henry’s Law, inorganic C speciation and pH of rain water. Other
sources of acidity, photosynthesis and ocean acidification. Redox equilibria, redox speciation diagrams.

- Atmospheric chemistry: atmospheric composition and structure; Sources, sinks, residence times and reactions of atmospheric constituents; Atmospheric pollution, effects on health, global warming, acid rain, ozone depletion and global treaties.
- Study of corrosion by a consideration of metallic corrosion (i) in gaseous environments, and (ii) in aqueous environments; Degradation of materials other than metals; Corrosion protection.
- *A practical course of 72 hours.*

Evaluation:
- Two 2-hour written examinations: 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. 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.

**LEVEL III COURSES**

**CHEM3010**

**CHEMICAL ANALYSIS B**

(3 Credits) Semester 2 Level III

Pre-requisite: CHEM2010

Course Content: This course covers the following topics:

- The process approach to quality management; The collection and analysis of real samples; Quantifying and reporting data quality.
- Advanced Chromatography principles; Gas and high performance liquid chromatographies; Tandem techniques (GC-MS, HPLC-MS); Developing chromatographic techniques.


Evaluation:
- One 2-hour written examination 60%
- In-course tests 20%
- Course assignment 20%

CHEM3011

CHEMICAL ANALYSIS LABORATORY II
(2 Credits) Semester 2 Level III

Pre-requisites: CHEM2010 and CHEM2011 (Pass or Fail but not Fail Absent)

Co-requisite: CHEM3010

Course Content: This course covers the following topics:
- A laboratory-based project centred on the application of one or two instrumental analytical techniques to the analysis of a real sample: hypotheses, project planning, sampling, sample preparation, instrumental analyses, Evaluation of data quality, interpretation, report preparation. Students work in groups of two or three.
- A series of workshops on effective oral communication skills;
• An oral presentation of the laboratory project.

Evaluation:
• Laboratory reports 50%
• Laboratory skills 25%
• Speaking exercises 25%

CHEM3110 INORGANIC CHEMISTRY B
(3 Credits) Semester 1 Level III

Pre-requisites: CHEM2110

Course Content: This course covers the following topics:


• Main Group elements: Hydrogen and its compounds, Oxides and oxyacids. Halogens and halides. Main Group organometallic compounds.

• A practical course of 36 hours.

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

CHEM3111 IN ORGANIC CHEMISTRY LABORATORY II
(2 Credits) Semester 1 Level III

Pre-requisite: CHEM2111

Co-requisite: CHEM3312 and/or 3112

Course Content: Laboratory experiments will cover advanced techniques in Inorganic Chemistry and may include the following topics:
Experimental techniques used in the synthesis and characterization of inorganic compounds (X-ray diffraction, NMR, and electronic spectroscopy, etc.)
- Synthesis of superconductors
- Synthesis of organometallic compounds and their use as catalysts
- Synthesis of transition metal complexes and their use as mimics of enzymes.
- Quadruple M-M bonds: Preparation of chromium (II) acetate dimer.

Evaluation:
- Written laboratory reports 80%
- One one-hour course tests 20%

CHEM3112  BIO-INORGANIC CHEMISTRY
(3 Credits)  Semester 1  Level III

Pre-requisites: CHEM2110 and CHEM3110.

Course Content: This course covers the following topics:
- Amino acids, peptides and proteins;
- Metal storage and transport: Fe, Cu, Zn and V;
- Molecular dioxygen, O2;
- Biological redox processes;
- The Zn^{2+} ion: Nature’s Lewis acid;
- Metal complexes used for diagnosis and treatment in medicine.

Evaluation:
- One 2-hour written final examination 60%
- Two 1-hour in-course tests 30%
- One course assignment 10%

CHEM3210  ORGANIC CHEMISTRY B
(3 Credits)  Semester 2  Level III

Pre-requisite: CHEM2210 - Pass or Fail but NOT Fail Absent
Course Content: This course covers the following topics:

- Mechanisms of carbocation and related rearrangements, substitution and elimination reactions.
- Stereochemistry of organic molecules. Static and dynamic aspects.
- The chemistry of carbohydrates- the synthesis and properties of mono- and disaccharides. The chemistry of amino acids, peptides and proteins.

Evaluation:
- One 2-hour written examination 70%
- Two In-course tests 30%

CHEM3211

ORGANIC CHEMISTRY LABORATORY II

(2 Credits) Semester 2 Level III

Pre-requisites: CHEM2211 AND permission of HOD

Co-requisite(s): CHEM3212 and/or CHEM3213

Course Content: This course covers the following topics:

- Synthesis of selected herbicides, insecticides, antibiotics and anticonvulsants; reactions of carbohydrates, lipids, terpenoids and steroids; column chromatographic purification; spectroscopic analysis.

Evaluation:
- Laboratory reports 80%
- In-course test 20%
CHEM3212  NATURAL PRODUCTS CHEMISTRY  
(3 Credits)  Semester 2  Level III

Pre-requisites: CHEM2210 and CHEM3210 or CHEM2201 and CHEM3201 from the old curriculum

Course Content: This course covers the following topics:
• Biosynthesis of Natural Products;
• Structural diversity in Natural Products Chemistry;
• Methods used in the elucidation of biosynthetic pathways.
• Advanced Spectroscopy: Mass spectrometry; instrumentation, isotope abundances and HRMS; Uses of MS other than for structure elucidation;
• Carbon-13 nuclear magnetic resonance spectroscopy; Instrumentation; Spectral interpretation; Uses of C-13 NMR other than for structure determination.
• The Synthesis and Chemistry of Natural Products; Linear versus convergent syntheses; Retrosynthetic analysis.
• Study of selected syntheses and synthetic transformations of natural products – terpenoids, alkaloids, phenolics.

Evaluation:
• One 2-hour written examination  60%
• Two in-course tests  40%

CHEM3213  APPLICATIONS OF ORGANIC CHEMISTRY IN MEDICINE AND AGRICULTURE  
(3 Credits)  Semester 1  Level III

Pre-requisites: CHEM2210 and CHEM3210 or CHEM2201 and CHEM3201 from the old curriculum

Course Content: This course covers the following topics:
  Organic Chemistry in Medicine:
Drug classification, the concept of receptor sites; an introduction to quantitative aspects of drug receptor interactions.

Drug Administration, distribution and metabolism; anti-infective agents; anti-allergenic and anti-ulcerative agents; central nervous system depressants; analgesics.

Organic Chemistry in Agriculture
- Use of organic compounds for the control of pests.
- Stages in the research and development of pesticides.
- An examination of insecticides, herbicides and fungicides with respect to structure, mode, of action, metabolism, synthesis, and environmental impact.

Evaluation:
- One 2-hour written examination 60%
- Two in-course tests 40%

CHEM3310 PHYSICAL CHEMISTRY B
(3 Credits) Semester 2 Level III

Pre-requisite: CHEM2310 Pass or Fail but NOT Fail Absent

Course Content: This course covers the following topics:
- Microstates of matter; Boltzmann entropy formula; Connection between molecular properties and macroscopic behaviour; Applications to ideal gases. Maxwell-Boltzmann distribution; Configurational partition functions of
non-ideal fluids. Structural phase transitions.

Evaluation:
- One 2-hour written examination 70%
- Two In-course tests 30%

CHEM3311  PHYSICAL CHEMISTRY LABORATORY II
(2 Credits) Semester I Level III

Pre-requisites: CHEM2311 and permission of HOD
Co-requisite(s): CHEM3312 and/or CHEM3313 (effective 2013/14)

Course Content: This course covers the following topics:
- polymer viscosity
- surface chemistry micellization
- X-ray diffraction
- polymer synthesis and characterization magnetic properties of solutions.

