Rules for the Degree of Bachelor of Science  
(Degree code: 02089)

These rules should be read in conjunction with the general rules and general information in Part 1 of the Calendar.

Complete list of modules for the BSc Degree

NB
BEFORE YOU COMPLETE THE REGISTRATION FORM for submission together with the prescribed fees and documents (see Part 1 of the Calendar and the Information Brochure), PLEASE ENSURE THAT YOU:
- have fulfilled all the ADMISSION REQUIREMENTS for the BSc degree (see Sc1) or, where applicable, the National Certificate in Datametrics (see Sc10);
- comply with all the PREREQUISITES and CO-REQUISITES as set out in the respective chapter in Part 2 of the Calendar for each of the modules (or courses) for which you wish to be registered (see Sc2 for definitions):

<table>
<thead>
<tr>
<th>Subject (and subject code)</th>
<th>Subject (and subject code)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applied Mathematics (APM)</td>
<td>Geology (GEL)</td>
</tr>
<tr>
<td>Archaeology (ACE)</td>
<td>Mathematics (MAT)</td>
</tr>
<tr>
<td>Astronomy (AST)</td>
<td>Information Systems (INF)</td>
</tr>
<tr>
<td>Biochemistry (BCH)</td>
<td>Microbiology (MIB)</td>
</tr>
<tr>
<td>Biology (BLG)</td>
<td>Operations Research (DSC)</td>
</tr>
<tr>
<td>Botany (BOT)</td>
<td>Physics (PHY)</td>
</tr>
<tr>
<td>Chemistry (CHE)</td>
<td>Physiology (FIS)</td>
</tr>
<tr>
<td>Comprehension Skills for</td>
<td>Psychology (PSY)</td>
</tr>
<tr>
<td>Science (CSS)</td>
<td>Statistics (STA)</td>
</tr>
<tr>
<td>Computer Science (COS)</td>
<td>Zoology (ZOL)</td>
</tr>
<tr>
<td>Geography (GGH)</td>
<td></td>
</tr>
</tbody>
</table>

- will be able to comply with all the PRACTICAL WORK REQUIREMENTS for those modules that have a practical component;
- do not register for too many modules – SEE RULE Sc3 and 3.2;
- understand the rules regarding the composition of your curriculum. For the BSc curriculum see Sc5 and 4.1. For the National Certificate in Datametrics see Sc13 and the examples under 6.4.

Further advice and information on particular subjects will be found in the relevant chapter together with the closing dates for assignments and dates for practical work and practical examinations.

THE RULES ARE STRICTLY APPLIED AND FAILURE TO COMPLY WITH THEM WILL CAUSE UNNECESSARY DELAYS AND MAY RESULT IN THE PARTIAL OR TOTAL CANCELLATION OF YOUR APPLICATION FOR REGISTRATION.

Sc1  

Admission

(1) To be registered as a candidate for the BSc degree, a student must:
(a) hold one of the following certificates (see NB below and Sc1(1) NB1):
   (i) New NSC with a rating code of at least 4 (passed with at least 50%);
   (ii) a matriculation certificate issued by the Joint Matriculation Board;
   (iii) a senior or school leaving certificate with a matriculation exemption endorsement signed by the Secretary of the Joint Matriculation Board;
   (iv) a senior certificate with a matriculation or university admission endorsement issued by the South African Certification Council;
   (v) a certificate of full or conditional exemption from the matriculation examination issued by the Joint Matriculation Board or
   (vi) an exemption certificate or conditional exemption certificate issued by the Matriculation Board of the Committee of University Principals.

   A degree shall not be awarded to a student who holds a conditional exemption certificate until all the conditions have been met and an exemption certificate can be produced,
   AND have
(b) satisfied the following prerequisite in respect of Mathematics:
   (i) obtained at least 50% (a rating of 4) in Mathematics (not Mathematical Literacy) or
   (ii) obtained at least 40% (E symbol) in Mathematics HIGHER GRADE at matriculation level or
   (iii) obtained at least 50% (D symbol) in Mathematics STANDARD GRADE at matriculation level or
   (iv) passed Mathematics at matriculation level prior to the differentiation or
   (v) passed an equivalent ** examination in Mathematics; or
   (vi) passed the Mathematics access module MAT0511 – see Sc1(1)(d) below and the subject chapter on Mathematics in Part 2 of the Calendar.
   AND
   (c) obtained at least 50% (a rating of 4) in English or CSS101H
Application for registration for a BSc degree

(i) may register for the Mathematics access module (MAT0511) and a maximum of four of the undermentioned modules for non-degree purposes (NDP). Re-enrolment for the MAT0511 module cannot exceed 2 years.

As soon as MAT0511 has been passed, the student may register for the BSc degree (in accordance with Sc3(2) and (3)), and any of the undermentioned modules passed (excluding MAT0511), will be recognised as credits towards the degree. Credit will be granted for first level modules in MAT1512, MAT113Q and MAT103N for a BSc degree.

(ii) Students will be granted credit for not more than six modules towards the BSc degree for modules or courses passed BEFORE the Mathematics admission requirements to the College have been met.

(e) Students who do not have matriculation exemption as stated in Sc1(1)(a) but who hold a senior or school leaving certificate:

There are two possibilities:

(i) Students who obtained a rating of less than 4 or 50% in Mathematics OR students who obtained less than 40% (E symbol) in Mathematics STANDARD GRADE at matriculation level.

Such students must register for CSS011 (English for Science Access) and MAT0511 (Access to Mathematics), and may register for a maximum of two modules from the list given in Sc1(1)(c) for non-degree purposes. When both CSS011 and MAT0511 have been passed the student may apply for a Senate discretionary conditional exemption certificate, and any of the modules from the list in Sc1(1)(c) that have been passed can be recognised as credits towards a BSc degree.

(ii) Students who obtained a rating of less than 4 or 50% in Mathematics HIGHER GRADE or less than 50% (D symbol) in Mathematics STANDARD GRADE at matriculation level.

Such students must register for CSS011 (English for Science Access), and may register for a maximum of two first-level modules in the subjects given at the beginning of Chapter 2, except for those modules where the student does not satisfy the stated mathematics or other prerequisites, or does not satisfy the stated co-requisites. When CSS011 and the two first-level modules have been passed the student may apply for a Senate discretionary conditional exemption certificate, and any first-level modules mentioned in the previous sentence that have been passed can be recognised as credits towards a BSc degree.

NB

- If you hold a senior or school leaving certificate without a matriculation exemption, matriculation or university admission endorsement, you should contact the University in connection with conditional exemption (eg on grounds of age (+23)) – see Sc1(1) NB 1.
- If you obtained a senior or school leaving certificate without a matriculation exemption, matriculation or university admission endorsement, and then began studies for an approved THREE- or FOUR-YEAR DIPLOMA (eg at a Teachers’ College, a Technikon, a University or a Nursing College that was affiliated to a South African university), you can normally apply to the University for a certificate of exemption on completion of the diploma.
- A certified copy of the relevant document under Sc1(1)(a) AND evidence that you have satisfied the Mathematics requirement in Sc1(1)(b)(i)-(ii) or Sc1(1)(c), must accompany your FIRST application for registration.
- See G13 in Section 1 in connection with applications for a certificate of exemption, conditional exemption and exemption by virtue of qualifications obtained in other countries.

(2) Application for registration for a second BSc degree

A student who has completed a BSc or another degree in Science or Engineering may not register for a second BSc degree without permission of the Senate. Applications must be submitted on the prescribed form which appears at the end of Section 2. The application must be accompanied by a statement of all the courses already passed, unless he/she completed his/her previous qualification(s) at Unisa. The sixteen modules on second and third level prescribed in accordance with Rule Sc5(1)(a) must be passed at this University towards the second BSc degree. Exemption from these modules cannot be granted. A student may not choose as a major subject for the second BSc degree a subject which was passed as a major subject for the first BSc degree.

(3) Application for registration for a second BSc degree after a completed Bachelors degree

Students who have completed a Bachelor's degree (not necessarily in Science) must pass the sixteen modules on second and third level prescribed in accordance with Rule Sc5(1)(a) at this university. Exemption from these modules may not be granted.

If a student is exempted from one or more modules (or a course) on third-year level on the grounds of courses passed at this or another university towards a completed degree, such modules/courses will NOT be counted as part of a major subject towards the BSc degree, except in the case of third-level modules that were previously passed at this university for the National Certificate in Datametrics or for non-degree purposes (NDP) in accordance with the provisions of Sc13(1)(d). See also Sc7(3). The sixteen modules on second and third level prescribed by Rule Sc5(1)(a) must be passed at this University.
Students who want to register for Computing as a major should
(a) have access to an Internet Café or a Unisa Regional Learning Centre or other Internet facility. After registration access to myUnisa on a regular basis is compulsory.
(b) have passed Computer Application Technology or Information Technology with a rating of 4 (new NSC) or passed Computer Studies (NSC) or hold an Industry Standard qualification such as the ICDL in Computer Literacy issued within the previous five years. Students who do not satisfy this requirement, must pass EUP1501 BEFORE they may register for COS111U or INF1511.

Sc2 Definitions

(1) Study units in all subjects are known as MODULES.
(2) A student receives credit for each study unit passed – see Sc6.
(3) If Module A is a PREREQUISITE for Module B, a student must pass Module A before he/she enrols for Module B.
(4) If Module A is a CO-REQUISITE for Module B and a student wishes to enrol for Module B but has not yet passed Module A, he/she must register for Modules A and B concurrently.

A student may NOT cancel his/her enrolment for a co-requisite unless the module(s) for which it is prescribed is(are) also cancelled.
(5) Modules, courses and the papers of second- and third-year courses are designated by codes consisting of seven characters.

NB
The FULL CODE for each study unit must be used by students in all cases. The full codes will be found in the respective subject chapter in Part 2 of the Calendar.

(6) The examination in each module with a theoretical component consists of one paper of two hours (or, in specified cases, three hours).

Sc3 Duration of study and number of study units per year

(1) The BSc degree cannot be completed in under THREE YEARS. It must be obtained within ten years of a student’s first registration for the degree.
(2) ON FIRST REGISTRATION and on RE-ENROLMENT at this University the number of study units for which a student may register is determined by ‘Number of study units per semester’ in Section D3 in Part 1 of the Calendar.

NB
A student who is restricted to registration for FOUR modules may register for ONE of the following as an additional module:
- CSS101H (Comprehension Skills for Science)
- MAT1510 (Precalculus Mathematics A)
- MAT1511 (Precalculus B)

All three modules may be taken as additional modules only by students who register for a maximum of two other modules.

Sc4 Subjects

The subjects in which modules may be selected for the BSc degree are listed below. The syllabuses, prerequisites and all relevant information relating to the subject will be found in the subject chapter in Part 2 of the Calendar.

The letter M before the name of a subject indicates that it may be selected as a major subject.

SUBJECTS OFFERED BY THE COLLEGE OF SCIENCE, ENGINEERING AND TECHNOLOGY

M Applied Mathematics (APM)
M Astronomy (AST) (was offered for the last time in 2009)
M Chemistry (CHE)
M Computer Science (COS)
M Information Systems (INF)
M Physics (PHY)
M Mathematics (MAT)
M Operations Research (DSC)
M Statistics (STA)

SUBJECTS OFFERED BY THE COLLEGE OF AGRICULTURE AND ENVIRONMENTAL SCIENCES

M Biochemistry (BCH)
M Botany (BOT)
M Geography (GGH)
M Geology (GEL)
M Microbiology (MIB)
M Physiology (FIS)
M Zoology (ZOL)
The curriculum for the BSc degree comprises THIRTY MODULES which must be composed as follows:

(1) The curriculum for the BSc degree comprises THIRTY MODULES (except where indicated otherwise under the specialisation streams), must be composed as follows:

(a) At least TWENTY-FOUR of the thirty modules must be in subjects from the list under Sc4. Note that:
   - not more than FOURTEEN of the thirty modules may be on first level. This includes any courses that are selected under Sc5(1)(c).
   - Additional modules on first level may be taken for non-degree purposes (NDP), subject to Sc5(1)(e);
   - at least SIXTEEN of these twenty-four modules must be on second and third level and of these at least EIGHT must be on third level.
   - If Physics III, Psychology III or Chemistry III were included in the curriculum, at least four further modules on third level must be selected. If any two of Physics III, Psychology III and Chemistry III were included, the two courses are regarded as the equivalent of ten modules on third level. See Sc5(1)(b);
   - for the purpose of this rule, Courses I, II and III in Physics, Chemistry and Psychology are each regarded as the equivalent of two, three and five modules respectively.

(b) The curriculum must include at least ONE MAJOR SUBJECT. For this purpose, each major consists of at least four modules (or one course) on third level as specified for each major subject. A particular module cannot be counted as a credit for more than one major subject.

(c) Not more than THREE courses on first-year level (the equivalent of six modules) may be in subjects from the curricula of first Bachelor’s degrees of other Colleges. Such courses must be selected and taken subject to the examination timetable and the rules of the College concerned.

Such courses on first-year level are each regarded as the equivalent of two modules on first-year level.

(d) Not more than FIFTEEN modules may be selected in any particular subject for degree purposes, unless both Experimental Physics or Theoretical Physics are taken as major subjects. Subject to the provisions of (e) below, additional modules may be taken for non-degree purposes (NDP).

(e) In addition to the THIRTY modules that may be selected for the BSc degree curriculum in accordance with Sc5(1)(a)-(d), a student may register for a maximum of EIGHT modules (or a maximum of two courses, or a maximum of four modules and one course) for non-degree purposes (NDP) concurrently with those for the BSc degree subject to Sc5(4). (After the student has satisfied the requirements for the BSc degree, a final decision can be made (if necessary) in consultation with the Department of Student Admissions and Registrations as to which modules will be recognized for degree and for non-degree purposes.)

(2) Modules and/or courses for each year must be selected in such a manner that the examination dates DO NOT CLASH.

The theoretical examinations in modules and courses on Levels 1, 2 and 3 are conducted in October/November. Examinations in semester modules are conducted in May/June and October/November.

(3) Credit is NOT granted for a particular module as well as its equivalent(s). See under ‘General Information’ under the relevant subject.

As from 2010

(Degree code: 98801)

(1) The curriculum for the BSc degree comprises THIRTY MODULES which must be composed as follows:

(a) At least TWENTY-FOUR of the thirty modules must be in subjects from the list under Sc4. Note that:
   - not more than EIGHT of the thirty modules may be on the first level (NQF level 5). This includes any modules that are selected under Sc5(1)(c).
   - Additional modules on first level may be taken for non-degree purposes (NDP), subject to Sc5(1)(e);
at least TEN modules must be on third level (NQF level 7).

(b) The curriculum must include at least ONE MAJOR SUBJECT. For this purpose, each major consists of at least five modules on third level or NQF level 7. A particular module cannot be counted as a credit for more than one major subject. To complete a BSc in one major, at least 15 modules in the discipline of the major must form part of the BSc structure. A BSc can also have two majors and the above requirement will not be enforced in such a case.