Evaluation:
- Laboratory reports 80%
- In-course test 20%

CHEM3312  CHEMISTRY OF MATERIALS
(3 Credits) Semester I Level III

Pre-requisites: CHEM2310 and CHEM2110 or CHEM2301 and CHEM3301 from the old curriculum

Course Content: This course covers the following topics:
- Polymers: definitions, nomenclature, molecular architecture.
- Colloids and Surfaces: liquid – gas and liquid–liquid interfaces, surface and interfacial tensions; Capillary action; Micelle formation; Adsorption isotherms; composition and structure of solid surfaces.
- Semiconductors: properties and types; optical and electrical properties, photoconductivity, luminescence; Applications.
- Classification of nanomaterials: Synthesis; structure and properties.
- Materials Characterisation; Optical and Electron Microscopy: TEM, SEM; Surface and Bulk Characterisation Techniques.

Evaluation:
- One 2-hour written final examination: 60%
- Two in-course tests (10% each): 20%
- One assignment 20%

CHEM3313  TOPICS IN ADVANCED PHYSICAL CHEMISTRY (4 Credits) Semester 2 Level III

Pre-requisites: CHEM2310 and CHEM3310 or CHEM2301 and CHEM3301/from the old curriculum

Course Content: This course covers the following topics:
- Computational Methods: Molecular orbital approximations; Molecular conformational energies; Charge distributions; Dipole moments.
- Molecular Interactions: Electric dipole moments; Interaction between dipoles; Hydrogen bonding; Molecular recognition; Kinetic model for the
perfect gas; Real gases; Molecular Interactions in liquids.

- Redox Processes and Advanced Electrochemistry: Electron transfer; Marcus theory for electron transfer; Electrified interfaces; Diffusion and migration. Cell design; Liquid junctions; Butler-Volmer equation and Tafel plots; Polarography; Cyclic voltammetry and impedance methods.

Evaluation:
- One 2-hour written examination 60%
- Two in-course tests 30%
- One assignment 10%

CHEM3401 PROJECT EVALUATION AND MANAGEMENT FOR SCIENCE BASED INDUSTRIES
(4 Credits) Semester 1 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.

Pre-requisites: CHEM2510 + CHEM2511 or CHEM3403

Course Content: This course covers the following topics:
- Economics: Introduction to macro & micro- economics; Supply and demand, pricing policy, price elasticity, profit vs. revenue maximising decisions; production function, maturity of industry.
- Accounting: Cost, volume and profit analysis; allocation of resources; preparation, analysis and reporting on management accounts.
- **Project Evaluation and Management:**
The project concept, project development and appraisals, discounting, risk analysis, project implementation and time management, critical path method.

- **Team Building Workshops:**
Teamwork, interpersonal skills, leadership, decision making, communication and conflict management.

Evaluation:
- One 2-hour written examination 75%
- Team-based project 25%

**CHEM3402 CHEMISTRY IN INDUSTRY**
(4 Credits) Semester 2 Level II

Pre-requisites: Any two of CHEM2010 + CHEM2011, CHEM2101, CHEM2210 + CHEM2211 or CHEM2310 and Permission of HOD

Co-requisite: CHEM2311

Course Content: This course will cover at least TWO of the following topics extensively:

- **Bauxite/Alumina.** Bauxites: types and origins, mineralogy and process design. Bauxite Processing by the Bayer process: Mining, desilication, digestion, the mud circuit, precipitation, calcination. Material flow diagrams, analytical techniques, product quality and uses, waste disposal and environmental impacts.

- **Petroleum and Petrochemical:** Crude oil and natural gas: formation, extraction, characterization, transportation and storage. Petroleum Refining; Analytical monitoring and
quality control; Environmental impacts; Regulations and monitoring.

- **Sugar Cane Processing**: Global and local industries; raw materials and their quality; cane preparation and milling; Clarification: reactions, equipment and effects of impurities; Evaporation; Crystallization. Product quality; By-products. Environmental regulations and waste management.

- **Cement Manufacture**: Technologies, raw materials and products; Basic cement chemistry; Equipment; Measurement and control of fineness. CaO-SiO₂-Al₂O₃ ternary system; chemical, physical and mineralogical transformations; clinker quality, grinding and cement preparation; Energy re-use and environmental regulations.

*Students are required to work for at least 8 weeks in an approved industrial setting during the summer following the theory component of the course.*

**Evaluation:**
- One 2-hour written examination  50%
- Course assignment  25%
- Work placement  25%

**CHEM3403  CHEMICAL PROCESS PRINCIPLES**
(8 Credits)  Semester 2  Level III

**Pre-requisites:** CHEM2301 or CHEM3301 from the old curriculum or CHEM2310 and CHEM2311 from the new curriculum and Permission of HOD

**Course Content:** This course covers the following topics:
- Process Material Balances.
- Heat Transfer Operations
- Mass Transfer Processes
- Applied Thermodynamics and
- Applied Kinetics.

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Course requires 72 hours of laboratory work.

Evaluation:
- Two 2-hour written examinations 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. 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.

**CHEM3510**

FOOD CHEMISTRY I

(3 Credits) Semester 2 Level III

Pre-requisites: CHEM2001 and CHEM2201 from the old curriculum or CHEM2010 + CHEM2011 and CHEM2210 + CHEM2211 from the new curriculum and permission of HOD

Course Content: This course covers the following topics:

- **Water**: properties; water-solute interactions, ice-water interactions; water activity and food stability.
- **Carbohydrates**: structure and classification; starch, pectin, cellulose, gums and dietary fiber; effect of carbohydrates on properties of food; chemical reactions of carbohydrates in foods.
- **Proteins**: amino acid - structure and properties; proteins - structure and properties; interactions with other food components; effects of processing on protein structure, function and quality.
- **Lipids**: structure and classification; relationship between lipids and health; lipid degradation; hydrolysis and autoxidation; application of
antioxidants; processing of lipids.
Effects of processing on properties of food.

Evaluation:
- One 2-hour written examination 60%
- In-course test 20%
- Course assignment 20%

CHEM3511 FOOD CHEMISTRY LABORATORY
(3 Credits) Semester 2 Level III

Pre-requisite: Permission of HOD

Co-requisites: CHEM3510, CHEM3512

Course Content: This course covers the following topics:
- Analytical techniques and methodologies commonly used for the analysis of macro and micro food components including: spectrophotometry, polarimetry, titrimetry and high performance liquid chromatography. Experiments will involve sample preparation, instrumental analyses, data analysis, and report preparation. Practical food analysis will be carried out in teams, and reports will be individually produced. Three lecture sessions will address topics including research ethics, research methodology, laboratory safety, and good laboratory practices.

Evaluation:
- Laboratory reports 50%
- Laboratory skills 30%
- Course assignment 10%
- Oral presentation 10%
CHEM3512  FOOD CHEMISTRY II
(3 Credits) Semester 2  Level III

Pre-requisites: CHEM2001 and CHEM2201 from the old curriculum or CHEM2010 + CHEM2011 and CHEM2210 + CHEM2211 from the new curriculum and Permission of HOD

Course Content: This course covers the following topics:

- **Enzymes**: nomenclature; catalysis; deactivation; applications in food processing; enzymes and health.
- **Vitamins and Minerals**: water and fat soluble vitamins; bulk and trace minerals; sources, functions and role in health; bioavailability, effects of processing; vitamin and mineral supplementation of foods; toxicity.
- **Pigments and Flavours**: natural and artificial colourants, dyes and lakes; flavours and flavourings; chemistry and physiology of taste and saporous substances; flavour enhancement.
- **Food Additives**: classes and applications; safety considerations.
- **Toxicants and Allergens**: sources, properties and chemistry; effects on consumer; effect of processing; measures for elimination or reduction of levels in foods.

Evaluation:
- One 2-hour written examination 60%
- In-course test 20%
- Course assignment 20%

CHEM3513  FOOD SAFETY & QUALITY ASSURANCE
(3 Credits) Semester 2  Level III

Pre-requisites: CHEM2510 OR CHEM2512 and Permission of HOD. Preference will be given to students majoring in Food Chemistry.

Course Content: This course covers the following topics:
• Quality Assurance and Quality Control: Food laws and regulations; Codex Alimentarius; food standards; food quality and food safety.

• Quality Systems: Total Quality Management; ISO9000; HACCP; Quality by Design (QbD).

• Prerequisite Programmes for Food Safety: Good Manufacturing Practices; Sanitation; Facilities & equipment; Personnel training; Traceability & recall; Transport & receiving; Chemical control; Production & Process control.

Evaluation:
- One 2-hour written examination 60%
- One 1-hour in-course test 20%
- One written assignment 20%

CHEM3610 MARINE AND FRESHWATER CHEMISTRY
(3 credits) Semester 1 Level III

Pre-requisites: CHEM2010, CHEM2011 and any one of the following:
CHEM2110, CHEM2210, CHEM2310: or CHEM3010. Preference will be given to students pursuing a major in environmental chemistry.

Course content: This course covers the following topics:

• Introduction to the Evolution, Structure & Composition of Planet Earth; Water and Rock cycles; Biogeochemical cycles; Characteristics of water bodies.

• Acidity and metals: Acid-base properties of water bodies; the $\text{CO}_3^{2-}/\text{HCO}_3^-/\text{CO}_2$ (aq) system; Inorganic C speciation; Henry’s law and its applications; pH of rain water; photosynthesis and ocean acidification.
• Redox equilibria; redox speciation diagrams.

• Nutrients and Organics: Natural and anthropogenic sources; Adsorption–desorption processes; eutrophication; humic and fulvic acids; Persistent organic pollutants; emerging organic pollutants.

• Sampling and analytical methods.

Evaluation:
  • One 2-hour written examination 60%
  • Three 30-minute course tests 20%
  • Three course assignments 20%
CHEM3611 ENVIRONMENTAL CHEMISTRY LABORATORY

(2 Credits) Semester 1 Level III

Co-requisite: CHEM3610 and Permission of HOD. Preference will be given to students majoring in Environmental Chemistry.

Course Content: This course covers the following:

- Interactive workshops on environmental sampling: sample preservation, conducting field observations and measurements, structuring of field reports.
- Guided review of the Hermitage Sewage Treatment plant and the UWI Water Re-use programme.
- Team-based collection of treated effluent samples from Lake Sidrak over a 4-week period and cycling through various analyses (to include P, N, pH/ANC and cations).
- Collection of soil samples exposed to irrigation with tertiary-treated effluent and, for comparison, agricultural soil and soil exposed only to rainfall.
- Team-based analyses of soils over a 4-week period (to include: CEC and pH, P, N, Na, K, Ca, Mg, trace metals and heavy metals (via XRF & INAA), mineralogy (XRD), particle size and colour).

Evaluation:

- Laboratory reports 60%
- Technical reports (two at 20% each) 20%
CHEM3612

ATMOSPHERIC CHEMISTRY AND BIOGEOCHEMICAL CYCLES

(6 credits)  Semester 2  Level III

Pre-requisites: CHEM3610 and HOD permission. Preference will be given to students majoring in Environmental Chemistry.

This course covers the following:

Course Content: This course covers the following topics:

- Atmospheric Chemistry: Atmospheric composition and structure; Atmospheric pollution: Global warming; Acid rain; Photochemical smog; Ozone depletion and global treaties.
- Environmental models, management and regulations: Use of Models in Atmospheric Chemistry, Air pollution and management; Air quality standards and pollution monitoring pollution.
- Organic materials: Biomolecules, their structure, degradation and impacts; pesticides, herbicides, fungicides and emerging pollutants.

Evaluation:

- One 2-hour written examination  50%
- Two 45-minute course tests  20%
- Course project  15%
- Field trip reports  15%
CHEM3621  MARINE AND FRESHWATER CHEMISTRY  
FIELD COURSE  
(2 credits)  Semester 2  Level III 

Pre-requisites: CHEM3610 and HOD permission.  
Preference will be given to students majoring in Environmental Chemistry.

Course Content: This course covers the following:

- An introductory workshop on the status of Jamaica’s environment, objectives of the course and student responsibilities.

- A five-day encampment at the UWI Discovery Bay Marine Laboratory:
  - Observation of environmental conditions and biological activities within Discovery Bay.
  - Collection and analysis of water samples in Discovery Bay; assessment of results.
  - Study of the Rio Cobre between Ewarton and Spanish Town.

- Five days of analytical and field work while based on the Mona Campus.
  - Analyse samples collected from the Rio Cobre; collate and assess water quality data.
  - Field trip to the Port Royal mangroves. Take in-field measurements of water parameters; view and qualitatively assess sediment and biological activities.

Evaluation:

- Literature review 10%
- One one-hour course test 20%
- Field reports 30%
- Data Interpretation reports 40%

CHEM3711  CHEMISTRY UNDERGRADUATE RESEARCH PROJECT  
(6 Credits over two semesters)  Semesters 1 & 2 or 2 & 3  Level III
Pre-requisites: Majoring in Chemistry; Completion of all compulsory Level II courses AND at least 6 credits from Level III AND HOD Approval. It is recommended that in the semester prior to enrolling in this course candidates discuss suitable topics with potential academic supervisors.

Course Content: This course covers the following topics:
- Research methods and Ethics. Use of chemical literature. Experiment design.
- Advanced instrumental and chemical investigation techniques. Investigation of an approved chemical research question.
- Preparation of written and oral scientific reports.
- Students will be required to spend at least 6 hours per week in the laboratory for about 22 weeks.

Evaluation:
- Course-work 40%
  - Research notebook 10%
  - 2 Progress reports 10%
  - Supervisor’s assessment 20%
- Research Report 40%
- Oral examination 20%

OCCUPATIONAL AND ENVIRONMENTAL SAFETY AND HEALTH (OESH)

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 Levels II and III consist of twenty (20) 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 124 credits.

LEVEL 1

<table>
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<td>GEOG1132</td>
<td>Human Geography II: World Economy, Agriculture and Food</td>
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<td>Earth Environments II: Climate and the Biosphere</td>
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Summer  
This period may be used to do any make-up courses

LEVEL II  
(43 Credits)

Semester 1

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<td>CHEM2011</td>
<td>Chemical Analysis Laboratory I</td>
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<td>OESH2000</td>
<td>Environmental Contaminants and Control</td>
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<td>Ecology</td>
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Semester 2

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Summer

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<td>MDSC3200</td>
<td>Understanding Research</td>
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LEVEL III  
(42 Credits)

Semester 1

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<td>OESH3100</td>
<td>Environment Hazard Evaluation and Risk Management and Control</td>
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<td>OESH3030</td>
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<td>OESH3220</td>
<td>Occupational Hygiene</td>
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<td>M32F</td>
<td>Labour and Employment (and Environment) Laws</td>
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Semester 2

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<tr>
<td>OESH3010</td>
<td>Occupational and Environmental Health Disorders</td>
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CHEMISTRY DEPARTMENT SCHOLARSHIPS & AWARDS

- THE CHEMISTRY DEPARTMENT PRIZE
- THE CEDRIC HASSALL PRIZE
- THE WILFRED chan AWARD
- THE GARFIELD SADLER AWARD
- THE WILLARD PINNOCK PRIZE
- THE BERT FRASER-REID PRIZE
- THE LEONARD J. HAYNES AWARD
- THE PAVELICH/HONKAN PRIZE
- THE GERALD LALOR SCHOLARSHIP
- THE KENNETH MAGNUS SCHOLARSHIP
- THE EARLE ROBERTS SCHOLARSHIP
- THE TARA DASGUPTA SCHOLARSHIP