(c) Not more than three modules on first level (NQF level 5) may be in subjects from the curricula of first Bachelor's degrees of other Colleges. Such modules must be selected and taken subject to the examination timetable and the rules of the College concerned.

(d) Not more than FIFTEEN modules may be selected in any particular subject for degree purposes, unless both Experimental Physics or Theoretical Physics are taken as major subjects. Subject to the provisions of (e) below, additional modules may be taken for non-degree purposes (NDP).

(e) In addition to the THIRTY modules that may be selected for the BSc degree curriculum in accordance with Sc5(1)(a)-(d), a student may register for a maximum of EIGHT modules for non-degree purposes (NDP) concurrently with those for the BSc degree subject to Sc3(4).

(After the student has satisfied the requirements for the BSc degree, a final decision can be made (if necessary) in consultation with the Department of Student Admissions and Registrations as to which modules will be recognized for degree or for non-degree purposes.)

(2) Modules for each semester must be selected in such a manner that the examination dates DO NOT CLASH.

The theoretical examinations in modules on Levels 1, 2 and 3 are conducted in October/November. Examinations in semester modules are conducted in May/June and October/November.

(3) Credit is NOT granted for a particular module as well as its equivalent(s). See under “General Information” under the relevant subject.

**Sc6**  
**Pass-mark and subminima; retention of credit**

(1) To pass a module, a candidate must obtain at least 50% in the examination but, in the case of the modules listed below, both a pass-mark of at least 50% and the subminimum opposite the module concerned must be obtained.

In the case of modules with both a practical and a theoretical component, credit for one component (practical or theoretical) can be retained for a maximum of two successive calendar years after the year in which it was passed, on condition that the student passes the other component within that period. The student must re-enrol for the module concerned in the year(s) in which the uncompleted component is repeated.

There is, at present, no time limit on the retention of credit for modules in which a student has passed as a whole, but conditions may be attached to the granting of exemptions.

<table>
<thead>
<tr>
<th>Module</th>
<th>Subminimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIB321–324</td>
<td>50% in the theory and 50% in the practical</td>
</tr>
<tr>
<td>ZOL222</td>
<td>50% in the theory and 50% in the project</td>
</tr>
</tbody>
</table>

(2) See General Rules G22 and G23 in Part 1 of the Calendar for the requirements to pass individual papers and Courses I, II and III in Archaeology, Geography and Psychology.

**Sc7**  
**Pass with distinction**

(1) A candidate shall pass a major subject with distinction if he/she obtains an average of at least 75% in the prescribed third-level modules. To pass with distinction in the final course of Archaeology, Psychology and Geography a candidate shall obtain an average of at least 75% in all the papers combined.

(2) A candidate shall be awarded the degree with distinction if he/she obtains, on third level, an average of 75% for his best eight modules, or nine modules if Archaeology, Geography or Psychology is selected as a major or ten modules if two of Archaeology, Geography and Psychology are selected as major subjects at Unisa. For this purpose Archaeology III, Geography III (Option B) and Psychology III (any option) are each (prior to 2002) regarded as the equivalent of five third-level modules.

(3) Only third level modules passed for a completed Diploma/National Certificate in Datametrics and for non-degree purposes (NDP) in accordance with Sc13(1)(d) can later be counted among the five modules on third level required for the BSc degree in accordance with Sc5(1)(b) and can be considered for the purpose of distinctions. Other third-level modules from which a student has been exempted will not be considered for the purpose of distinctions.

**Sc8**  
**Major subjects – see also Sc5(1)(b)**

Major subjects for the BSc degree must be selected from the list under Sc4. The modules (or the course) a student must pass to obtain credit for a particular major subject are listed in the relevant chapter.
A subject in which a student has passed as a major or principal subject for a completed degree may not be selected as a major for this degree.

**NB**

A particular module cannot be recognized as part of more than one major subject (e.g., COS3114 can be recognized as part of a major in either Computer Science or Information Systems but NOT for both subjects).
Advice and information on registration for the BSc Degree

4.1 Procedure for compiling a BSc curriculum

Old curriculum prior to 2010
(Degree code: 02089)

NOTE that each subject is discussed under a separate chapter in Part 2 of the Calendar. A form to assist you in compiling your curriculum appears at the end of Section 6.

NB
- If you are interested in a particular subject (or subjects), first read the relevant chapter before deciding on the modules to be taken in your first year.
- A student who wishes to register for the BSc degree may, where applicable, consider registering first for the National Certificate in Datametrics. All credits obtained for the certificate will normally be recognized as credits for the BSc degree at a later date. Particulars of the National Certificate (including model curricula) will be found in Chapter 4.
- BEFORE you complete the registration form, you are strongly advised to follow the important general information under the relevant subject. See also Rule Sc3 for possible restrictions. The dates for practical work and practical examinations also appear under the relevant chapter.

It is quite simple to compile a BSc curriculum if you begin as follows:

4.1.1 Divide a sheet of paper horizontally into three parts to represent the three levels, with four or more columns – one for each of the subjects which you include in your curriculum. See the examples under 4.1.4.

4.1.2 You must select at least EIGHT modules on third level (or higher) in such a manner that at least one major is included – see Sc5(1) and Sc8. Fill in the codes for these modules in the appropriate columns and blocks on your diagram.

4.1.3 Consult the relevant subject chapter to determine which modules are prescribed as the prerequisites and co-requisites for each of the third-level modules you have already selected. Fill in the codes for the new modules in the appropriate columns and blocks.

4.1.4 Repeat this procedure in respect of the prerequisites and co-requisites for those modules and/or recommended modules which you added under 4.1.3 above.

EXAMPLE 1

If you have selected Chemistry and Mathematics as your major subjects (see the respective subject chapters), your curriculum will already contain the following 25 modules:

<table>
<thead>
<tr>
<th>Level</th>
<th>CHE311/321, 312/322, 313/323, 314/324</th>
<th>4 MAT modules</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 2</td>
<td>CHE211/221, 212/222, 213/223, 214/224</td>
<td>MAT2611, MAT213 At least 2 other second-level MAT modules</td>
</tr>
<tr>
<td>Level 1</td>
<td>CHE101, 102, 103, 104</td>
<td>CSS101 MAT1512, 103N, 113Q, 1511</td>
</tr>
<tr>
<td>Total</td>
<td>12</td>
<td>1</td>
</tr>
</tbody>
</table>

This curriculum will be in order if FIVE more modules are added (SIX if exemption (without credit) from CSS101 is granted). These modules may be in Mathematics and/or Applied Mathematics, or in one or more other subjects. See 4.1.5 and 4.1.6 below.

EXAMPLE 2

If you have selected Computer Science and Geography as major subjects then your curriculum will already contain the following 27 modules:

| Level 3 | COS301, 311, 321, 332 | GGH301, 302, 303, 304, 305 |
| Level 2 | COS201, 211, 214, 221, 233 | GGH201, 202, 203, 204 |
| Level 1 | COS101, 111, 112, 113 | GGH101, 102 MAT1511, 1512, 103N |
| Total | 13 | 11 | 3 |

These modules may be in Mathematics and/or Applied Mathematics, or in one or more other subjects. See 4.1.5 and 4.1.6 below.
This curriculum will be in order if another three modules (preferably on first level) are taken.

4.1.5 If you have not yet selected at least SIXTEEN modules on second and third level, you must now select the necessary number of modules at this level, bearing in mind that the new prerequisites and co-requisites and recommended modules must also be added. You may select modules in subjects other than those already chosen.

4.1.6 Repeat the procedure described in 4.1.5 until you have a total of THIRTY modules in your curriculum.

New curriculum as from 2010
(Degree code: 98801)

NOTE that each subject is discussed under a separate chapter in Part 2 of the Calendar. A form to assist you in compiling your curriculum appears at the end of Section 6.

NB

- If you are interested in a particular subject (or subjects), first read the relevant chapter before deciding on the modules to be taken in your first year.
- A student who wishes to register for the BSc degree may, where applicable, consider registering first for the National Certificate in Datametrics. All credits obtained for the certificate will normally be recognized as credits for the BSc degree at a later date. Particulars of the National Certificate (including model curricula) will be found in Chapter 4.
- BEFORE you complete the registration form, you are strongly advised to follow the important general information under the relevant subject. See also Rule Sc3 for possible restrictions. The dates for practical work and practical examinations also appear under the relevant chapter.

To compile a BSc of your choice it could be helpful to apply the 3-4-5 structure. This implies: three modules (of a major) on NQF level 5, four modules on NQF level 6, and five modules on NQF level 7.

To illustrate the PQM structure the following examples are compiled to be of help to students.

EXAMPLE 1
Structure for a BSc majoring in Mathematics and Applied Mathematics

NOTE:
See Calendar 2 for prerequisites and co-requisites.

<table>
<thead>
<tr>
<th>DEGREE</th>
<th>LEVEL</th>
<th>NQF</th>
<th>MODULES</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSc</td>
<td>3</td>
<td>7</td>
<td>MAT301S MAT307Y MAT301W MAT3711</td>
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<td></td>
<td></td>
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<td>MAT302T MAT3711</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>MAT305W APM301W</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>MAT306X APM3123</td>
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<tr>
<td></td>
<td>2</td>
<td>6</td>
<td>MAT2611 MAT213T</td>
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<td>APM1612 MAT1512</td>
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<tr>
<td></td>
<td></td>
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<td>MAT113Q MAT163N</td>
</tr>
</tbody>
</table>

NOTE:
This structure already accounts for 24 modules of the required 30, so 6 more modules are needed, which have to be chosen in accordance with the rules given in Sc5.

EXAMPLE 2
Structure for a BSc majoring in Physics, Astronomy and Applied Mathematics

NOTE:
See Calendar 2 for prerequisites and co-requisites.
EXAMPLE 3

Structure for a BSc majoring in Mathematics, Applied Mathematics and Decision Sciences (Financial Modelling)

NOTE:
See Calendar 2 for prerequisites and co-requisites

<table>
<thead>
<tr>
<th>DEGREE</th>
<th>LEVEL</th>
<th>NQF</th>
<th>MODULES</th>
</tr>
</thead>
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<td>AST255S MAT2611 or MAT 212S</td>
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<td>PHY202A PHY206E PHY1049</td>
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<td>AST134J MAT1512 APM1612</td>
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<td>MAT1512 MAT113Q PHY105A</td>
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EXAMPLE 4

Structure for a BSc majoring in Computer Science

NOTE:
See Calendar 2 for prerequisites and co-requisites

<table>
<thead>
<tr>
<th>DEGREE</th>
<th>LEVEL</th>
<th>NQF</th>
<th>MODULES</th>
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<td>MAT103N</td>
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</table>

4.2 How many modules can you cope with each year?

No student may register for more than five modules per semester for the BSc degree.

This, however, does not answer the question posed. We answer it in the light of the following findings:

The results of a survey indicate that the average Unisa science student has about 14 hours per week available for study.

Compare this with the average student at a residential university who has about 40 hours available. Since he/she can usually manage only four first-year courses this implies that the average Unisa student can only manage the equivalent of a little more than one first-year course per year.

It is thus recommended that you restrict the number of modules you take each year to comply with your own personal circumstances.

| NB 1 |

You must complete the degree within 10 academic years in the study units available during your period of study.

The table below was derived from the results of the survey. It gives an indication of the number of modules for which a student should register per semester.
To use this table you must first make a realistic estimate of the average number of hours you will have available each week for study from January to June. You should then determine the number of modules for which you should register from the table.

Suppose we consider our average student as an example. He/she has 16 hours available per week (say 2 hours per evening Monday to Friday and 6 hours over the weekend) and for him/her the table gives:

Recommended number of modules per semester = 2

That is, you should be able to manage 2 modules per semester. At this rate it will take 7 to 7½ years to complete 30 modules for the BSc degree if no modules are repeated.

You may feel that you can manage much more, but remember you will find it much more stimulating if you pass all your modules each year than if you register for too many and pass only a few.

For a student to complete a BSc degree in a time-frame of three years, such student needs to register for 5 modules per semester. This implies that this student has 40 hours, i.e. 8 hours per day available to study. This is comparable to the time spent on a full-time job! Students who study after hours don’t have the time to cope with such a study load.

**NB 2**
- Note that the abovementioned survey revealed that many students have poor academic records because they attempt to do too many study units.
- Attention is also drawn to the restrictions in Sc3 and the requirements for readmission to study in Part 1 of the Calendar.
- For every semester module a student needs AT LEAST 8 hours per week.

### 4.3 Compulsory handbooks

See under General Information in Part 1 of the Calendar.

### 4.4 Registration and fees

See also under General Information and D1(2): Payment of Fees in Part 1 of the Calendar and the Information Brochure.

### 4.5 Applications for exemption from study units

With due observance of General Rule G17 in Part 1 of the Calendar, students may apply for exemption from study units towards a BSc degree or the National Certificate in Datametrics that are not necessarily offered by the College of Science, Engineering and Technology at Unisa. Such applications for exemption will only be considered on condition that the previous University or Technikon would have granted recognition for that study unit towards a similar degree at that institution.

An application form will be found in the Information Brochure.

### 4.6 Registration for a second BSc Degree or the equivalent

See Sc1(2) for the BSc degree and Sc10(2) for the National Certificate in Datametrics.

### 4.7 Electronic pocket calculators for examination purposes

Students may use electronic pocket calculators in the examinations only where special permission is granted by the departments concerned.

A pocket calculator used in the examinations must comply with the following requirements:
(a) it must be battery driven and the batteries must be fully charged
(b) it must not be programmable
(c) it must fit into a jacket pocket
(d) no calculator literature or instruction manual may be taken into the examination room
(e) there may be no notes in or on the calculator and
(f) calculators may not be passed from one student to another during the examination.

For general scientific work the following functions will be adequate:

sin, cos, tan, arcsin, arccos, arctan, √x, x², yx, log, ln, 10ⁿ, eⁿ, two memories, statistics (for Statistics students) and scientific notation.
4.8 The Science Library

Literature for the departments in the College of Science, Engineering and Technology is housed in the Main Library, except books and journals for Chemistry and Physics, and journals for Mathematics, Applied Mathematics and Astronomy, which can be found in the Unisa Science Library, on the sixth floor of the Science Block of the Theo van Wijk building, Unisa in Pretoria.

The Science Library is open from Mondays to Fridays between 07:45 and 13:00, and between 13:45 and 16:00. Students requiring access to Science Library material outside of these hours can telephone 012 429 8077 on any weekday before 15:00 and make arrangements to have the relevant material transferred to the Main Library.

Further details of Library Services will be found in the Library Regulations in the brochure ‘Your service guide@Unisa’ which is issued to registered students together with their tutorial matter.

4.9 Duration of examination papers/modules

See the syllabus of the relevant subject in Part 2 of the Calendar.
BSc (with specialisation in Environmental Management)

Purpose: the purpose of the programme is twofold. Firstly, to deliver competent emerging professionals who have a holistic approach to environmental issues as well as a focused knowledge of the human impact on the natural, socio-economic and cultural environments, and who are equipped with the necessary skills and knowledge to participate in the work of an environmental Management team. Secondly, to deliver citizens who have the knowledge to act as responsible and knowledgeable stakeholders in environmental decision making.

This degree may be taken in the following specialisation direction in this College:

Chemistry stream (02089 – ENC)

Purpose: it will provide BSc graduates with the knowledge, skills and a broad theoretical and practical competence to occupy entry level positions as professionals in the field of environmental management, and who are able to apply their knowledge and skills concerning Geography and Chemistry in environmental analysis and problem solving, specifically relating to air, water and soil pollution as well as other forms of environmental degradation. This stream also forms the basis for further postgraduate studies in Geography and Chemistry.

The curriculum comprises 32 modules:

FIRST LEVEL

This level comprises of 15 modules, the following 14 of which are compulsory:

- GGH101Q: Know your world: introduction to geography (Geography 101)
- GGH102R: World issues: a geographical perspective (Geography 102)
- CHE101N: General chemistry A (Chemistry 101)
- CHE1503: General chemistry B (Chemistry 1503)
- CHE103Q: Organic chemistry (Chemistry 103)
- CHE104R: Chemistry practical (Chemistry 104)
- MAT1511: Precalculus B (Mathematics 1511)
- MAT1512: Calculus A (Mathematics 1512)
- BLG112J: Biology of plants (Biology 112)
- BLG113K: Biology of animals (Biology 113)
- GEL1156: Environmental geology (Geology 1156)
- CSS101H: Comprehension skills for science (Comprehension Skills for Science 101)
- STA1510: Basic statistics (Statistics 1510)
- EUP1501: End-user computing (practical) (Information systems 1501)

and 1 of the following:

- DSC1510: Introduction to the business world (Operations Research 1510)
- APY101E: The anthropological study of culture in a multicultural context (Anthropology 101) (or SKA100V prior to 2001)
- APY102F: Culture as human resource in the African context (Anthropology 102) (or SKA100V prior to 2001)
- DVA101Q: Introduction to development studies (Development Studies 101)
- COM101X: Introduction to communication (Communication Science 101)
- SOC101V: Introduction to Sociology: Societal structures and processes (Sociology 101) (or SOS1004 prior to 2001)
- PYC1023: Psychology in society (Psychology 1023)

SECOND LEVEL

This level comprises 10 modules, the following 9 of which are compulsory:

- GGH201T: The African challenge: people and environment (Geography 201)
- GGH203V: The interpretation of maps, aerial photographs and satellite images (Geography 203)
- GGH204W: People and the natural environment: use and impact (Geography 204)
- GGH205X: Environmental politics (Geography 205)
- CHE211T/CHE221V: Inorganic chemistry/Practical work (Chemistry 211 and 221)
- CHE212U/CHE222W: Physical chemistry/Practical work (Chemistry 212 and 222)
- CHE213V/CHE223X: Organic chemistry/Practical work (Chemistry 213 and 223)
- ECS208H: Environmental economics (Economics 208)
- LEG201E: Legal aspects of environmental management (Legal Aspects of Environmental Management 201)

and 1 of the following:

- ACE2018: Archaeological fieldwork techniques and analytical methods (Archaeology 2018)
- CHE214W/CHE224Y: Analytical chemistry/Practical work (Chemistry 214 and 224)
- PUB206G: Environmental affairs (Public Administration 206)
- IOP205U: Environmental psychology (Industrial Psychology 205)
- ENE2019: Environmental education (Environmental Education 2019)
- GGH206Y: Geography of tourism (Geography 206)

THIRD LEVEL

This level comprises 7 modules, the following 6 of which are compulsory:

- GGH301W: State of the environment in Southern Africa (Geography 301)
- GGH302X: Spatial economic development (Geography 302)
- GGH303Y: Introduction to geographical information systems (Geography 303)
- GGH3054: Environmental evaluation and impact assessment (Geography 3054)
PLS3701 : Theoretical and applied ethics (Philosophy 3701)
DVA303Y : Projects and programmes as instruments of development (Development Studies 303)

and 1 of the following:

AGE302C : Applied archaeology: heritage conservation, cultural resource management and archaeotourism (Archaeology 302)
PYC305D : Interpersonal skills in diverse contexts (Psychology 305)
GGH3043 : Development of urban space (Geography 3043)
GGH3076 : Ecotourism (Geography 3076)
BSc (with specialisation in Mathematical and Statistical Science)

Purpose: the overall purpose is the education and training of students who will have an understanding of mathematical, statistical, and operations research principles, and are equipped with the necessary skills, knowledge and scientific attitudes required for solving a wide variety of mathematical, statistical and operations research problems (including those in science, engineering, technology, finance and commerce) at various levels of complexity.

This degree may be taken in any of the following streams:
- Mathematics
- Applied Mathematics
- Financial Modelling
- Mathematical Modelling
- Mathematical Statistics
- Statistical Decision Science
- Statistics for Management
- Environmental Statistics

Mathematics stream (02089 – MMA)

NB
From 2010 no new registrations will be allowed for this stream. Students have until the end of 2012 to complete the qualification, after which students will be transferred to the BSc General degree.

Purpose: the specific purpose of this stream is to bring students to the point where they have mastered the basic theory of the two main traditional branches of Mathematics, viz. real analysis (which includes calculus) and linear algebra, as well as two to four of the following: abstract algebra, complex analysis, discrete mathematics, ordinary differential equations, partial differential equations. Such students are equipped for a wide variety of careers in education (e.g. insurance companies, engineering and technology) and an academic career, depending on the various exit levels, and on the other discipline that the student chooses to study.

The curriculum comprises 30 modules.

FIRST LEVEL
This level comprises the following 14 modules:

- MAT1510 : Precalculus Mathematics A (Mathematics 1510) (if necessary)
- MAT1511 : Precalculus B (Mathematics 1511)
- MAT1512 : Calculus A (Mathematics 1512)
- MAT113Q : Calculus B (Mathematics 113)
- MAT103N : Linear algebra (Mathematics 103)
- CSS101H : Comprehension skills for science (Comprehension Skills for Science 101)
- EUP1501 : End-user computing (practical) (Information systems 1501)

plus 7 or 8 other suitable first-year modules, in 1 or more of the following subjects:
- Applied Mathematics
- Astronomy
- Computer Science
- Operations Research
- Physics
- Statistics

It is strongly recommended that the module Basic Statistics (STA1610) be taken, if neither Physics 103 (PHY1038), nor Chemistry 104 (CHE104R) nor any other Statistics modules are chosen from the recommended list of subjects mentioned above.

SECOND LEVEL
This level comprises the following 8 modules:

- MAT2611 : Linear algebra (Mathematics 2611)
- MAT213T : Real analysis (Mathematics 213)

and AT LEAST 2 of the following modules:
- MAT212S : Introduction to discrete mathematics (Mathematics 212)
- MAT215V : Calculus in higher dimensions (Mathematics 215)
- APM2611 : Differential equations (Applied Mathematics 2611)
- APM214Y : Applied dynamical systems (Applied Mathematics 214)
- APM2616 : Computer algebra (Applied Mathematics 2616)

plus 1 to 4 suitable second-year modules to make up the required number of 8 modules in this level, with 1 or more of the following subjects being strongly recommended:
- Applied Mathematics
- Astronomy
- Computer Science
- Operations Research
- Physics
- Statistics

THIRD LEVEL
This level comprises the following 8 modules:
AT LEAST 4 of the following modules:

- MAT301S: Linear algebra (Mathematics 301)
- MAT302T: Algebra (Mathematics 302)
- MAT305W: Complex analysis (Mathematics 305) (if MAT215 is selected in second level)
- MAT306X: Ordinary differential equations (Mathematics 306) (if MAT216 is selected in second level)
- MAT307Y: Discrete mathematics: Combinatorics (Mathematics 307) (if MAT212 is selected in second level)
- MAT3711: Real analysis (Mathematics 3711) (if MAT215 is selected in second level)
- APM301W: Partial differential equations (Applied Mathematics 301) (if MAT217 was selected in second level to make up the required number of 8 modules on this level)

plus 2 to 4 other suitable third-level modules to make up the required number of 8 modules on this level with 1 or more of the following subjects being strongly recommended:

- Applied Mathematics
- Astronomy
- Computer Science
- Operations Research
- Physics
- Statistics

Applied Mathematics stream (02089 – MAM)

**NB**

From 2010 no new registrations will be allowed for this stream. Students have until the end of 2012 to complete the qualification, after which students will be transferred to the BSc General degree.

**Purpose:**

The specific purpose of this stream is to bring students to the point where they have mastered the basic theory and some of the applications of ordinary differential equations and multivariable calculus; as well as three of four of the following branches of Applied Mathematics: partial differential equations, numerical methods, mechanics, special theory of relativity, discrete mathematics. Such students are also equipped for the careers mentioned for the Mathematics Stream, but will generally have a wider knowledge of the applications of Mathematics, and will be more proficient in practical problem solving and the development of mathematical models.

The curriculum comprises 30 modules.

**FIRST LEVEL**

This level comprises the following 14 modules:

- MAT1510: Precalculus Mathematics A (Mathematics 1510) *(if necessary)*
- MAT1511: Precalculus B (Mathematics 1511)
- MAT1512: Calculus A (Mathematics 1512)
- MAT113Q: Calculus B (Mathematics 113)
- MAT103N: Linear algebra (Mathematics 103)
- CSS101H: Comprehension skills for science (Comprehension Skills for Science 101)
- EUP1501: End-user computing (practical) (Information systems 1501)

plus AT LEAST 2 of the following:

- PHY1015: Elementary Mechanics (Physics 1015)
- APM1612: Mechanics II (Applied Mathematics 1612)
- APM1513: Applied linear algebra (Applied Mathematics 1513)
- APM1514: Mathematical modelling (Applied Mathematics 1514)

plus 3 to 6 other suitable first-year modules (to make up the 14 modules required in this level), with 1 or more of the following subjects being strongly recommended:

- Astronomy
- Computer Science
- Operations Research
- Physics
- Statistics

It is strongly recommended that the module STA1501 (Basic Statistics 1501) be taken, if neither PHY1038 (Physics 103), nor CHE104R (Chemistry 104) nor any other Statistics modules are chosen from the recommended list of subjects mentioned above.

**SECOND LEVEL**

This level comprises the following 8 modules:

- APM2611: Differential equations (Applied Mathematics 2611)
- MAT215V: Calculus in higher dimensions (Mathematics 215)

and AT LEAST 2 of the following modules:

- COS2338: Numerical methods I (Computer Science 233)
- APM214Y: Applied dynamical systems (Applied Mathematics 214)
- APM2616: Computer algebra (Applied Mathematics 2616)

plus 3 or 4 other suitable second-year modules (to make up the 8 modules required on this level), with 1 or more of the following subjects being strongly recommended:

- Astronomy
- Computer Science
- Mathematics
- Operations Research
- Physics
- Statistics
THIRD LEVEL

This level comprises the following 8 modules:

At least 4 of the following modules:

- APM301W: Partial differential equations (Applied Mathematics 301)
- APM3711: Numerical methods 2 (Applied Mathematics 3711)
- APM3123: Mechanics and the calculus of variations (Applied Mathematics 3123)
- APM3134: Special relativity and Riemannian geometry (Applied Mathematics 3134)
- MAT306X: Ordinary differential equations (Mathematics 306) (if MAT211 was selected on second level)
- MAT307Y: Discrete mathematics: Combinatorics (Mathematics 307) (if MAT2612 was selected on second level)

and 2 to 4 suitable other third-level modules to make up the 8 modules required on third level with 1 or more of the following subjects being strongly recommended:

- Applied Mathematics
- Astronomy
- Computer Science
- Operations Research
- Physics
- Statistics

Financial modelling stream (02089 – MFI)

NB
From 2010 no new registrations will be allowed for this stream. Students have until the end of 2012 to complete the qualification, after which students will be transferred to the BSc General degree.

Purpose: the education and training of professionals who will have an understanding of mathematical, statistical, and operations research concepts and principles, and are equipped with the necessary skills, knowledge and scientific attitudes required for solving a wide variety of mathematical, statistical and operations research problems (including those in finance, science, engineering, technology and commerce) at various levels of complexity.

The curriculum comprises 30 modules.

FIRST LEVEL

This level comprises the following 13 compulsory modules:

- MAT1511: Precalculus B (Mathematics 1511)
- MAT1512: Calculus A (Mathematics 1512)
- MAT113Q: Calculus B (Mathematics 113)
- MAT103N: Linear algebra (Mathematics 103)
- APM1514: Mathematical modelling (Applied Mathematics 1514)
- DSC1510: Introduction to the business world (Operations Research 1510)
- DSC1630: Introductory financial mathematics (Operations Research 1630)
- ECS1016: Economics 1A (Economics 1016)
- ECS1028: Economics 1B (Economics 1028)
- STA1501: Descriptive statistics and probability (Statistics 1501)
- STA1502: Statistical inference I (Statistics 1502)
- IOP101M: Psychological processes in work context (Industrial Psychology 101)
- COS111U: Introduction to programming 1 (Computer Science 111)

SECOND LEVEL

This level comprises the following 9 compulsory modules:

- DSC2601: Mathematical programming (Operations Research 2601)
- DSC2602: Rational decision making (Operations Research 2602)
- DSC2604: Financial modelling (Operations Research 2604)
- APM2611: Differential equations (Applied Mathematics 2611)
- COS2338: Numerical methods 1 (Computer Science 2338)
- MAT2611: Linear algebra (Mathematics 2611)
- ECS209J: The South African financial system (Economics 209)
- STA2603: Distribution theory II (Statistics 2603)
- STA2601: Applied statistics II (Statistics 2601)

THIRD LEVEL

This level comprises the following 8 compulsory modules:

- DSC3702: Optimisation of resources (Operations Research 3702)
Mathematical modelling stream (02089 – MMM)

**Purpose:** This programme provides the BSc graduate with the knowledge, specific skills and a broad theoretical and practical competence to use Operations Research, Mathematics and Applied Mathematics in a decision-making environment. It aims to integrate a solid understanding of the principles underlying various mathematical techniques with their implementation in the modelling of decision and management problems in the business, financial and related milieus. It also prepares the graduate for postgraduate studies in Operations Research and/or Applied Mathematics.

The curriculum comprises 30 modules.