The Chemistry Department reserves the right to determine the awards that are offered each year.
### DEPARTMENT OF COMPUTING

**OPTION**

**COMPUTER STUDIES**

<table>
<thead>
<tr>
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<tr>
<td><strong>LEVEL 1</strong></td>
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<tr>
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<tr>
<td>COMP1126/1127</td>
<td>Introduction to Computing (I)/(II)</td>
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<td>Object-Oriented Programming</td>
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<td>Algebra/Calculus (I)</td>
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<td>MATH1151/1152</td>
<td>Formal Mathematics/Calculus (II)</td>
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<td>MS15D/ACCT1005</td>
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<td>Introduction to Cost and Management Accounting</td>
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<td>SY14/SOCI1002</td>
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59
### LEVEL 2

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<td>Discrete Mathematics for Computer Science</td>
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<tr>
<td>CS22Q/COMP2140</td>
<td>Software Engineering</td>
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<tr>
<td>CS28Q/COMP2170</td>
<td>Object Technology</td>
<td>3</td>
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<tr>
<td>COMP2190</td>
<td>Net-Centric Computing</td>
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<td>CS23Q/COMP2240</td>
<td>Computer Organization</td>
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<tr>
<td>CS31A/COMP3100</td>
<td>Operating Systems</td>
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<tr>
<td>CS33Q/COMP3120</td>
<td>Artificial Intelligence</td>
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<td>CS35A/COMP3160</td>
<td>Database Management Systems</td>
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<tr>
<td>CS35Q/COMP3110</td>
<td>Information Systems in Organizations</td>
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<tr>
<td>CS39Q/COMP3900</td>
<td>Group Project</td>
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**Plus**

Twenty-seven (27) additional credits from Level 2 or 3 chosen from Computing, Mathematics, Economics or Management Studies.
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<th>TITLES</th>
<th>CREDIT</th>
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<th>LEVEL</th>
<th>PRE-REQUISITES</th>
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<td>MATHEMATICS FOR COMPUTING</td>
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<td>• Teacher’s College Diploma or Assoc. Degree in Mathematics or Science or Computing</td>
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<td>COMP1161</td>
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<td>LEVEL</td>
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<td>COMP1161</td>
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<td>CS35A/COMP3160</td>
<td>DATABASE MANAGEMENT SYSTEMS</td>
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<td>CS35R/COMP3170</td>
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<td>CREDIT</td>
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<td>CS39Q/COMP3900</td>
<td>GROUP PROJECT</td>
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COMPUTER SCIENCE MAJOR

A major in Computer Science requires a minimum of thirty-nine (39) credits from Level 2 and III Computer Science courses. The courses that make up the Computer Science major must include the following:

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<td>COMP1220</td>
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<td>COMP1126</td>
<td>Introduction to Computing I</td>
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<td>Computer Science</td>
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<td>COMP2141</td>
<td>Software Engineering</td>
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<td>CS28Q/COMP2170</td>
<td>Object Technology</td>
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<td>Net-Centric Computing</td>
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<td>CS33Q/COMP3120</td>
<td>Introduction to Artificial Intelligence</td>
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<td>CS35A/COMP3161</td>
<td>Introduction to Databases</td>
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<td>Capstone Project</td>
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INFORMATION TECHNOLOGY MAJOR

A major in Information Technology is a new programme that began in 2011/2012. The required credits are as summarized below.

Below are the details of what is required for the B.Sc. in Information Technology.

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<td>COMP1127</td>
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<td>COMP1161</td>
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<td>COMP1220</td>
<td>Computing and Society</td>
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<td>Mathematics for Computing</td>
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<td>In-Faculty course</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Courses from any discipline</td>
<td>12</td>
<td></td>
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</tbody>
</table>

| **LEVEL 2 (15 Credits)**                          |         |
| INFO2100      | Mathematics and Statistics for IT         | 3       |
| INFO2110      | Data Structures for IT                    | 3       |
| COMP2141      | Software Engineering                      | 3       |
| INFO2180      | Dynamic Web Development I                 | 3       |
| COMP2190      | Net-Centric Computing                     | 3       |

| **LEVEL 3 (21 Credits)**                          |         |
| INFO3105      | Computer System Administration            | 3       |
| INFO3110      | Information Systems                       | 3       |
| INFO3155      | Computer & Network Security for IT        | 3       |
| COMP3161      | Introduction to Databases                 | 3       |
| INFO3170      | User Interface Design for IT              | 3       |
| INFO3180      | Dynamic Web Development II                | 3       |
| COMP3901      | Capstone Project                          | 3       |

**Plus**
Nine (9) credits at Level 2 or Level 3 taken from Computing (i.e. CS, IT, IS, SWE, CE).

**Plus**
Eighteen (18) credits at Level 2 or Level 3 taken from any discipline including Computing and nine (9) credits of Foundational courses.
(These courses are common to both the Computer Science major and the BSc IT programme)

LEVEL 1 COURSES

COMP1210 MATHEMATICS FOR COMPUTING
(3 Credits) Semester 1 & 2 Level 1

Pre-requisite: CSEC Mathematics

Course Description: This course covers the following topics:

- The course introduces students to fundamental concepts in theoretical computer science, such as proof by induction and the use of graphs as a general abstraction mechanism. The course also exposes students to specific topics that are likely to be relevant to many of the areas of application of computing, particularly in the science and engineering disciplines. This course introduces mathematical tools and concepts that have been found to be useful in general computing. These include the use of logic and various proof techniques. The formal language of mathematics and the terminology therein are introduced to set the Foundation for the formality that is inherent in all the computing sub-disciplines. Sets, relations and functions are covered.

Course Content: This course covers the following topics:

- Propositional logic;
- Local connectives;
- Truth tables;
- Normal forms (conjunctive and disjunctive);
- Validity;
- Predicate logic;

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• Universal and existential quantification;
• Modus ponens and modus tollens;
• Limitations of predicate logic;
• Functions (surjections, injections, inverses, composition);
• Relations (reflexivity, symmetry, transitivity, equivalence relations);
• Sets (Venn diagrams, complements, Cartesian products, power sets)
• Pigeonhole principle;
• Cardinality and countability;
• Finite probability space, probability measure, events;
• Conditional probability, independence
• Trees;
• Undirected graphs;
• Directed graphs;
• Spanning trees/forests;

Method of Delivery:
• Lectures: 26 contact hours; 26 credits hours
• Tutorials: 13 contact hours; 13 credits hours

Evaluation:
• 2-hours written final exam 60%
• Course Work: 40%
  • 3 Assignments/quizzes (10% each) 30%
  • One In-course test (1 hour) 10%

Students will be required to pass both the Course Work and the final examination to pass the course.

COMP1220  COMPUTING AND SOCIETY
(3 Credits) Level 1 Semester 1 & 2
Pre-requisite: None
Course Description: This course covers the following topics:
• This course aims to engender an understanding of the basic cultural, social, legal, and ethical issues inherent in the discipline of computing. It describes where the discipline has been,
where it is, and where it is heading, in the global as well as the regional context. It also aims to create an awareness of the role of the individual in this process, as well as an appreciation of the philosophical questions, technical problems, and aesthetic values that play an important role in the development of the discipline. This course on Computing and society examines the relatively short history of computing and establishes context and trends. It looks at the emergence of different programming languages and paradigms and the significant impact they have had. Computing has a social context that the course examines. Issues of professional ethics and risks of computing products are also examined.