**FIRST LEVEL**

This level comprises the following 13 compulsory modules:

- DSC1510 : Introduction to the business world (Operations Research 1510)
- DSC1630 : Introductory financial mathematics (Operations Research 1630)
- STA1501 : Descriptive statistics and probability (Basic Statistics 1501)
- STA1502 : Statistical inference I (Statistics 1502)
- MAT1511 : Precalculus B (Mathematics 1511)
- MAT1512 : Calculus A (Mathematics 1512)
- MAT113Q : Calculus B (Mathematics 113)
- MAT103N : Linear algebra (Mathematics 103)
- APM1513 : Applied linear algebra (Applied Mathematics 1513)
- APM1514 : Mathematical modelling (Applied Mathematics 1514)
- CSS101H : Comprehension skills for science (Comprehension Skills for Science 101)
- EUP1501 : End-user computing (practical) (Information systems 1501)
- COS111U : Introduction to programming 1 (Computer Science 111)

**SECOND LEVEL**

This level comprises the following 8 compulsory modules:

- DSC2601 : Mathematical programming (Operations Research 2601)
- DSC2602 : Rational decision making (Operations Research 2602)
- DSC2604 : Financial modelling (Operations Research 2604)
- STA2603 : Distribution theory II (Statistics 2603)
- MAT2611 : Linear algebra (Mathematics 2611)
- MAT212S : Introduction to discrete mathematics (Mathematics 212)
- APM2611 : Differential equations (Applied Mathematics 2611)
- COS2338 : Numerical methods 1 (Computer Science 233)

**THIRD LEVEL**

This level comprises the following 9 compulsory modules:

- APM301W : Partial differential equations (Applied Mathematics 301)
- APM3711 : Numerical methods 2 (Applied Mathematics 3711)
- MAT306X : Ordinary differential equations (Mathematics 306)
- MAT307Y : Discrete mathematics: Combinatorics (Mathematics 307)
- DSC3702 : Optimisation of resources (Operations Research 3702)
- DSC3703 : Simulation (Operations Research 3703)
- DSC3704 : Models for strategic decision-making (Operations Research 3704)
- DSC3705 : Financial risk modelling (Operations Research 3705)
- DSC3706 : Selected topics in Operations Research (Operations Research 3706)

Mathematical Statistics stream (02089 – MMS)

**Purpose:** Statistics is the collection and analysis of data, followed by the interpretation and presentation of the information in the data. This stream develops a thorough mathematical foundation on which statistical theories are built.

**NB**

From 2010 no new registrations will be allowed for this stream. Students have until the end of 2012 to complete the qualification, after which students will be transferred to the BSc General degree.
The curriculum comprises 30 modules.

**FIRST LEVEL**

This level comprises the following 13 compulsory modules:

- STA1501: Descriptive statistics and probability (Statistics 1501)
- STA1502: Statistical inference I (Statistics 1502)
- STA1503: Distribution theory I (Statistics 1503)
- DSC1630: Introductory financial mathematics (Statistics 1630)
- MAT1511: Precalculus B (Mathematics 1511)
- MAT1512: Calculus A (Mathematics 1512)
- MAT113Q: Calculus B (Mathematics 113)
- MAT103N: Linear algebra (Mathematics 103)
- APM1513: Applied linear algebra (Applied Mathematics 1513)
- COS111U: Introduction to programming 1 (Computer Science 111)
- COS112V: Introduction to programming 2 (Computer Science 112)
- CSS101H: Comprehension skills for science (Comprehension Skills for Science 101)
- EUP1501: End-user computing (practical) (Information systems 1501)

**SECOND LEVEL**

This level comprises 9 modules, the following 7 of which are compulsory:

- STA2601: Applied statistics II (Statistics 2601)
- STA2602: Statistical inference II (Statistics 2602)
- STA2603: Distribution theory II (Statistics 2603)
- STA2604: Forecasting II (Statistics 2604)
- MAT2611: Linear algebra (Mathematics 2611)
- MAT213T: Real analysis (Mathematics 213)
- MAT215V: Calculus in higher dimensions (Mathematics 215)

*plus 2 of the following modules:*

- COS2338: Numerical methods 1 (Computer Science 2338)
- MAT212S: Introduction to discrete mathematics (Mathematics 212)
- APM2611: Differential equations (Applied Mathematics 2611)

**THIRD LEVEL**

This level comprises 8 modules, the following 7 of which are compulsory:

- STA3701: Applied statistics III (Statistics 3701)
- STA3702: Statistical inference III (Statistics 3702)
- STA3703: Distribution theory III (Statistics 3703)
- STA3704: Time series IV (Statistics 3704)
- STA3705: Sampling techniques (Statistics 3705)
- MAT301S: Linear algebra (Mathematics 301)
- MAT305W: Complex analysis (Mathematics 305)

*plus 1 of the following modules:*

- MAT302T: Algebra (Mathematics 302)
- MAT306X: Ordinary differential equations (Mathematics 306) *(provided MAT216 was selected on second level)*

Statistical Decision Science stream (02089 – MSD)

**NB**

*From 2010 no new registrations will be allowed for this stream. Students have until the end of 2012 to complete the qualification, after which students will be transferred to the BSc General degree.*

**Purpose:** This stream provides the graduate with knowledge of operations research, statistics and aspects of computer science and informatics. It also prepares the graduate for postgraduate studies in data mining, operations research and statistics.

The curriculum comprises 30 modules.

**NB**

*EUP1501 must be taken for non-degree purpose, if a student is not computer literate.*

**FIRST LEVEL**

- DSC1510: Introduction to the business world (Operations Research 1510)
- DSC1630: Introductory financial mathematics (Operations Research 1630)
- STA1501: Descriptive statistics and probability (Statistics 1501)
- STA1502: Statistical inference I (Statistics 1502)
- STA1503: Statistical inference I (Statistics 1503)
- MAT103N: Linear algebra (Mathematics 103)
- MAT1512: Calculus A (Mathematics 1512)
- COS111U: Introduction to programming 1 (Computer Science 111)
COS112V : Introduction to programming 2 (Computer Science 112)
COS113W : Computer systems: fundamental concepts (Computer Science 113)

SECOND LEVEL

DSC2601 : Mathematical programming (Operations Research 2601)
DSC2602 : Rational decision making (Operations Research 2602)
DSC2604 : Financial modelling (Operations Research 2604)
STA2601 : Applied statistics II (Statistics 2601)
STA2602 : Statistical inference II (Statistics 2602)
STA2603 : Distribution theory II (Statistics 2603)
STA2604 : Forecasting II (Statistics 2604)
STA3710 : Mathematical techniques (Statistics 3710)
COS211X : Programming: data structures (Computer Science 211)
COS2144 : Programming: contemporary concepts (Computer Science 2144)
ICT2621 : Structured systems analysis and design (Information Systems 2621)

THIRD LEVEL

DSC3702 : Optimisation of resources (Operations Research 3702)
DSC3703 : Simulation (Operations Research 3703)
DSC3704 : Models for strategic decision-making (Operations Research 3704)
DSC3705 : Financial risk modelling (Operations Research 3705)
STA3701 : Applied statistics III (Statistics 3701)
STA3702 : Statistical inference III (Statistics 3702)
STA3703 : Distribution theory III (Statistics 3703)
STA3704 : Time series III (Statistics 3704)
INF303D : Principles of databases (Information Systems 303)
INF307H : Database design and implementation (Information Systems 307)

Should a student wish to continue with an honours degree in Information Systems, the following modules should be added (for non-degree purposes):

ICT2622 : Object-oriented analysis (Information Systems 2622)
INF305F : Advanced systems development (Information Systems 305)
INF308J : Software project management (Information Systems 308)

Statistics for Management stream
(02089 – MSM)

From 2010 no new registrations will be allowed for this stream. Students have until the end of 2012 to complete the qualification, after which students will be transferred to the BSc General degree.

Purpose: this stream develops programming, modelling, simulation, risk analysis, forecasting and statistical techniques required to solve problems in manufacturing, banking, business management and management consultancy.

The curriculum comprises 30 modules.

FIRST LEVEL

This level comprises the following 13 compulsory modules:

STA1501 : Descriptive statistics and probability (Statistics 1501)
STA1502 : Statistical inference I (Statistics 1502)
STA1503 : Distribution theory I (Statistics 1503)
DSC1630 : Introductory financial mathematics (Statistics 1630)
MAT1511 : Precalculus B (Mathematics 1511)
MAT1512 : Calculus A (Mathematics 1512)
MAT113Q : Calculus B (Mathematics 113)
MAT103N : Linear algebra (Mathematics 103)
DSC1510 : Introduction to the business world (Operations Research 1510)
DSC1630 : Introductory financial mathematics (Statistics 1630)
EUP1501 : End-user computing (practical) (Information systems 1501)
INF1059 : Introduction to Business Information Systems (Information Systems 1059)
CSS101H : Comprehension skills for science (Comprehension Skills for Science 101)

SECOND LEVEL

This level comprises of the following 9 modules:

STA2601 : Applied statistics II (Statistics 2601)
STA2602 : Statistical inference II (Statistics 2602)
STA2603 : Distribution theory II (Statistics 2603)
STA2604 : Forecasting II (Statistics 2604)
MAT2611 : Linear algebra (Mathematics 2611)
MAT215V : Calculus in higher dimensions (Mathematics 215)
DSC2601 : Mathematical programming (Operations Research 2601)
DSC2602 : Rational decision making (Operations Research 2602)
DSC2604 : Financial modelling (Operations Research 2604)

**THIRD LEVEL**

This level comprises 8 modules, the following 6 of which are compulsory:

- STA3701 : Applied statistics III (Statistics 3701)
- STA3702 : Statistical inference III (Statistics 3702)
- STA3703 : Distribution theory III (Statistics 3703)
- DSC3703 : Simulation (Operations Research 3703)
- DSC3705 : Financial risk modelling (Operations Research 3705)
- DSC3706 : Selected topics in Operations Research (Operations Research 3706)

*plus the following 2 modules:*

- STA3704 : Time series III (Statistics 3704)
- STA3705 : Sampling techniques (Statistics 3705)

*or*

1 of the following:

- DSC3702 : Optimisation of resources (Operations Research 3702)
- DSC3704 : Models for strategic decision-making (Operations Research 3704)

*and 1 of the following:*

- STA3704 : Time series IV (Statistics 3704)
- STA3705 : Sampling techniques (Statistics 3705)

---

**Environmental Statistics stream (02089 – MES)**

**NB**

*From 2010 no new registrations will be allowed for this stream. Students have until the end of 2012 to complete the qualification, after which students will be transferred to the BSc General degree.*

**Purpose:** this stream provides the statistical and geographical knowledge required to solve problems as environmental evaluation, population, spatial structures, and interpretation of aerial photos.

The curriculum comprises 30 modules.

**FIRST LEVEL**

This level comprises the following 13 compulsory modules:

- STA1501 : Descriptive statistics and probability (Statistics 1501)
- STA1502 : Statistical inference I (Statistics 1502)
- STA1503 : Distribution theory I (Statistics 1503)
- DSC1630 : Introductory financial mathematics (Statistics 1630)
- MAT1511 : Precalculus B (Mathematics 1511)
- MAT1512 : Calculus A (Mathematics 1512)
- MAT1513Q : Calculus B (Mathematics 113)
- MAT103N : Linear algebra (Mathematics 103)
- GGH101Q : Know your world: introduction to geography (Geography 101)
- GGH102R : World issues: a geographical perspective (Geography 102)
- EUP1501 : End-user computing (practical) (Information systems 1501)
- INF1059 : Introduction to Business Information Systems (Information Systems 1059)
- CSS101H : Comprehension skills for science (Comprehension Skills for Science 101)

**SECOND LEVEL**

This level comprises 9 modules, the following 8 of which are compulsory:

- STA2601 : Applied statistics II (Statistics 2601)
- STA2602 : Statistical inference II (Statistics 2602)
- STA2603 : Distribution theory II (Statistics 2603)
- STA2604 : Forecasting II (Statistics 2604)
- MAT2611 : Linear algebra (Mathematics 2611)
- MAT215V : Calculus in higher dimensions (Mathematics 215)
- GGH203V : The interpretation of maps, aerial photographs and satellite images (Geography 203)
- GGH204W : People and the natural environment: use and impact (Geography 204)

*plus 1 of the following modules:*

- GGH201T : The African challenge: people and environment (Geography 201)
- GGH202U : The geography of basic services provision (Geography 202)
- ICT2621 : Structured systems analysis and design (Information Systems 2621)
### THIRD LEVEL

This level comprises 8 modules, the following 7 of which are compulsory:

<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>STA3701</td>
<td>Applied statistics III (Statistics 3701)</td>
</tr>
<tr>
<td>STA3702</td>
<td>Statistical inference III (Statistics 3702)</td>
</tr>
<tr>
<td>STA3703</td>
<td>Distribution theory III (Statistics 3703)</td>
</tr>
<tr>
<td>GGH301W</td>
<td>State of the environment in Southern Africa</td>
</tr>
<tr>
<td></td>
<td>(Geography 301)</td>
</tr>
<tr>
<td>GGH302X</td>
<td>Spatial economic development</td>
</tr>
<tr>
<td></td>
<td>(Geography 302)</td>
</tr>
<tr>
<td>GGH303Y</td>
<td>Introduction to geographical information systems</td>
</tr>
<tr>
<td></td>
<td>(Geography 303)</td>
</tr>
<tr>
<td>GGH3054</td>
<td>Environmental evaluation and impact assessment</td>
</tr>
<tr>
<td></td>
<td>(Geography 3054)</td>
</tr>
</tbody>
</table>

**plus 1 of the following modules:**

<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>STA3704</td>
<td>Time series III (Statistics 3704)</td>
</tr>
<tr>
<td>STA3705</td>
<td>Sampling techniques (Statistics 3705)</td>
</tr>
</tbody>
</table>
BSc (with specialisation in Information Technology and Computer Science)

Purpose: the overall purpose of the programme is the education and training of responsible and competent Information Technology and Computer Science professionals/practitioners.

Prerequisite: See Chapter 3, Sc 1(e)

NB

Students registering for the first time in 2010 should register for a BSc (Degree code: 98801) with major in Computer Science or Information Systems. See the recommended curricula below.
**BSc (major in Computer Science)**

**Purpose:**
- to provide the graduate with knowledge, skills and competence in software engineering, computational intelligence, scientific computing, information technology management, informatics, and decision modelling,
- to provide the international community with graduates who have the potential to become intellectual leaders through continuing learning.

The curriculum comprises 30 modules.

**FIRST LEVEL**

This level comprises 8 modules.

- COS101S : Theoretical computer science 1
- COS111U : Introduction to programming 1
- COS112V : Introduction to programming 2
- COS113W : Computer systems: Fundamental concepts
- INF1059 : Introduction to business information systems
- INF1208 : Human-computer interaction 1
- INF1911 : Visual programming 1
- MAT103N : Linear algebra

**SECOND LEVEL**

This level comprises 11 modules.

- COS201V : Theoretical computer science 2
- COS211X : Programming: data structures
- COS2144 : Programming: contemporary concepts
- COS2213 : Computer organisation
- COS2269 : Computer networks
- COS261C : Formal logic 2
- ICT2621 : Structured systems analysis and design
- ICT2622 : Object-oriented analysis
- INF2611 : Visual programming 2
- MNE2601 : Introduction to entrepreneurship and small-business management
- DSC2602 : Rational decision-making

**THIRD LEVEL**

This level comprises 11 modules.

- COS301Y : Theoretical computer science 3
- COS3114 : Advanced programming
- COS3216 : Operating systems and architecture
- COS340A : Computer graphics
- COS351D : Techniques of artificial intelligence
- COS361F : Formal logic 3
- INF303D : Principles of databases
- INF305F : Advanced systems development
- INF307H : Database design and implementation
- INF308J : Software project management
- INF320E : Human-computer interaction 2
BSc (major in Information Systems)

Purpose:
- to provide the graduate with knowledge, skills and competence in software engineering, information technology management and informatics,
- to provide the international community with graduates who have the potential to become intellectual leaders through continuing learning.

The curriculum comprises 30 modules.

FIRST LEVEL

This level comprises 8 modules.

COS111U  :  Introduction to programming 1
COS112V :  Introduction to programming 2
COS113W :  Computer systems: fundamental concepts
FAC1502 :  Accounting concepts, principles and procedures
INF1059 :  Introduction to business information systems
INF1208 :  Human-computer interaction 1
INF1511 :  Visual programming 1
MNB101D :  Business management 1A

SECOND LEVEL

This level comprises 12 modules.

AUE202M  :  Introduction to the performing of the audit process
COS2269 :  Computer networks 1
COS211X :  Programming: data structures
COS2144 :  Programming: contemporary concepts
FAC1601 :  Accounting reporting
ICT2621 :  Structured systems analysis and design
ICT2622 :  Object-oriented analysis
INF2611 :  Visual Programming 2
MNG2016 :  General management
MNB102E :  Business management 1B
MNE2601 :  Introduction to entrepreneurship and small business management
STA1610 :  Introduction to statistics

THIRD LEVEL

This level comprises 10 modules.

COS3114 :  Advanced programming
INF303D :  Principles of Databases
INF305F :  Advanced Systems development
INF307H :  Database design and implementation
INF308J :  Software project management
INF320E :  Human Computer Interaction II
MNE3701 :  Entrepreneurship and small business management
MNE3702 :  Intrapreneurship
MNG301A :  Strategic management 3A
MNG302B :  Strategic management 3B

Prior to 2010 students could register for one of the following streams:

- Software Engineering
- Computational Intelligence
- Scientific Computing
- Information Systems and Geography
- Information Technology Management
- Computational Statistics (Programming)
- Computational Statistics (Information Systems)
- Information and Decision Modelling
- Decision Modelling and Computing

TRANSITIONAL ARRANGEMENTS

From 2010 the codes of some of the modules in the eight streams below will change. The table below lists those modules together with their old codes. Students who have completed the module under the old code cannot register for the module under the new code.

<table>
<thead>
<tr>
<th>Old code in 2009 and before</th>
<th>New code from 2010 onwards</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEM101A</td>
<td>EUP1501</td>
</tr>
<tr>
<td>INF206D</td>
<td>ICT2621</td>
</tr>
</tbody>
</table>
Software Engineering stream (02089 – ISE)

NB

The last year of new registrations for this stream was 2009. Students have until the end of 2012 to complete the qualification. From 2010 the codes of some of the modules in this stream will change. Refer to the table under Transitional arrangements above.

Purpose: this programme stream concerns the development of robust and reliable software. It will provide the BSc graduate with the knowledge, specific skills and applied and theoretical competence to occupy entry level positions involved in the development of computer based systems ranging from business applications to software control systems in power plants, aircraft, medical devices, etc.

The curriculum comprises 30 modules.

FIRST LEVEL

This level comprises 14 modules, the following 10 of which are compulsory.

<table>
<thead>
<tr>
<th>Module Code</th>
<th>Module Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>INF1059</td>
<td>Introduction to Business Information Systems (Information Systems 1059)</td>
</tr>
<tr>
<td>INF1208</td>
<td>Human-computer interaction I (Information Systems 1208)</td>
</tr>
<tr>
<td>COS101S</td>
<td>Theoretical computer science 1 (Computer Science 101)</td>
</tr>
<tr>
<td>COS111U</td>
<td>Introduction to programming 1 (Computer Science 111)</td>
</tr>
<tr>
<td>COS112V</td>
<td>Introduction to programming 2 (Computer Science 112)</td>
</tr>
<tr>
<td>COS113W</td>
<td>Computer systems: fundamental concepts (Computer Science 113)</td>
</tr>
<tr>
<td>INF1511</td>
<td>Visual programming I (Information Systems 1511)</td>
</tr>
<tr>
<td>CSS101H</td>
<td>Comprehension skills for science (Comprehension Skills for Science 101)</td>
</tr>
<tr>
<td>STA1510</td>
<td>Basic statistics (Statistics 1510)</td>
</tr>
<tr>
<td>EUP1501</td>
<td>End-user computing (practical) (Information systems 1501)</td>
</tr>
</tbody>
</table>

plus 4 suitable first-year modules.

If COS2338 is chosen on second level the following 3 modules must be included:

<table>
<thead>
<tr>
<th>Module Code</th>
<th>Module Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT1511</td>
<td>Precalculus B (Mathematics 1511)</td>
</tr>
<tr>
<td>MAT1512</td>
<td>Calculus A (Mathematics 1512)</td>
</tr>
<tr>
<td>MAT103N</td>
<td>Linear algebra (Mathematics 103)</td>
</tr>
</tbody>
</table>

If COS340A is chosen on third level, MAT103N must be included.

SECOND LEVEL

This level comprises 8 modules, the following 4 of which are compulsory:

<table>
<thead>
<tr>
<th>Module Code</th>
<th>Module Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICT2621</td>
<td>Structured systems analysis and design (Information Systems 2621)</td>
</tr>
<tr>
<td>ICT2622</td>
<td>Object-oriented analysis (Information Systems 2622)</td>
</tr>
</tbody>
</table>
The curriculum comprises 30 modules.

**Purpose:** This programme stream concerns the development of computer software to solve problems such as game playing, logical inference and theory, improving, planning, medical diagnosis, learning, vision, robotics, and natural language understanding. The programme aims to educate and train computational intelligence professionals/practitioners that possess and are able to apply these skills.

The curriculum comprises 30 modules.

**FIRST LEVEL**

This level comprises 14 modules, the following 11 of which are compulsory.

- COS101S: Theoretical computer science 1 (Computer Science 101)
- COS112V: Introduction to programming 2 (Computer Science 112)
- COS113W: Computer systems: fundamental concepts (Computer Science 113)
- INF1208: Human-computer interaction I (Information Systems 1208)
- MAT1511: Precalculus B (Mathematics 1511)
- MAT1512: Calculus A (Mathematics 1512)
- PYC101Y: Basic psychology (Psychology 101)
- COS111U: Introduction to programming 1 (Computer Science 111)
- CSS101H: Comprehension skills for science (Comprehension Skills for Science 101)
- STA1510: Basic statistics (Statistics 1510)
- EUP1501: End-user computing (practical) (Information systems 1501)

plus 3 of the following modules:

- INF1511: Visual programming 1 (Information Systems 1511)
- MAT103N: Linear algebra (Mathematics 103)
- DSC1510: Introduction to the business world (Operations Research 1510)
- LIN101W: Grammatical patterns and principles (Linguistics 101)

**SECOND LEVEL**

This level comprises 8 modules, the following 4 of which are compulsory.

- COS201V: Theoretical computer science 2 (Computer Science 201)
- COS211X: Programming: data structures (Computer Science 211)
- COS261C: Formal logic 2 (Computer Science 261)
- COS2144: Programming: contemporary concepts (Computer Science 2144)

plus 4 of the following modules:

- COS2213: Computer organisation (Computer Science 2213)
- COS2338: Numerical methods 1 (Computer Science 2338)
- MAT212S: Introduction to discrete mathematics (Mathematics 212)
- LIN309F: Text structure and function (Linguistics 309)
- LIN2024: Linguistic categorisation (Linguistics 2024)
THIRD LEVEL

This level comprises 8 modules, the following 5 of which are compulsory:

- COS301Y : Theoretical computer science 3 (Computer Science 301)
- INF320E : Human-computer interaction II (Information Systems 320)
- COS351D : Techniques of artificial intelligence (Computer Science 351)
- COS361F : Formal logic 3 (Computer Science 361)
- PYC303B : Cognition: thinking, memory and problem solving (Psychology 303)

plus 3 of the following modules:

- COS3114 : Advanced programming (Computer Science 3114)
- APM3711 : Numerical methods 2 (Applied Mathematics 3711)
- MAT307Y : Discrete mathematics: Combinatorics (Mathematics 307)
- INF303D : Principles of databases (Information Systems 303)
- LIN3028 : Approaches in Linguistics (Linguistics 3028)
- COS340A : Computer graphics (Computer Science 340)

Scientific Computing stream (02089 – ISC)

NB

The last year of new registrations for this stream was 2009. Students have until the end of 2012 to complete the qualification. From 2010 the codes of some of the modules in this stream will change. Refer to the table under Transitional arrangements above.

Purpose: this programme stream aims to educate and train practitioners/professionals with specialisation in computational abilities and scientific programming as applied in Mathematics, Statistics, Quantitative Management, Applied Mathematics, Geography, Physics and Chemistry.

The curriculum comprises 30 modules.

FIRST LEVEL

This level comprises 13 compulsory modules.

- COS101S : Theoretical computer science 1 (Computer Science 101)
- COS111U : Introduction to programming 1 (Computer Science 111)
- COS112V : Introduction to programming 2 (Computer Science 112)
- COS113W : Computer systems: fundamental concepts (Computer Science 113)
- MAT1511 : Precalculus B (Mathematics 1511)
- MAT1512 : Calculus A (Mathematics 1512)
- MAT113Q : Calculus B (Mathematics 113)
- MAT103N : Linear algebra (Mathematics 103)
- APM1513 : Applied linear algebra (Applied Mathematics 1513)
- APM1514 : Mathematical modelling (Applied Mathematics 1514)
- CSS101H : Comprehension skills for science (Comprehension Skills for Science 101)
- STA1510 : Basic statistics (Statistics 1510)
- EUP1501 : End-user computing (practical) (Information systems 1501)

SECOND LEVEL

This level comprises the following 9 compulsory modules.

- COS201V : Theoretical computer science 2 (Computer Science 201)
- COS211X : Programming: data structures (Computer Science 211)
- COS2144 : Programming: contemporary concepts (Computer Science 2144)
- COS2213 : Computer organisation (Computer Science 2213)
- COS238 : Numerical methods 1 (Computer Science 238)
- DSC2601 : Mathematical programming (Operations Research 2601)
- DSC2602 : Rational decision making (Operations Research 2602)
- MAT212S : Introduction to discrete mathematics (Mathematics 212)
- COS2269 : Computer networks I (Computer Science 2269)

THIRD LEVEL

This level comprises the following 8 compulsory modules:

- COS301Y : Theoretical computer science 3 (Computer Science 301)
- COS3114 : Advanced programming (Computer Science 3114)
- APM3711 : Numerical methods 2 (Applied Mathematics 3711)
- COS3216 : Operating systems and architecture (Computer Science 3216)
- MAT307Y : Discrete mathematics: Combinatorics (Mathematics 307)
- INF303D : Principles of databases (Information Systems 303)
- DSC3702 : Optimisation of resources (Operations Research 3702)
- COS340A : Computer graphics (Computer Science 340)
The last year of new registrations for this stream was 2009. Students have until the end of 2012 to complete the qualification. From 2010 the codes of some of the modules in this stream will change. Refer to the table under Transitional arrangements above.

Purpose: the emphasis of this stream is on information technology and the management thereof. The Information Technology management stream has a strong technical basis, but includes business exposure to prepare students for a career in software development in a business environment and eventually for the management of information technology in an enterprise.

The curriculum comprises 30 modules.

**FIRST LEVEL**

This level comprises 13 modules, the following 12 of which are compulsory:

1. INF1059 : Introduction to Business Information Systems (Information Systems 1059)
2. COS112V : Introduction to Programming 2 (Computer Science 112)
3. INF1511 : Visual Programming I (Information Systems 1511)
4. COS131W : Computer systems: fundamental concepts (Computer Science 113)
5. MNB101D : Business management 1A (Business Management 101)
6. MNB102E : Business management 1B (Business Management 102)
7. FAC1502 : Accounting concepts, principles and procedures (Accounting 1502)
8. FAC1601 : Accounting reporting (Accounting 1601)
9. COS111U : Introduction to Programming 1 (Computer Science 111)
10. CSS101H : Comprehension skills for science (Comprehension Skills for Science 101)
11. STA1510 : Basic Statistics (Statistics 1510)
12. INF1208 : Human-computer interaction I (Information Systems 1208)
13. COS101S : Theoretical computer science 1 (Computer Science 101)

plus 1 of the following modules:

1. ICT2621 : Structured systems analysis and design (Information Systems 2621)
2. ICT2622 : Object-oriented analysis (Information Systems 2622)
3. COS2269 : Computer networks I (Computer Science 2269)
4. COS211X : Programming: data structures (Computer Science 211)
5. COS2144 : Programming: contemporary concepts (Computer Science 2144)
6. COS2213 : Computer organisation (Computer Science 2213)
7. MNG2016 : General management (Business Management 2016)
8. AUE202M : Introduction to the performing of the audit process (Auditing 202)

**SECOND LEVEL**

This level comprises 9 modules, the following 8 of which are compulsory:

1. ICT2621 : Structured systems analysis and design (Information Systems 2621)
2. ICT2622 : Object-oriented analysis (Information Systems 2622)
3. COS2269 : Computer networks I (Computer Science 2269)
4. COS211X : Programming: data structures (Computer Science 211)
5. COS2144 : Programming: contemporary concepts (Computer Science 2144)
6. COS2213 : Computer organisation (Computer Science 2213)
7. MNG2016 : General management (Business Management 2016)
8. AUE202M : Introduction to the performing of the audit process (Auditing 202)

plus 1 of the following modules:

1. DPA202T : Practical accounting data processing (Accounting Data Processing 202)
2. MNE2601 : Introduction to entrepreneurship and small-business management (Business Management 2601)
3. MNF2023 : Financial management (Business Management 2023)
4. MNH202C : Human resource management (Business Management 202)
5. MNK203R : Enterprise risk management (Business Management 203)
6. MNM202Y : Marketing management (Business Management 202)
7. MNO202B : Production and operations management (Business Management 202)

**THIRD LEVEL**

This level comprises 8 modules, the following 6 of which are compulsory:

1. INF303D : Principles of databases (Information Systems 303)
2. INF305F : Advanced systems development (Information Systems 305)
3. INF307H : Database design and implementation (Information Systems 307)
4. INF308J : Software project management (Information Systems 308)
5. MNG301A : Strategic management 3A (Business Management 301)
6. MNG302B : Strategic management 3B (Business Management 302)

plus 2 of the following modules:

1. COS3114 : Advanced programming (Computer Science 3114)
2. COS3216 : Operating systems and architecture (Computer Science 3216)
3. INF320E : Human-computer interaction II (Information Systems 320)
Purpose: statistics requires the intelligent, critical and judicious use of computers this stream provides the necessary statistical and computational techniques and skills required to make a meaningful contribution to any computing team.