Course Content: This course covers the following topics:

**History of Computing**
- History of computer hardware, software, networking. Regional computing history;
- Pioneers of computing. Contributions of region and of other developing countries;

**An Overview of Computing**
- How hardware, software, and networks work at a conceptual level; use and high-level construction of computing artefacts, e.g. simple webpages, animations, robotics programs;
- Sub-disciplines within Computing: Computer Science, IT, IS, etc.;
- The global computing industry and its impact on industry and society;
- The use of computing in enterprise, entrepreneurship, various disciplines and careers;

**Social Context of Computing**
• Social implications of computing and networked communication in general and on youth, e.g. cultural, self-image, possible effects of videogames.
• Understanding the social and cultural context of design;
• Understanding the potential of computing to transform society positively, globally or regionally, or to exacerbate inequalities or mask underdevelopment;
• Analysis of the government and business policies of developing and developed countries with successful computing industries;
• Accessibility issues in computing professions (e.g. class, culture, ethnicity, gender, disabled);
• Public policy issues (e.g. cybercrime, privacy, electronic voting);
• Growth and control of and access to the Internet;
• Environmental Issues and Computing, e.g. e-waste, green computing;

Professional Ethics in Computing
• Making and evaluating ethical choices and arguments, identifying assumptions and values;
• The nature of professionalism (including care, attention and discipline, fiduciary responsibility, and mentoring);
• Keeping up-to-date as a professional (in terms of knowledge, tools, skills, legal and professional framework as well as the ability to self-assess and computer fluency);
• Various forms of professional credentialing and the advantages and disadvantages;
• The role of the professional in public policy;
• Maintaining awareness of consequences of decisions;
• Introduction to ethics, ethical dissent and whistle-blowing;
• Codes of ethics, conduct, and practice (IEEE, ACM, SE, and so forth);
• Harassment and discrimination, “Acceptable use” policies for computing in the workplace;
• Healthy computing environment (ergonomics);

Risks of Computing Products
• Historical examples of software risks (such as the Therac-25 case);
• Implications of software complexity on risk. The limits of computing.

Method of Delivery:
• Lectures: 26 contact hours; 26 credits hours
• Tutorials: 13 contact hours; 13 credits hours

Evaluation:
• 2-hours written final exam  50%
• Course Work  50%
  • 3 written assignments(10% each)  30%
  • 2 tutorial presentations (10% each)  20%

Students will be required to pass both the Course Work and the final examination to pass the course.

COMP1126 INTRODUCTION TO COMPUTING I
(3Credits)Level 1Semester 1 & 2

Pre-requisites: Any one of the following: CAPE (or A-level) Science, subject EC14C, Teacher’s College Diploma or Associate Degree in Mathematics or Science or Computing.

Course Description: The style of programming used is functional, and the language used is Python. The choices of programming style and language are intended to encourage students to think about solutions to problems in terms of the requirements of those solutions, rather than the mechanics of how to fulfil them. This entry level course into both the
Computing sub-disciplines of Computer Science and Information Technology leans more towards the functional-first approach although basic concepts of Object-Oriented Programming are introduced. It is a first programming course and focuses on basic programming concepts (such as computation, function, operation) and structures (such as basic and structured data, procedures).

Course Content: This course covers the following topic:

**History of programming languages:** Brief survey of programming paradigms

**Building Abstractions**
- Computational Processes
- Primitive Operations
- Special Forms for naming, conditional execution
- Procedures as sequences of operations
- Recursion and Iteration
- Lexical scoping and Nested Procedures

**Higher-order Procedures**
- Customising Procedures with procedural arguments
- Creating new functions at run-time

**Compound Data:** Pairs and Lists

Method of Delivery:
- Lectures: 22 contact hours; 22 credits hours
- Tutorials: 6 contact hours; 6 credits hours
- Laboratory Exercise: 22 contact hours; 11 credits hours

Evaluation:
- 2-hours written final exam 60%
- Course Work: 40%
  - 1 written assignment/programming project 15%
  - 1 In-course test (1 hour) 10%
  - 5 Labs 10%
  - 2 Quizzes 5%
Students will be required to pass both the Course Work and the final examination to pass the course.

**COMP1127**  
**INTRODUCTION TO COMPUTING II**  
(3 Credits) Level 1 Semester 1 & 2

*Pre-requisites:* Any one of the following: CAPE (or A-level) Science, subject EC14C, Teacher’s College Diploma or Associate Degree in Mathematics or Science or Computing.

*Course Description:* This course covers the following topics: The primary goal of the course is to introduce students to the big ideas in Computer Science, and how they are used to control the complexity of developing large computational systems. In this course, recognising patterns of problem solving is more important than the efficiency of the solutions themselves. An interpreted language is used to facilitate rapid feedback to the student as she experiments with proposed solutions to a problem. We hope that this method of interaction will build confidence in students as they learn the joys and challenges of programming. This course continues the entry level course COMP1126. It covers concepts and tools that are essential in strengthening the learning of programming. These include data structures and higher order functions.

*Course Content:* This course covers the following topics:

**Building Abstractions**
- Compound Data: Lists and Trees
- Abstract Data Types

**Controlling Interactions**
- Generic operations
- Self-Describing Data
- Message Passing
- Streams and Infinite Data Structures
- Object-oriented Programming
Method of Delivery:
- Lectures: 22 contact hours; 22 credits hours
- Tutorials: 6 contact hours; 6 credits hours
- Laboratory Exercise: 22 contact hours; 11 credits hours

Evaluation:
- 2-hours written final exam 60%
- Course Work: 40%
  - 1 written assignment/ programming project 15%
  - 1 In-course test (1 hour) 10%
  - 5 Labs 10%
  - 2 Quizzes 5%

Students will be required to pass both the Course Work and the final examination to pass the course.

COMP1161 OBJECT-ORIENTED PROGRAMMING
(3 Credits) Level 1 Semester 1 & 2

Pre-requisites: COMP1126 & COMP1127

Course Description: This course covers the methodology of programming from an object-oriented perspective, and introduces OOP principles using a language that supports the OOP paradigm. It also introduces object-oriented testing and debugging techniques, as well as the basics of graphical user interface programming and event-driven programming. The course continues the introduction to programming started in COMP1126 and continued in COMP1127.

Course Content: This course covers the following topics:
- **Object-Oriented Programming**
  - Objects and classes. Methods, message passing. Instance and class variables.
  - Encapsulation and information-hiding. Imperative control structures, assignment/state, parameter passing models. Primitive types.
• Inheritance, polymorphism, class hierarchies. Object composition.
• Abstract and concrete classes, interfaces. Templates.
• Using APIs, class libraries. Modules/packages.
• Array and string processing. I/O processing.
• Concept of object references and aliases.
• Collection classes and Iterators.
• OO Testing. Debugging tools.

**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.
• Simple HTML-embedded objects such as applets.

Method of Delivery:
• Lectures: 22 contact hours; 22 credits hours
• Tutorials: 6 contact hours; 6 credits hours
• Laboratory Exercise: 22 contact hours; 11 credits hours

Evaluation:
• 2-hours written final exam 50%
• Course Work: 50%
  • 3 Projects (10% each) 30%
  • 3 Labs 5%
  • 2 In-course tests (5% & 10%) 15%

*Students will be required to pass both the Course Work and the final examination to pass the course.*

**LEVEL 2 COURSES**

**COMP2140 SOFTWARE ENGINEERING**
(3 Credits) Level 2 Semester 1
Pre-requisite: COMP1161
Courses Content: This course covers the following topics:

- 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 modelling 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;

Evaluation:

- One 2-hours written paper 60%
- Course Work: 40%
  - Presentations and quizzes 10%
  - Project 25%
  - In-course test 5%
COMP2190

NET-CENTRIC COMPUTING

(3 Credits)    Level 2    Semesters 2

Pre-requisite: COMP1161

Course Description: The underlying principle of Net-Centric Computing is a distributed environment where applications and data are downloaded from servers and exchanged with peers across a network on an as-needed basis. This is in stark contrast to the use of powerful personal computers that rely primarily on local resources. The course will provide students with an understanding of the various technologies involved in developing systems and providing services in such distributed environments. It examines the protocols that underpin the interaction among the heterogeneous platforms, the services that are provided by combining various elements of these platforms and ways in which these end systems are presented. End users impose many requirements upon the systems and services they interact with and these requirements play an important role during development. Security is foremost among these requirements and as such, the course also exposes students to important aspects of secure systems development including cryptography, intrusion detection and malware detection. The course will also provide students with the opportunity to experiment with the knowledge they gain. They will be required to engage in weekly laboratory exercises using various tools and/or development environments, and demonstrate an understanding of the concepts by completing graded projects. Bi-weekly lectures and weekly tutorials provide the main avenue for the introduction and discussion of the material.