The curriculum comprises 30 modules.

**FIRST LEVEL**

This level comprises 14 modules, the following 13 of which are compulsory.

- STA1501 : Descriptive statistics and probability (Statistics 1501)
- STA1502 : Statistical inference I (Statistics 1502)
- STA1503 : Distribution theory I (Statistics 1503)
- DSC1630 : Introductory financial mathematics (Statistics 1630)
- MAT1511 : Precalculus B (Mathematics 1511)
- MAT1512 : Calculus A (Mathematics 1512)
- MAT113Q : Calculus B (Mathematics 113)
- MAT103N : Linear algebra (Mathematics 103)
- COS111U : Introduction to programming 1 (Computer Science 111)
- COS112V : Introduction to programming 2 (Computer Science 112)
- COS113W : Computer systems: fundamental concepts (Computer Science 113)
- CSS101H : Comprehension skills for science (Comprehension Skills for Science 101)
- EUP1501 : End-user computing (practical) (Information systems 1501)

plus 1 of the following modules:

- INF1059 : Introduction to Business Information Systems (Information Systems 1059)
- DSC1510 : Introduction to the business world (Operations Research 1510)

**SECOND LEVEL**

This level comprises the following 9 compulsory modules:

- STA2601 : Applied statistics II (Statistics 2601)
- STA2602 : Statistical inference II (Statistics 2602)
- STA2603 : Distribution theory II (Statistics 2603)
- STA2604 : Forecasting II (Statistics 2604)
- MAT2611 : Linear algebra (Mathematics 2611)
- MAT215V : Calculus in higher dimensions (Mathematics 215)
- COS211X : Programming: data structures (Computer Science 211)
- COS2144 : Programming: contemporary concepts (Computer Science 2144)
- COS2338 : Numerical methods 1 (Computer Science 2338)

**THIRD LEVEL**

This level comprises 9 modules:

- STA3701 : Applied statistics III (Statistics 3701)
- STA3702 : Statistical inference III (Statistics 3702)
- STA3703 : Distribution theory III (Statistics 3703)
- STA3704 : Time series III (Statistics 3704)
- STA3705 : Sampling techniques (Statistics 3705)
- APM3711 : Numerical methods 2 (Applied Mathematics 3711)
- INF303D : Principles of databases (Information Systems 303)

**Computational Statistics (Information Systems) stream (02089 – ICS)**

Purpose: this stream aims to educate and train statistical practitioners and professionals primarily involved in the business information needs of an organisation. It provides a sound understanding of computers databases, and the essence of statistical theory.

The curriculum comprises 30 modules.

**FIRST LEVEL**

This level comprises the following 13 compulsory modules:

- STA1501 : Descriptive statistics and probability (Statistics 1501)
- STA1502 : Statistical inference I (Statistics 1502)
- STA1503 : Distribution theory I (Statistics 1503)
SECOND LEVEL

This level comprises 8 compulsory modules:

- STA2601: Applied statistics II (Statistics 2601)
- STA2602: Statistical inference II (Statistics 2602)
- STA2603: Distribution theory II (Statistics 2603)
- STA2604: Forecasting II (Statistics 2604)
- MAT2611: Linear algebra (Mathematics 2611)
- MAT2615V: Calculus in higher dimensions (Mathematics 215)
- ICT2621: Structured systems analysis and design (Information Systems 2621)
- ICT2622: Object-oriented analysis (Information Systems 2622)

Informatics and Decision Modelling stream (02089 – IDM)

NB

The last year of new registrations for this stream was 2009. Students have until the end of 2012 to complete the qualification. From 2010 the codes of some of the modules in this stream will change. Refer to the table under Transitional arrangements above.

Purpose: this programme provides the BSc graduate with the knowledge, specific skills and a broad theoretical and practical competence to use Operations Research and Information Systems in a decision-making environment. It aims to integrate modelling skills, algorithmic and heuristic techniques from Operations Research with computer Systems principles and practice. It also prepares the graduate for postgraduate studies in Operations Research and/or Information Systems.

The curriculum comprises 30 modules.

FIRST LEVEL

This level comprises 14 modules, the following 13 of which are compulsory:

- DSC1510: Introduction to the business world (Operations Research 1510)
- DSC1630: Introductory financial mathematics (Operations Research 1630)
- STA1501: Descriptive statistics and probability (Statistics 1501)
- STA1502: Statistical inference I (Statistics 1502)
- MAT1511: Precalculus B (Mathematics 1511)
- MAT1512: Calculus A (Mathematics 1512)
- MAT113Q: Calculus B (Mathematics 113)
- MAT103N: Linear algebra (Mathematics 103)
- INF1059: Introduction to Business Information Systems (Information Systems 1059)
- INF1208: Human-computer interaction I (Information Systems 1208)
- CSS101H: Comprehension skills for science (Comprehension Skills for Science 101)
- EUP1501: End-user computing (practical) (Information Systems 1501)
- INF1511: Visual programming I (Information Systems 1511)

plus 1 of the following modules:
- PLC207B: Philosophy of science (Philosophy 207)
- COS101S: Theoretical computer science 1 (Computer Science 101)
- DSC1620: Mathematical modelling I (Quantitative Management 1620)

SECOND LEVEL

This level comprises 7 modules:
DSC2601 : Mathematical programming (Operations Research 2601)
DSC2602 : Rational decision making (Operations Research 2602)
DSC2604 : Financial modelling (Operations Research 2604)
STA2603 : Distribution theory II (Statistics 2603)
ICT2621 : Structured systems analysis and design (Information Systems 2621)
ICT2622 : Object-oriented analysis (Information Systems 2622)
COS2338 : Numerical methods I (Computer Science 2338)

THIRD LEVEL

This level comprises the following 9 modules of which the following 7 are compulsory:

- INF303D : Principles of databases (Information Systems 303)
- INF305F : Advanced systems development (Information Systems 305)
- DSC3702 : Optimisation of resources (Operations Research 3702)
- DSC3703 : Simulation (Operations Research 3703)
- DSC3704 : Models for strategic decision-making (Operations Research 3704)
- DSC3705 : Financial risk modelling (Operations Research 3705)
- DSC3707 : Mathematical Modelling II (Operations Research 3707)

plus 2 of the following modules:

- INF307H : Database design and implementation (Information Systems 307)
- INF308J : Software project management (Information Systems 308)
- INF320E : Human-computer interaction II (Information Systems 320)

Information Systems and Geography stream (02089 – ISG)

NB

The last year of new registrations for this stream was 2009. Students have until the end of 2012 to complete the qualification. From 2010 the codes of some of the modules in this stream will change. Refer to the table under Transitional arrangements above.

Purpose: This stream equips students with the skills, knowledge and insight concerning information technology and geographical and other relevant applications, together with decision-support methodologies, in order for them to qualify for entry level positions in the field of Geographical Information Systems and to pursue postgraduate studies to specialise in this field.

The curriculum comprises 30 modules

FIRST LEVEL

This level comprises 11 modules, the following 10 of which are compulsory:

- EUP1501 : End-user computing (practical) (Information systems 1501)
- INF1059 : Introduction to Business Information Systems (Information Systems 1059)
- INF1208 : Human-computer interaction I (Information Systems 1208)
- COS113W : Computer systems: fundamental concepts (Computer Science 113)
- INF1511 : Visual programming I (Information Systems 1511)
- STA1510 : Basic statistics (Statistics 1510)
- AGE1014 : Introduction to archaeology (Archaeology 1014)
- GGH101Q : Know your world: introduction to geography (Geography 101)
- GGH102R : World issues: a geographical perspective (Geography 102)
- CSS101H : Comprehension skills for science (Comprehension Skills for Science 101)

plus one of the following modules:

- DSC1520 : Quantitative modelling I (Quantitative Management 1520)
- DSC1620 : Mathematical modelling I (Quantitative Management 1620)

SECOND LEVEL

This level comprises 9 modules, the following 8 of which are compulsory:

- ICT2621 : Structured systems analysis and design (Information Systems 2621)
- ICT2622 : Object-oriented analysis (Information Systems 2622)
- GGH201T : The African challenge: people and environment (Geography 201)
- GGH202U : The geography of basic services provision (Geography 202)
- GGH203V : The interpretation of maps, aerial photographs and satellite images (Geography 203)
- GGH204W : People and the natural environment: use and impact (Geography 204)
- DSC2601 : Mathematical programming (Quantitative Management 2601)
- DSC2602 : Rational decision-making (Quantitative Management 2602)

plus one of the following modules:

- AGE2018 : Archaeological fieldwork techniques and analytical methods (Archaeology 2018)
- COS2269 : Computer networks I (Computer Science 2269)

THIRD LEVEL

This level comprises 10 modules, the following 8 of which are compulsory:

- INF303D : Principles of databases (Information Systems 303)
- INF305F : Advanced systems development (Information Systems 305)
INF307H : Database design and implementation (Information Systems 307)
INF320E : Human-computer interaction II (Information Systems 320)
GGH301W : State of the environment in Southern Africa (Geography 301)
GGH302X : Spatial economic development (Geography 302)
GGH303Y : Introduction to geographical information systems (Geography 303)
GGH3043 : Development of urban space (Geography 3043)

plus two of the following modules:
INF308J : Software project management (Information Systems 308)
DSC3702 : Optimisation of resources (Quantitative management 3702)
DSC3703 : Simulation (Quantitative management 3703)
DSC3704 : Models for strategic decision-making (Quantitative management 3704)
DSC3705 : Risk analysis techniques (Quantitative management 3705)
AGE302C : Applied archaeology: heritage conservation, cultural resource management and archaeotourism (Archaeology 302)
GGH3054 : Environmental evaluation and impact assessment (Geography 3054)

Decision Modelling and Computing stream (02089 – IDC)

NB

The last year of new registrations for this stream was 2009. Students have until the end of 2012 to complete the qualification. From 2010 the codes of some of the modules in this stream will change. Refer to the table under Transitional arrangements above.

Purpose: this programme provides the BSc graduate with the knowledge, specific skills and a broad theoretical and practical competence to use Operations Research and Computer Science in a decision-making environment. Graduates are equipped with the modelling skills and numerical and programming techniques needed to solve real-life decision and management problems. It also prepares the graduate for postgraduate studies in Operations Research and/or Computer Science.

The curriculum comprises 30 modules.

FIRST LEVEL

This level comprises the following 13 compulsory modules.

DSC1510 : Introduction to the business world (Operations Research 1510)
DSC1630 : Introductory financial mathematics (Operations Research 1630)
STA1501 : Descriptive statistics and probability (Statistics 1501)
STA1502 : Statistical inference I (Statistics 1502)
MAT1511 : Precalculus B (Mathematics 1511)
MAT1512 : Calculus A (Mathematics 1512)
MAT113Q : Calculus B (Mathematics 113)
MAT103N : Linear algebra (Mathematics 103)
COS111U : Introduction to programming 1 (Computer Science 111)
COS112V : Introduction to programming 2 (Computer Science 112)
COS113W : Computer systems: fundamental concepts (Computer Science 113)
COS101S : Theoretical computer science 1 (Computer Science 101)
EUP1501 : End-user computing (practical) (Information systems 1501)

SECOND LEVEL

This level comprises the following 9 compulsory modules:

DSC2601 : Mathematical programming (Operations Research 2601)
DSC2602 : Rational decision making (Operations Research 2602)
DSC2604 : Financial modelling (Operations Research 2604)
STA2603 : Distribution theory II (Statistics 2603)
COS211X : Programming: data structures (Computer Science 211)
COS2144 : Programming: contemporary concepts (Computer Science 2144)
COS2213 : Computer organisation (Computer Science 2213)
COS2338 : Numerical methods 1 (Computer Science 2338)
COS261C : Formal logic 2 (Computer Science 261)

THIRD LEVEL

This level comprises the following 8 compulsory modules:

COS3114 : Advanced programming (Computer Science 3114)
COS3216 : Operating systems and architecture (Computer Science 3216)
APM3711 : Numerical methods 2 (Applied Mathematics 3711)
COS351D : Techniques of artificial intelligence (Computer Science 351)
DSC3702 : Optimisation of resources (Operations Research 3702)
DSC3703 : Simulation (Operations Research 3703)
DSC3705 : Financial risk modelling (Operations Research 3705)
DSC3707 : Mathematical modelling II (Operations Research 3707)
**BSc (with specialisation in Natural Sciences)**

Purpose: the overall purpose of the programme is the education and training of professionals who will have an understanding of concepts and principles in a variety of specialisation areas in Science, and are equipped with the necessary skills, knowledge and scientific attitudes required for solving a wide variety of problems in one or more of these areas at various levels of complexity.

**This degree may be taken in any of the following streams in this College:**

- Astronomy
- Biochemistry and Chemistry
- Botany and Chemistry
- Chemistry and Mathematics
- Chemistry and Microbiology
- Chemistry and Physics
- Chemistry and Physiology
- Chemistry and Zoology
- Physics
- Physics and Computer Science

**Astronomy stream (02089 – NAS)**

**NB**

From 2010 no new registrations will be allowed for this stream. Students have until the end of 2012 to complete the qualification, after which students will be transferred to the BSc General degree.

Purpose: the overall purpose of this stream is the education and training of professionals who will have an understanding of astronomical concepts and principles, and are equipped with the necessary skills, knowledge and scientific attitudes required for solving a wide variety of problems in astronomy and related disciplines at various levels of complexity.

The curriculum comprises 30 modules.

**FIRST LEVEL**

This level comprises 14 modules, the following of which are compulsory:

- AST1631 : General introduction to astronomy (Astronomy 1631)
- AST134J : Spherical astronomy and Kepler orbits (Astronomy 134)
- MAT1511 : Precalculus B (Mathematics 1511)
- MAT1512 : Calculus A (Mathematics 1512)
- MAT113Q : Calculus B (Mathematics 113)
- MAT103N : Linear algebra (Mathematics 103)
- PHY1038 : Practical work (Physics 1038)
- PHY1049 : Modern physics (Physics 1049)
- PHY105A : Mechanics (Physics 105)
- PHY106B : Electromagnetism and heat (Physics 106)
- CSS101H : Comprehension skills for science (Comprehension Skills for Science 101)
- EUP1501 : End-user computing (practical) (Information systems 1501)

Plus 2 other modules. A selection from the following modules are strongly recommended:

- STA1510 : Basic statistics (Statistics 1510)
- APM1513 : Applied linear algebra (Applied Mathematics 1513)
- APM1514 : Mathematical modelling (Applied Mathematics 1514)
- COS111U : Introduction to programming 1 (Computer Science 111)
- COS112V : Introduction to programming 2 (Computer Science 112)

**SECOND LEVEL**

This level comprises the following 8 compulsory modules:

- AST251N : The structure and evolution of stars (Astronomy 251)
- AST252P : The structure and evolution of galaxies (Astronomy 252)
- AST255S : Astronomy Practical (Astronomy 255)
- MAT215V : Calculus in higher dimensions (Mathematics 215)
- APM2611 : Differential equations (Applied Mathematics 2611)
- PHY2019 : Classical mechanics (Physics 2019)
- PHY202A : Electricity and magnetism (Physics 202)
- PHY206E : Waves (Physics 206)

**THIRD LEVEL**

This level comprises 8 modules, the following which are compulsory:

- PHY302D : Quantum physics (Physics 302)
- PHY303E : Statistical physics (Physics 303)
- APM3123 : Mechanics and the calculus of variations (Applied Mathematics 3123)
- APM3134 : Special relativity and Riemannian geometry (Applied Mathematics 3134)
- AST355V : Advanced Astronomy Practical (Astronomy 355)
- AST363V : Observational Techniques (Astronomy 363)

Plus 2 appropriate second or third year modules. A selection from the following modules is strongly recommended:
Biochemistry and Chemistry stream
(02089 – NOC)

Purpose: this stream will provide the BSc graduate with the knowledge, specific skills and a broad theoretical and practical competence to occupy entry-level positions as professionals for a wide range of vocations such as medical research, agriculture as well as the chemical, food and biotechnological industries or as teachers. This program also forms the basis for further postgraduate studies in Chemistry and Biochemistry.

The curriculum comprises 30 modules.

**FIRST LEVEL**

This level comprises the following 14 modules:

- CHE101N : General chemistry A (Chemistry 101)
- CHE103Q : Organic chemistry (Chemistry 103)
- CHE104R : Chemistry practical (Chemistry 104)
- BLG111H : Basic Biology (Biology 111)
- BLG112J : Biology of plants (Biology 112)
- BLG113K : Biology of animals (Biology 113)
- BLG114L : Practical (Biology 114)
- MAT1511 : Precalculus B (Mathematics 1511)
- MAT1512 : Calculus A (Mathematics 1512)
- EUP1501 : End-user computing (practical) (Information systems 1501)
- CSS101H : Comprehension skills for science (Comprehension Skills for Science 101)

*plus 2 of the following modules:*

- MAT103N : Linear algebra (Mathematics 103)
- STA1510 : Basic statistics (Statistics 1510)
- PLS207B : Philosophy of science (Philosophy 207)
- DSC1510 : Introduction to the business world (Operations Research 1510)

**SECOND LEVEL**

This level comprises the following 8 compulsory modules:

- CHE211T/CHE221V : Inorganic chemistry/Practical work (Chemistry 211 and 221)
- CHE212U/CHE222W : Physical chemistry/Practical work (Chemistry 212 and 222)
- CHE213V/CHE223X : Organic chemistry/Practical work (Chemistry 213 and 223)
- CHE214W/CHE224Y : Analytical chemistry/Practical work (Chemistry 214 and 224)
- BCH2118 : Introductory biochemistry (Biochemistry 2118)
- BCH2129 : Bioenergetics (Biochemistry 2129)
- BCH213A : Biopolymers of heredity (Biochemistry 213)
- BCH214B : Experimental biochemistry (Biochemistry 214)

**THIRD LEVEL**

This level comprises the following 8 compulsory modules:

- CHE311W/CHE321Y : Inorganic chemistry/Practical work (Chemistry 311 and 321)
- CHE312X/CHE3223 : Physical chemistry/Practical work (Chemistry 312 and 322)
- CHE313Y/CHE3234 : Organic chemistry/Practical work (Chemistry 313 and 323)
- CHE3143/CHE3245 : Analytical chemistry/Practical work (Chemistry 314 and 324)
- BCH3711 : Enzymology (Biochemistry 3711)
- BCH3712 : Advanced metabolism (Biochemistry 3712)
- BCH3713 : Molecular genetics (Biochemistry 3713)
- BCH314E : Analytical biochemistry and practical (Biochemistry 314)

Botany and Chemistry stream (02089 – NBC)

Purpose: this stream will provide the BSc graduate with the knowledge, specific skills and a broad theoretical and practical competence in Chemistry and in plants and their environment to occupy entry-level positions as professionals for a wide range of vocations such as the teaching, in industry, forestry, plant breeding and in other sectors where knowledge of Botany and Chemistry is needed. Graduates may continue with studies at a postgraduate level in Chemistry, Botany, Ecology or Environmental Sciences.

The curriculum comprises 30 modules.

**FIRST LEVEL**
This level comprises 14 modules, the following 12 of which are compulsory:

<table>
<thead>
<tr>
<th>Module Code</th>
<th>Module Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOT131W</td>
<td>Plant structure: cytology, morphology and anatomy (Botany 131)</td>
</tr>
<tr>
<td>BOT132X</td>
<td>Biodiversity (Botany 132)</td>
</tr>
<tr>
<td>BOT133Y</td>
<td>Plant diversity and environmental botany (Botany 133)</td>
</tr>
<tr>
<td>BOT1343</td>
<td>Practical (Botany 1343)</td>
</tr>
<tr>
<td>CHE101N</td>
<td>General chemistry A (Chemistry 101)</td>
</tr>
<tr>
<td>CHE103Q</td>
<td>Organic chemistry (Chemistry 103)</td>
</tr>
<tr>
<td>CHE104R</td>
<td>Chemistry practical (Chemistry 104)</td>
</tr>
<tr>
<td>MAT1511</td>
<td>Precalculus B (Mathematics 1511)</td>
</tr>
<tr>
<td>MAT1512</td>
<td>Calculus A (Mathematics 1512)</td>
</tr>
<tr>
<td>EUP1501</td>
<td>End-user computing (practical) (Information systems 1501)</td>
</tr>
<tr>
<td>CSS101H</td>
<td>Comprehension skills for science (Comprehension Skills for Science 101)</td>
</tr>
</tbody>
</table>

plus 2 of the following modules:

<table>
<thead>
<tr>
<th>Module Code</th>
<th>Module Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT103N</td>
<td>Linear algebra (Mathematics 103)</td>
</tr>
<tr>
<td>ZOL121Q</td>
<td>Animal diversity 1 (Zoology 121)</td>
</tr>
<tr>
<td>ZOL122R</td>
<td>Animal diversity 2 (Zoology 122)</td>
</tr>
<tr>
<td>ZOL123S</td>
<td>Animal diversity 3 (Zoology 123)</td>
</tr>
</tbody>
</table>

SECOND LEVEL

This level comprises the following 8 compulsory modules:

<table>
<thead>
<tr>
<th>Module Code</th>
<th>Module Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHE211T/CHE221V</td>
<td>Inorganic chemistry/Practical work (Chemistry 211 and 221)</td>
</tr>
<tr>
<td>CHE212U/CHE222W</td>
<td>Physical chemistry/Practical work (Chemistry 212 and 222)</td>
</tr>
<tr>
<td>CHE213V/CHE223X</td>
<td>Organic chemistry/Practical work (Chemistry 213 and 223)</td>
</tr>
<tr>
<td>CHE214W/CHE224Y</td>
<td>Analytical chemistry/Practical work (Chemistry 214 and 224)</td>
</tr>
<tr>
<td>BOT221X</td>
<td>Systematics of non-vascular plants (Botany 221)</td>
</tr>
<tr>
<td>BOT2632</td>
<td>Systematics of vascular plants (Botany 2632)</td>
</tr>
<tr>
<td>BOT2233</td>
<td>Plant anatomy and physiology (Botany 2233)</td>
</tr>
<tr>
<td>BOT2244</td>
<td>Practical (Botany 2244)</td>
</tr>
</tbody>
</table>

THIRD LEVEL

This level comprises the following 8 compulsory modules:

<table>
<thead>
<tr>
<th>Module Code</th>
<th>Module Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHE311W/CHE321Y</td>
<td>Inorganic chemistry/Practical work (Chemistry 311 and 321)</td>
</tr>
<tr>
<td>CHE312X/CHE3223</td>
<td>Physical chemistry/Practical work (Chemistry 312 and 3223)</td>
</tr>
<tr>
<td>CHE313Y/CHE3234</td>
<td>Organic chemistry/Practical work (Chemistry 313 and 3234)</td>
</tr>
<tr>
<td>CHE3143/CHE3245</td>
<td>Analytical chemistry/Practical work (Chemistry 314 and 3245)</td>
</tr>
<tr>
<td>BOT3214</td>
<td>Plant physiology (Botany 3214)</td>
</tr>
<tr>
<td>BOT3225</td>
<td>Aquatic ecology (Botany 3225)</td>
</tr>
<tr>
<td>BOT3236</td>
<td>Terrestrial ecology (Botany 3236)</td>
</tr>
<tr>
<td>BOT3248</td>
<td>Practical (Botany 3248)</td>
</tr>
</tbody>
</table>

Chemistry and Mathematics stream
(02089 – NCM)

NB
From 2010 no new registrations will be allowed for this stream. Students have until the end of 2012 to complete the qualification, after which students will be transferred to the BSc General degree.

Purpose: this stream will provide the BSc graduate with the knowledge, specific skills and a broad theoretical and practical competence to occupy entry level positions in teaching Mathematics and Physical Science, as technicians in the chemical, mining and petroleum industry or to continue with Chemistry or Mathematics at a postgraduate level.

The curriculum comprises 30 modules.

FIRST LEVEL

This level comprises 14 modules, the following 10 of which are compulsory:

<table>
<thead>
<tr>
<th>Module Code</th>
<th>Module Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHE101N</td>
<td>General chemistry A (Chemistry 101)</td>
</tr>
<tr>
<td>CHE103Q</td>
<td>Organic chemistry (Chemistry 103)</td>
</tr>
<tr>
<td>CHE104R</td>
<td>Chemistry practical (Chemistry 104)</td>
</tr>
<tr>
<td>MAT1511</td>
<td>Precalculus B (Mathematics 1511)</td>
</tr>
<tr>
<td>MAT1512</td>
<td>Calculus A (Mathematics 1512)</td>
</tr>
<tr>
<td>MAT113Q</td>
<td>Calculus B (Mathematics 113)</td>
</tr>
<tr>
<td>MAT103N</td>
<td>Linear algebra (Mathematics 103)</td>
</tr>
<tr>
<td>EUP1501</td>
<td>End-user computing (practical) (Information systems 1501)</td>
</tr>
<tr>
<td>CSS101H</td>
<td>Comprehension skills for science (Comprehension Skills for Science 101)</td>
</tr>
</tbody>
</table>

plus 4 of the following modules:

<table>
<thead>
<tr>
<th>Module Code</th>
<th>Module Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>COS111U</td>
<td>Introduction to programming 1 (Computer Science 111)</td>
</tr>
</tbody>
</table>
SECOND LEVEL

This level comprises 8 modules, the following 6 of which are compulsory:

CHE211T/CHE221V : Inorganic chemistry/Practical work (Chemistry 211 and 221)
CHE212U/CHE222W : Physical chemistry/Practical work (Chemistry 212 and 222)
CHE213V/CHE223X : Organic chemistry/Practical work (Chemistry 213 and 223)
CHE214W/CHE224Y : Analytical chemistry/Practical work (Chemistry 214 and 224)
MAT2611 : Linear algebra (Mathematics 2611)
MAT213T : Real analysis (Mathematics 213)

plus 2 of the following modules:
MAT212S : Introduction to discrete mathematics (Mathematics 212)
MAT215V : Calculus in higher dimensions (Mathematics 215)
APM2611 : Differential equations (Applied Mathematics 2611)
APM2616 : Computer algebra (Applied Mathematics 2616)
APM214Y : Applied dynamical systems (Applied Mathematics 214)

THIRD LEVEL

This level comprises 8 modules, of which the following 6 are compulsory:

CHE311W/CHE321Y : Inorganic chemistry/Practical work (Chemistry 311 and 321)
CHE312X/CHE3223 : Physical chemistry/Practical work (Chemistry 312 and 322)
CHE313Y/CHE3234 : Organic chemistry/Practical work (Chemistry 313 and 323)
CHE3143/CHE3245 : Analytical chemistry/Practical work (Chemistry 314 and 324)
MAT301S : Linear algebra (Mathematics 301)
MAT302T : Algebra (Mathematics 302)

plus 2 of the following modules:
MAT307Y : Discrete mathematics: Combinatorics (Mathematics 307)
MAT305W : Complex analysis (Mathematics 305)
MAT306X : Ordinary differential equations (Mathematics 306)
MAT3711 : Real analysis (Mathematics 3711)

Chemistry and Microbiology stream
(02089 – NCK)

NB
From 2010 no new registrations will be allowed for this stream. Students have until the end of 2012 to complete the qualification, after which students will be transferred to the BSc General degree.

Purpose: this stream will provide the BSc graduate with the knowledge, specific skills and applied and theoretical competence to occupy entry-level positions in the teaching, in the chemical, pharmaceutical and brewing industry, in agriculture or environmental vocations, in health and food-related industries or to continue with studies in Chemistry and Microbiology at a postgraduate level.

The curriculum comprises 30 modules.

FIRST LEVEL

This level comprises 14 modules, the following 12 of which are compulsory:

CHE101N : General chemistry A (Chemistry 101)
CHE1503 : General chemistry B (Chemistry 1503)
CHE103Q : Organic chemistry (Chemistry 103)
CHE104R : Chemistry practical (Chemistry 104)
BLG111H : Basic Biology (Biology 111)
BLG112J : Biology of plants (Biology 112)
BLG113K : Biology of animals (Biology 113)
BLG114L : Practical (Biology 114)
MAT1511 : Precalculus B (Mathematics 1511)
MAT1512 : Calculus A (Mathematics 1512)
EUP1501 : End-user computing (Practical) (Information systems 1501)
CSS101H : Comprehension skills for science (Comprehension Skills for Science 101)

plus 2 of the following modules:
MAT103N : Linear algebra (Mathematics 103)
STA1510 : Basic statistics (Statistics 1510)
PLS207B : Philosophy of science (Philosophy 207)
DSC1510 : Introduction to the business world (Operations Research 1510)
SECOND LEVEL

This level comprises the following 8 compulsory modules:

- CHE211T/CHE221V : Inorganic chemistry/Practical work (Chemistry 211 and 221)
- CHE212U/CHE222W : Physical chemistry/Practical work (Chemistry 212 and 222)
- CHE213V/CHE223X : Organic chemistry/Practical work (Chemistry 213 and 223)
- CHE214W/CHE224Y : Analytical chemistry/Practical work (Chemistry 214 and 224)
- MIB221Q : Introductory Microbiology (Microbiology 221)
- MIB222R : Microbial ecology (Microbiology 222)
- MIB223S : Introductory microbial genetics, immunology and epidemiology (Microbiology 223)
- MIB224T : Practical microbiology II (Microbiology 224)

THIRD LEVEL

This level comprises the following 8 compulsory modules:

- CHE311W/CHE321Y : Inorganic chemistry/Practical work (Chemistry 311 and 321)
- CHE312X/CHE3223 : Physical chemistry/Practical work (Chemistry 312 and 3223)
- CHE313Y/CHE3234 : Organic chemistry/Practical work (Chemistry 313 and 3234)
- CHE3143/CHE3245 : Analytical chemistry/Practical work (Chemistry 3143 and 324)
- MIB321T : Microbial physiology (Microbiology 321)
- MIB322U : Advanced microbial genetics, recombinant DNA technology and industrial microbiology (Microbiology 322)
- MIB323V : Microbial diversity (Microbiology 323)
- MIB324W : Practical Microbiology III (Microbiology 324)

Chemistry and Physics stream (02089 – NCF)

From 2010 no new registrations will be allowed for this stream. Students have until the end of 2012 to complete the qualification, after which students will be transferred to the BSc General degree.