Course Content: This course covers the following topics: Background and History of Networking and the internet    Network Architectures
- Client/server and Peer to Peer paradigms;

**The ISO 7-layer reference model in general**
- Network protocols;
- Physical and Data Link layer concepts (framing, error control, flow control, protocols);
- Internetworking and routing (routing algorithms, internetworking, congestion control);

**Transport layer services (connection establishment, performance issues, flow and error control)**
- Overview of Distributed Computing;
- Overview of Mobile and wireless computing;
- Fundamentals of cryptography;
- Authentication protocols;
- Public-key algorithms;
- Types of attack e.g. denial of service, flooding, sniffing and traffic redirection;

**Basic network defense tools and strategies**
- Intrusion Detection;
- Firewalls;
- Detection of malware;
- Kerberos;
- IPSec;
- Virtual Private Networks;
- Network Address Translation;

**Web Technologies**
- Basic server-side programs (php, MySQL);
- Basic client-side scripts (XHTML, XML, JavaScript, CSS);
- Nature of the client-server relationship
- Web protocols with particular emphasis on HTTP;
- Support tools for web site creation and web management;

Method of Delivery:
- Lectures: 22 contact hours; 22 credits hours
• Tutorials: 6 contact hours; 6 credits hours
• Laboratory Exercise: 22 contact hours; 11 credits hours

Evaluation:
• 2-hours written final exam  50%
• Course Work:  50%
  • 2 Assignments (10% each)  20%
  • 2 Projects (15% each)  30%

_Students will be required to pass both the Course Work and the final examination to pass the course._

**CS35A/COMP3160**  **DATABASE MANAGEMENT SYSTEMS**
(3 Credits) Level 3  Semester 2

Pre-requisite:  COMP2101

Course Content:  This course covers the following topics:

**Introduction to database concept**
**Goals of Database Management Systems**

• Logical and physical organizations;
• Schema and subschema, trade-offs between utilization of data;
• Control of data;
• Database Design;
• Overview of the design process;
• Database design and the Entity-Relationship model;
• ER diagrams;
• Constraints;
• Reduction to relational schema;
• 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;

**Description/Manipulation Languages**
• Relational algebra;

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• Relational calculus;
• Structured Query Languages – SQL;
• Query Optimization;

**Application Design and Development**
• User Interface and Tools;
• Web Interface to a database;
• Authorization in SQL;
• Application Security;

**Current trends**
• Distributed systems;
• Object-oriented systems;
• Knowledge-based systems;

Evaluation:
• One 2-hours written paper 60%
• Course Work 40%

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**CS39Q/COMP3901**
**CAPSTONE PROJECT**
(3Credits) Level 3 Semesters 1, 2 & 3
Pre-requisites: CS20R/COMP2111 and CS22Q/COMP2140 and 8 other Credits from level 2 or 3 CS courses.

Course Content: This course covers the following topics:
• 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.

Evaluation:
• Mid-term presentation 10%
• Final presentation 15%
• Demonstration 15%
• Report 50%
• Web Page 10%

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Students will be asked to assess their peers and themselves on different aspects of the project. Those Evaluations are combined with a peer evaluation weight from the supervisor to determine, for each student, an adjustment to the base score of the group.

**COMPUTER SCIENCE COURSES**

**LEVEL 2 COURSES**

**CS20R/COMP2111**

(3 Credits)  Level 1  Semester 2

**ANALYSIS OF ALGORITHMS**

Pre-requisite:  COMP1161

Course Content:  This course covers the following topics:

- Divide and conquer algorithm;
- Solving recurrence equations, the Master;
- Recursive Data structures (lists and trees) and recursion as a Problem-solving tool;
- Theorem;
- Heaps as implementations for priority queues;
- Sorting;
- Binary search trees, Red-Black trees;
- Dynamic programming (matrix multiplication, longest substring);
- Graphs;

Selected algorithms Form:  Fast exponentiation, Euclid's algorithm, Discrete logarithm;

- RSA cryptography;
- Matrix computations;
- Representation of and computation with polynomials;
- NP-completeness;

Evaluation:

- One 2-hours written paper  60%
- Course Work:  40%

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• Mid-term 5%
• Assignments 15%
• 2 Projects 20%

CS20S/COMP2101 DISCRETE MATHEMATICS FOR
COMPUTER SCIENCE
(3 Credits) Level 2 Semester2

Pre-requisite: COMP1161

Course Content: This course covers the following topics

**Background**
- Asymptotic Analysis;
- Limits;
- Orders of Growth;

**Counting**
- Permutations;
- Combination;
- Inclusion-exclusion principle;

**Elementary Probability Theory**
- Counting in event space;
- Probability Tree;
- 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;

Evaluation:
• One 2-hours written paper 60%
• Course work 40%

CS21R/COMP2230 COMPUTER ARCHITECTURE AND ORGANIZATION
(3 Credits) Level 2 Semester 2
Pre-requisites: CS21S/COMP2120
Course Content: This course covers the following topics:
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;

Evaluation:
• One 2-hours written paper 60%
• Course Work 40%

CS23Q/COMP2240  COMPUTER ORGANISATION
(3 Credits) Level 2 Semester

Pre-requisites: COMP1125 and COMP1160

Course Content: This course covers the following topics:
• 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; Micro-coded 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;

### Evaluation:
- One 2-hours written paper 60%
- Course Work: 40%
  - Mid-term 10%
  - 3 Assignments 30%

#### CS24W/COMP2180 WEB DESIGN & PROGRAMMING
(3 Credits) Level 2 Semester 1

Pre-requisite: COMP1161

Course Content: This course covers the following topics:

**DNS, MIME types:**
- XHTML, dynamic XHTML, CSS, DOM;
- Networking concepts, Internet protocols TCP/IP;
- 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;

Evaluation:
- One 2-hours written paper 50%
- Course Work: 50%
  - 10 Labs, 5 Projects 45%
  - In-course test 5%

**CS28Q/COMP2170  OBJECT TECHNOLOGY**
(3 Credits) Level 2 Semester 2
Pre-requisite: COMP1161
Co-requisite: CS22Q

Course Content: This course covers the following topics:

**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;

Evaluation:
- One 2-hours written paper 60%
- Course work 40%
CS31A/COMP3100 OPERATING SYSTEMS
(3 Credits) Semester 1 Level 2

Pre-requisites: COMP2111 and COMP2230 or COMP2240

Course Content: This course covers the following topics:

**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;

**Concurrency**
- 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**

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• 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;

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Evaluation:

- One 2-hours written paper 60%
- Course Work: 40%
- In-course test 10%
- 2 Projects 30%

CS32Q/COMP3150 COMPUTER NETWORKING AND COMMUNICATION

(4 Credits) Level 3 Semester 1

Pre-requisites: COMP2111 and COMP2230 or COMP2240

Course Content: This course covers the following topics:

**Computer Networks and the Internet**
- The network edge and network core;
- Access networks and physical media SPs 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;

Evaluation:
• One 2-hours written paper 60%
• Course Work 40%

**CS32R/COMP3160**
**COMPUTER & NETWORK SECURITY**
(4 Credit) Level 3 Semester 3

Pre-requisite: COMP3150

Course Content: This course covers the following topics:
• 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, evaluation 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);

Evaluation:
- One2-hours written paper: 60%
- Course Work:
  - Assignments: 10%
  - In-course test: 10%
  - Project: 20%

CS33Q/COMP3120  INTRODUCTION TO ARTIFICIAL INTELLIGENCE
(4 Credits) Level 3  Semester 1
Pre-requisites: COMP2111 and COMP2101
Course Content: This course covers the following topics:
- Introduction to AI;
- Overview and history of AI;
- Philosophical Issues;
- Introduction to Prolog;
- Search: Search in Prolog
- Game Playing;
- Knowledge representation and reasoning: Logic; Production rules; structured objects;
- Planning;
- Introduction to Expert Systems;
- Knowledge Acquisition in Expert Systems;
- Elective topics: Neural networks; Machine Learning; Reasoning under uncertainty; Natural Language Processing; Speech recognition;
- Robotics; Fuzzy logic; Virtual reality;

CS34Q/COMP3651  LANGUAGE PROCESSORS
(4 Credits) Level 3  Semester 1
Pre-requisite: COMP2111

Course Content: This course covers the following topics:

**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;

Evaluation:
- One 2-hours written paper 40%
- Course Work: 60%
  - Assignments 40%
  - Group Projects 20%
Pre-requisite: COMP2180

Course Content: This course covers the following topics:

- Web application design principles: requirements, concept design, implementation, testing;
- DOM, XML, XSLT, AJAX;
- 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;
- Web network security issues, ethical and social issues;
- Multimedia for the web;
- Mobile and wireless web platforms;

Evaluation:

- One2-hours written paper 40%
- Course Work 60%
- Projects 60%

CS35Q/COMP3110 INFORMATIONSYSTEMSIN ORGANISATION
(4 Credits) Level 3 Semester 2

Pre-requisite: COMP2140

Course Content: This course covers the following topics:
Organization Characteristics
- Business Functions;
- Management Hierarchy;
- Business Process;

Information Systems
- Types of applications;
- Enterprise systems;
- Supply Chain Management Systems;
- Customer Relationship Management Systems;
- Knowledge Management Systems;

Information Systems and Business Strategy
- Corporate strategy;
- Information Systems strategy;
- Strategic information;

Information Technology Infrastructure
- Computer hardware;
- System software;
- Data management;
- Telecommunication networks;

IT for business intelligence gathering
- Data mining;
- Artificial Intelligence;
- Environment Scanning;

Internet and Other IT Innovations
- E-Commerce;
- E-Business;
- Collaborative Commerce;

Information Systems Delivery
- Concepts;
- Evaluation and selection;
- Alternative Approaches;
- Process and Project Management;

Managing Information Systems
- Information system staff;
- Information systems security and control;
- Disaster planning and recovery;
- Ethics and social issues;

Evaluation:
- One 2-hours written paper 40%
- Course Work: 60%

**CS35R/COMP3170**  
**USER INTERFACE DESIGN**  
(4 Credits) Semester 2 Level 3

Pre-requisite: COMP2140 or COMP2180

Course Content: This course covers the following topics:

- 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 model Information collection and analysis methods Prototyping: storyboarding, Implementation;
- Evaluation methods: heuristic, observational, empirical;
Evaluation:
- One 2-hours written paper 60%
- Course Work: 40%
  - 1 or 2 In-course test 10%
  - Group laboratory/project reports 20%
  - Individual projects/reports/presentations 10%

**CS37R/COMP3701**  **THEORY OF COMPUTATION**

(4 Credits) Level 3 Semester 2

Pre-requisites: COMP2101

Course Content: This course covers the following topics

**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;

**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;

Evaluation:
- One 2-hours written paper 60%
- Course Work: 40%
  - In-course test 5%
  - 5 Written homework assignments 35%

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CS38Q/COMP3800  REAL-TIME EMBEDDED SYSTEMS
(Software + HW)
(4 Credits)Level 3Semester 1

Pre-requisites: COMP2120 and COMP2230

Course Content: This course covers the following topics:

- 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, RTEMS, 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;
Evaluation:
- One 2-hours written paper 40%
- Course Work: 60%
  - In-course test 20%
  - Labs 10%
  - Final Project 30%

INFORMATION TECHNOLOGY COURSES

LEVEL 2 COURSES

<table>
<thead>
<tr>
<th>INFO2100</th>
<th>MATHEMATICS AND STATISTICS FOR IT</th>
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Pre-requisite: COMP1210

Course Description: This course introduces probability and statistics to students of Information Technology as well as the application of these concepts to the computing discipline. It examines the basic concepts of probability theory including counting and measuring and conditional probability and independence of events. It studies discrete, continuous, and joint random variables and functions of random variables. The course shows how to sum independent random variables, generate random numbers, and random event generation. It also discusses the Law of large numbers and the Central Limit Theory. The course also introduces linear and nonlinear regression, sampling distributions, confidence intervals, and hypothesis testing. The applications of these concepts to computing will be stressed throughout the course.

Course Content: This course covers the following topics:
- Randomness, finite probability space, probability measure, events;
- Conditional probability, independence, Bayes’ theorem;
- Integer random variables, expectation;
• Formulation of hypotheses: null and alternate hypothesis;
• Parametric and non-parametric tests and their applicability;
• Criteria for acceptance of hypotheses, significance levels;
• t-test, z-test, Chi-square test, and their applicability;
• Correlation coefficients;
• Linear and nonlinear regression models;
• Stochastic versus deterministic analysis;
• Purpose and nature of sampling, its uses and applications;
• Mean, median, mode, variance, standard deviation;

Method of Delivery:
• Lectures: 26 contact hours; 26 credits hours
• Tutorials: 13 contact hours; 13 credits hours

Evaluation:
• Final Exam (2 hours) 60%
• Course Work: 40%
  • 3 assignments/quizzes (10% each) 30%
  • 1 In-course test (1 hour) 10%

Students will be required to pass both the Course Work and the final examination to pass the course.

INFO2110 DATA STRUCTURES FOR IT
(3 Credits) Level 2 Semesters 2

Pre-requisites: COMP1210 & COMP1161

Course Description: In computing, a data structure is a particular way of storing and organizing data in a computer so that it can be used efficiently. Different kinds of data structures are suited to different kinds of applications, and some are highly specialized to specific tasks. This course covers several data structures and seeks to equip the student with these as tools for managing data in their
programs. From simple and structured data types the course progresses through some commonly used built-in data structures to special-purpose user-defined structures.

Course Content: This course covers the following topics:
- Primitive types;
- Arrays;
- Records;
- Strings and string processing;
- Data representation in memory;
- Pointers and references;
- Linked structures;
- Knowledge of hashing function;
- Use of stacks, queues;
- Use of graphs and trees;
- Strategies for choosing the right data structure;

Method of Delivery:
- Lectures: 26 contact hours; 26 credits hours
- Tutorials: 13 contact hours; 13 credits hours

Evaluation:
- Final Exam (2 hours) 60%
- Course Work: 40%
  - 3 written assignments (5% each) 15%
  - 2 programming projects (10 each) 20%
  - 1 In-course test (1 hour) 5%

Students will be required to pass both the Course Work and the final examination to pass the course.

INFO2180 DYNAMIC WEB DEVELOPMENT I
(3 Credits) Semesters 1 Level 2

Pre-requisites: COMP1210, COMP1220 & COMP1161

Course Description: This course covers the Foundations of the technologies that enable the creation of interactive websites that process and modify server-based data. This includes fundamental
networking technologies, data representation for the web, web UI design and site design, client-server architecture and client-side and server-side programming. It covers the fundamentals of ecommerce, web security, ethical and social issues, and relevant software engineering concepts such as the three-tier architecture and frameworks for the web. It also provides an introduction to mobile web issues and web multimedia.

Content Course: This course covers the following topics:
- Networking concepts, Internet protocols TCP/IP, DNS, MIME types;
- XHTML, dynamic XHTML, CSS, DOM, XML, XSLT;
- 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;

Method of Delivery:
- Lectures: 26 contact hours; 26 credits hours
- Tutorials: 13 contact hours; 13 credits hours
- Laboratory Exercises: 22 contact hours; 11 credits hours
Evaluation:
- 2-hours written final exam  50%
- Course Work  50%
  - 10 Labs (1% each)  10%
  - 5 Programming projects (7% each)  35%
  - 1 In-course test (1 hour)  5%

*Students will be required to pass both the Course Work and the final examination to pass the course.*

**INFO3105**  
**COMPUTER SYSTEM ADMINISTRATION**  
(3 Credits)  
Level 3  
Semesters 1

Pre-requisite:  
COMP2190

Course Description: IT professionals will encounter a variety of platforms in their careers. The role of the IT professional is to select, deploy, integrate and administer platforms or components to support the organization’s IT infrastructure. This knowledge area includes the fundamentals of hardware and software and how they integrate to form essential components of IT systems. This course covers the techniques that are used for the installation, configuration, and maintenance of computer hardware, software, and network infrastructure. The course presents the basic theoretical concepts of computer networks and operating systems in a little less detail than would be the case for specialist courses on these subjects. These basic concepts are complemented by practical demonstrations and hands on exercises of tasks that are carried out by a system administrator.

Course Content:  
This course covers the following topic:
- Operating Systems
- Overview
- Operating system principles
- Concurrency, Scheduling and dispatch
- Memory management
- Device management
- Security and protection
- File systems
- Real-time and embedded systems
- Fault tolerance
- Scripting
- Virtualisation

**Installation, configuration and maintenance of OS and Applications**
- Installation and Configuration;
- Maintenance (upgrades, patches, etc.);
- Server services (print, file, DHCP, DNS, FTP, HTTP, mail, SNMP, telnet);
- Application Management (database, web, network services, etc.);
- Deployment of a system image using imaging software;
- Support and Licensing issues;

**Administration Activities**
- Content management;
- Content deployment (file system planning and structure);
- Server administration and management;
- User and group management;
- Backup management;
- Security management;
- Disaster recovery;
- Resource management;
- Automation management (automatic job scheduling);
- Use of site management logs;
- System support;

**Administrative Domains**
- Web, Network, OS, Support, Database;

**Power Management**
- Power requirements for individual systems;
- Heat and power budgets;
- Power load monitoring and management;

Method of Delivery:
- Lectures: 22 contact hours; 22 credits hours
• Tutorials: 6 contact hours; 6 credits hours
• Laboratory Exercises: 22 contact hours; 11 credits hours

Evaluation:
• 2-hours written final exam 50%
• Course Work: 50%
  • 2 Written assignments: (10% each) 20%
  • 5 Labs (4% each) 20%
  • 1 Programming project 10%

Students will be required to pass both the Course Work and the final examination to pass the course.

INFO3110 INFORMATION SYSTEMS
(3 Credits) Level 3 Semesters 2

Pre-requisite: COMP2140

Course Description: This course introduces students to the challenges that are faced by organizations as they attempt to use information technology to create competitive businesses that provide useful goods and services to their customers. It presents an overview of an organization, organizational characteristics, and basic theories of organizational behaviour. It introduces the issues surrounding the management of information systems in organizations. This course presents a review of current information technology and the application of these technologies in organizations. It presents the interactions and relationship between information systems and other organizational systems.

Courses Content: This course covers the following topics:

Information Systems
• Types of Applications;
• Enterprise Systems;
• Supply Chain Management Systems;

Customer Relationship Management Systems
• Knowledge Management Systems;
• Information Systems and Business; Strategy;
• Corporate Strategy;
• Information Systems Strategy;
• Strategic Information Systems;

**Information Technology Infrastructure**
• Computer Hardware;
• System Software;
• Data Management;
• Telecommunication Networks;

**IT for business intelligence gathering**
• Data mining;
• Artificial Intelligence;
• Environment Scanning;

**Internet and Other IT Innovations**
• E-Commerce;
• E-Business;
• Collaborative Commerce;

**Managing Information Systems**
• Information Systems Security and Control;
• Disaster Planning and Recovery;

Method of Delivery:
• Lectures: 26 contact hours; 26 credits hours
• Tutorials: 13 contact hours; 13 credits hours

Evaluation:
• 2-hours written final exam 60%
• Course Work: 40%
  • 3 assignments (10% each) 30%
  • In-course Test (1 hour) 10%

*Students will be required to pass both the Course Work and the final examination to pass the course.*

**INFO3155 COMPUTER AND NETWORK SECURITY FOR IT**
(3 Credits) Level 3 Semesters 2

Pre-requisite: COMP2190

Course Description: Building upon the concepts introduced in Net-Centric Computing, this course explores the
security issues that every IT professional must be aware of. The course will inform the student on the various attack surfaces and defensive approaches that must be considered during all phases of life of an organisation's information technology assets. The course will also provide an opportunity for students to gain hands-on experience with the tools needed to protect an organisation from the various forms of attack it can be subjected to.

Course Content: This course covers the following topics:

- The reality for the growing need of security in our day to day tasks;
- Confidentiality, integrity and availability: the pillars of security;
- The ethical 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, Evaluation and system hardening;
- Confidentiality, integrity and non-repudiation: the use of cryptography in security (hash functions, message digests, public/private key cryptography);

Method of Delivery:
- Lectures: 26 contact hours; 26 credits hours
- Tutorials: 13 contact hours; 13 credits hours

Evaluation:
- 2-hours written final exam 60%
- Course Work: 40%
  - 2 Assignments (13%, 12%) 25%
  - Programming project 15%

Students will be required to pass both the Course Work and the final examination to pass the course.
INFO3170 USER INTERFACE DESIGN FOR IT
(3 Credits) Level 3 Semesters 1

Pre-requisites: COMP2140 or INFO2180

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

Course Content: This course covers the following topic:

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;

Method of Delivery:
- Lectures: 26 contact hours; 26 credits hours
- Tutorials: 13 contact hours; 13 credits hours

Evaluation:
- 2-hours written final exam 50%
- Course Work: 50%
  - In-course test (1 hour) 5%
  - Programming projects (6) 45%

Students will be required to pass both the Course Work and the final examination to pass the course.

INFO3180 DYNAMIC WEB DEVELOPMENT II
(3 Credits) Level 3 Semesters 2

Pre-requisite: INFO2180

Course Description: This course covers the technologies that enable the creation of interactive web applications that process and modify server-based data, at an intermediate level. It continues from Web Design and Programming I, covering many of the same topics in more depth. This includes further coverage of topics in networking technologies, data representation for the web, web UI design and site design, client-server architecture and client-side and server-side
programming. It covers relevant topics in e-commerce, web security, ethical and social issues, and engineering concepts such as the three-tier architecture and frameworks for the web. It also covers further topics in mobile web issues and web multimedia.

Course Content: This course covers the following topics:

- 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;
- Web network security issues, ethical and social issues;
- Multimedia for the web;
- Mobile and wireless web platforms;

Method of Delivery:
- Lectures: 22 contact hours; 22 credits hours
- Tutorials: 6 contact hours; 6 credits hours
- Laboratory Exercises: 22 contact hours; 11 credits hours

Evaluation:
- 2-hours written final exam 50%
- Course Work: 50%
  - 10 labs (1% each) 10%
  - 5 programming projects (7% each) 35%
Students will be required to pass both the Course Work and the final examination to pass the course.

INFO3435  E-COMMERCE
(3 Credits)  Level 3  Semesters 2

Pre-requisite:  COMP2141


Evaluation:
- Final Exam, One 2-hours written paper  60%
- Course Work (test/assignments)  40%