Purpose: this stream will provide the BSc graduate with the knowledge, specific skills and a broad theoretical and practical competence to occupy entry level positions in the teaching of Physical Science, as technicians in the chemical, mining, petroleum, electrical and applied technological industries or to continue with Chemistry, Physics or Material Science at a postgraduate level.

The curriculum comprises 30 modules.

FIRST LEVEL

This level comprises the following 14 compulsory modules:

- CHE101N : General chemistry A (Chemistry 101)
- CHE1503 : General chemistry B (Chemistry 1503)
- CHE103Q : Organic chemistry (Chemistry 103)
- CHE104R : Chemistry practical (Chemistry 104)
- MAT1511 : Precalculus B (Mathematics 1511)
- MAT1512 : Calculus A (Mathematics 1512)
- MAT113Q : Calculus B (Mathematics 113)
- MAT103N : Linear algebra (Mathematics 103)
- PHY1038 : Practical work (Physics 1038)
- PHY1049 : Modern physics (Physics 1049)
- PHY105A : Mechanics (Physics 105) (or PHY101 with at least 65% prior to 2007)
- PHY106B : Electromagnetism and heat (Physics 106) (or PHY102 with at least 65% prior to 2007)
- EUP1501 : End-user computing (Practical) (Information systems 1501)
- CSS101H : Comprehension skills for science (Comprehension Skills for Science 101)

Students who have passed MAT113 need not register for MAT111 and MAT112 but may choose any 2 of the following modules:

- STA1510 : Basic statistics (Statistics 1510)
- DSC1510 : Introduction to the business world (Operations Research 1510)
- PLS207B : Philosophy of science (Philosophy 207)
- COS111U : Introduction to programming 1 (Computer Science 111)
- COS112V : Introduction to programming 2 (Computer Science 112)
- COS113W : Computer systems: fundamental concepts (Computer Science 113)

SECOND LEVEL

This level comprises the following 8 modules, the following 7 of which are compulsory:

- CHE211T/CHE221V : Inorganic chemistry/Practical work (Chemistry 211 and 221)
- CHE212U/CHE222W : Physical chemistry/Practical work (Chemistry 212 and 222)
- CHE213V/CHE223X : Organic chemistry/Practical work (Chemistry 213 and 223)
- CHE214W/CHE224Y : Analytical chemistry/Practical work (Chemistry 214 and 224)
- PHY2019 : Classical mechanics (Physics 2019)
- PHY202A : Electricity and magnetism (Physics 202)
- PHY206E : Waves (Physics 206)
plus 1 other of the following modules:

- PHY204C : Practical work (Physics 204)
- COS2144 : Programming: contemporary concepts (Computer Science 2144)
- COS261C : Formal logic 2 (Computer Science 261)
- MAT2611 : Linear algebra (Mathematics 261)

### THIRD LEVEL

This level comprises 8 modules, the following 6 of which are compulsory:

- CHE311W/CHE321Y : Inorganic chemistry/Practical work (Chemistry 311 and 321)
- CHE312X/CHE3223 : Physical chemistry/Practical work (Chemistry 312 and 3223)
- CHE313Y/CHE3234 : Organic chemistry/Practical work (Chemistry 313 and 3234)
- CHE3143/CHE3245 : Analytical chemistry/Practical work (Chemistry 3143 and 3245)
- PHY302D : Quantum physics (Physics 302)
- PHY303E : Statistical physics (Physics 303)

plus 2 of the following modules:

- PHY307J : Solid state physics (Physics 307)
- PHY308K : Atomic and nuclear physics (Physics 308)
- APM3123 : Mechanics and the calculus of variations (Applied Mathematics 3123)

#### Chemistry and Physiology stream

(02089 – NCP)

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**NB**

From 2010 no new registrations will be allowed for this stream. Students have until the end of 2012 to complete the qualification, after which students will be transferred to the BSc General degree.

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**Purpose:** this stream will provide the BSc graduate with the knowledge, specific skills and a broad theoretical and practical competence to occupy entry-level positions as professionals for a wide range of vocations such as medical and related professions, the chemical and food industries, dietetics, occupational hygiene, sport physiology and biokinetics and environmental sciences. This program also forms the basis for further postgraduate studies in Chemistry and Physiology.

The curriculum comprises 30 modules.

### FIRST LEVEL

This level comprises 14 modules, the following 13 of which are compulsory:

- CHE101N : General chemistry A (Chemistry 101)
- CHE1503 : General chemistry B (Chemistry 1503)
- CHE103Q : Organic chemistry (Chemistry 103)
- CHE104R : Chemistry practical (Chemistry 104)
- BLG111H : Basic Biology (Biology 111)
- BLG112J : Biology of plants (Biology 112)
- BLG113K : Biology of animals (Biology 113)
- BLG114L : Practical (Biology 114)
- MAT1511 : Precalculus B (Mathematics 1511)
- MAT1512 : Calculus A (Mathematics 1512)
- EUP1501 : End-user computing (practical) (Information systems 1501)
- CSS101H : Comprehension skills for science (Comprehension Skills for Science 101)
- STA1510 : Basic statistics (Statistics 1510)

plus 1 of the following modules:

- PLS207B : Philosophy of science (Philosophy 207)
- DSC1510 : Introduction to the business world (Operations Research 1510)

### SECOND LEVEL

This level comprises the following 8 compulsory modules:

- CHE211T/CHE221V : Inorganic chemistry/Practical work (Chemistry 211 and 221)
- CHE212U/CHE222W : Physical chemistry/Practical work (Chemistry 212 and 222)
- CHE213V/CHE223X : Organic chemistry/Practical work (Chemistry 213 and 223)
- CHE214W/CHE224Y : Analytical chemistry/Practical work (Chemistry 214 and 224)
- FIS211K : Digestion, endocrine control and metabolism (Physiology 211)
- FIS212L : Respiration and excretion (Physiology 212)
- FIS213M : Physiological defence mechanisms (Physiology 213)
- FIS214N : Practical (Physiology 214)

### THIRD LEVEL

This level comprises the following 8 compulsory modules:

- CHE311W/CHE321Y : Inorganic chemistry/Practical work (Chemistry 311 and 321)
- CHE312X/CHE3223 : Physical chemistry/Practical work (Chemistry 312 and 322)
Purpose: this stream will provide the BSc graduate with the knowledge, specific skills and a broad theoretical and practical competence in Chemistry and Zoology to occupy entry-level positions in teaching, as technicians in pest control firms, in the broad chemical and veterinary science related fields industries, in the fisheries industry, in forestry and in environmental and agricultural sectors. Graduates may continue with studies at a postgraduate level in Chemistry, Zoology or Ecology.

The curriculum comprises 30 modules.

**FIRST LEVEL**

This level comprises 14 modules, the following 12 of which are compulsory:

- CHE101N : General chemistry A (Chemistry 101)
- CHE1503 : General chemistry B (Chemistry 1503)
- CHE103Q : Organic chemistry (Chemistry 103)
- CHE104R : Chemistry practical (Chemistry 104)
- ZOL121Q : Animal diversity 1 (Zoology 121)
- ZOL122R : Animal diversity 2 (Zoology 122)
- ZOL123S : Animal diversity 3 (Zoology 123)
- ZOL124T : Practical (Zoology 124)
- MAT1511 : Precalculus B (Mathematics 1511)
- MAT1512 : Calculus A (Mathematics 1512)
- EUP1501 : End-user computing (practical) (Information systems 1501)
- CSS101H : Comprehension skills for science (Comprehension Skills for Science 101)

plus 2 of the following modules:

- MAT103N : Linear algebra (Mathematics 103)
- BOT131W : Plant structure: cytology, morphology and anatomy (Botany 131)
- BOT132X : Biodiversity (Botany 132)
- BOT133Y : Plant diversity and environmental botany (Botany 133)
- BOT1343 : Practical (Botany 1343)

**SECOND LEVEL**

This level comprises the following 8 compulsory modules:

- CHE211T/CHE221V : Inorganic chemistry/Practical work (Chemistry 211 and 221)
- CHE212U/CHE222W : Physical chemistry/Practical work (Chemistry 212 and 222)
- CHE213V/CHE223X : Organic chemistry/Practical work (Chemistry 213 and 223)
- CHE214W/CHE224Y : Analytical chemistry/Practical work (Chemistry 214 and 224)
- ZOL221T : Comparative animal physiology (Zoology 221)
- ZOL222U : Ethology and Project (Zoology 222)
- ZOL223V : Cytogenetics and embryology (Zoology 223)
- ZOL224W : Practical (Zoology 224)

**THIRD LEVEL**

This level comprises the following 8 compulsory modules:

- CHE311W/CHE321Y : Inorganic chemistry/Practical work (Chemistry 311 and 321)
- CHE312X/CHE3223 : Physical chemistry/Practical work (Chemistry 312 and 3223)
- CHE313Y/CHE3234 : Organic chemistry/Practical work (Chemistry 313 and 3234)
- CHE3143/CHE3245 : Analytical chemistry/Practical work (Chemistry 3143 and 3245)
- ZOL321W : Ecology (Zoology 321)
- ZOL322X : Applied zoology 1 (Zoology 322)
- ZOL323Y : Applied zoology 2 (Zoology 323)
- ZOL3243 : Practical (Zoology 3243)

**Physics stream (02089 – NFI)**

*NB*

From 2010 no new registrations will be allowed for this stream. Students have until the end of 2012 to complete the qualification, after which students will be transferred to the BSc General degree.

Purpose: this stream will provide the student with education up to the BSc degree level in Physics, in particular in physical and mathematical modelling, and thereby equip students with the necessary theoretical background and applied competence to be self-employed, work in industry, be teachers or administrators, or to continue studies at a postgraduate level.
The curriculum comprises 30 modules.

**FIRST LEVEL**

This level comprises 14 modules, the following 11 of which are compulsory:

- PHY1038 : Practical work (Physics 1038)
- PHY1049 : Modern physics (Physics 1049)
- PHY105A : Mechanics (Physics 105) *(or PHY101 with at least 65% prior to 2007)*
- PHY106B : Electromagnetism and heat (Physics 106) *(or PHY102 with at least 65% prior to 2007)*
- MAT103N : Linear algebra (Mathematics 103)
- MAT1511 : Precalculus B (Mathematics 1511)
- MAT1512 : Calculus A (Mathematics 1512)
- MAT113Q : Calculus B (Mathematics 113)
- CHE1503 : General chemistry B (Chemistry 1503)
- CSS101H : Comprehension skills for science (Comprehension Skills for Science 101)
- EUP1501 : End-user computing (practical) (Information systems 1501)

Students who have passed MAT1513 need not register for MAT1511 and MAT1512 but must register for 2 of the additional modules from the undermentioned list.

and any 3 of the following additional modules:

- DSC1510 : Introduction to the business world (Operations Research 1510)
- STA1510 : Basic statistics (Statistics 1510)
- PLS207B : Philosophy of science (Philosophy 207)
- CHE101N : General chemistry A (Chemistry 101)
- CHE103Q : Organic chemistry (Chemistry 103)
- CHE104R : Chemistry practical (Chemistry 104)
- COS111U : Introduction to programming 1 (Computer Science 111)
- COS112V : Introduction to programming 2 (Computer Science 112)
- COS113W : Computer systems: fundamental concepts (Computer Science 113)
- APM1514 : Mathematical modelling (Applied Mathematics 1514)
- AST163I : General introduction to astronomy (Astronomy 1631)
- AST134J : Spherical astronomy and Kepler orbits (Astronomy 134)

**SECOND LEVEL**

This level comprises the following 8 modules, the following 6 of which are compulsory:

- PHY2019 : Classical mechanics (Physics 2019)
- PHY202A : Electricity and magnetism (Physics 202)
- PHY206E : Waves (Physics 206)
- MAT215V : Calculus in higher dimensions (Mathematics 215)
- MAT2611 : Linear algebra (Mathematics 2611)
- APM2611 : Differential equations (Applied Mathematics 2611)

plus 2 of the following:

- PHY204C : Practical work (Physics 204)
- CHE211T/CHE221V : Inorganic chemistry/Practical work (Chemistry 211 and 221)
- CHE212U/CHE222W : Physical chemistry/Practical work (Chemistry 212 and 222)
- COS211X : Programming; data structures (Computer Science 211)
- COS2338 : Numerical methods 1 (Computer Science 2338)
- AST251N : The structure and evolution of stars (Astronomy 251)

**THIRD LEVEL**

This level comprises the following 8 modules, the following 7 of which are compulsory:

- PHY302D : Quantum physics (Physics 302)
- PHY307J : Solid state physics (Physics 307)
- PHY308K : Atomic and nuclear physics (Physics 308)
- APM3123 : Mechanics and the calculus of variations (Applied Mathematics 312)
- PHY302E : Statistical physics (Physics 303)
- MAT305W : Complex analysis (Mathematics 305)
- MAT306X : Ordinary differential equations (Mathematics 306)

and any 1 of the following modules:

- PHY306H : Practical work (Physics 306)
- APM3711 : Numerical methods 2 (Applied Mathematics 3711)
- APM3134 : Special relativity and Riemannian geometry (Applied Mathematics 3134)
NB
From 2010 no new registrations will be allowed for this stream. Students have until the end of 2012 to complete the qualification, after which students will be transferred to the BSc General degree.

Purpose: this stream aims to provide education up to the BSc degree in Physics with a strong background in Computer Science, focusing on the use of computer technology in investigations of physical phenomena, in particular physical and computer modelling, and thereby equip students with the necessary theoretical background and applied competence to be self-employed, to do computer intensive work at a research centre, in business or industry. It also prepares students for studies at postgraduate level in science where computers are extensively used.

The curriculum comprises 30 modules.

FIRST LEVEL

This level comprises 14 modules, the following 12 of which are compulsory:

PHY1038 : Practical work (Physics 1038)
PHY1049 : Modern physics (Physics 1049)
PHY105A : Mechanics (Physics 105) (or PHY1001 with at least 65% prior to 2007)
PHY106B : Electromagnetism and heat (Physics 106) (or PHY1002 with at least 65% prior to 2007)
COS111U : Introduction to programming 1 (Computer Science 111)
COS112V : Introduction to programming 2 (Computer Science 112)
COS113W : Computer systems: fundamental concepts (Computer Science 113)
MAT1512 : Calculus A (Mathematics 1512)
MAT113Q : Calculus B (Mathematics 113)
MAT103N : Linear algebra (Mathematics 103)
CSS101H : Comprehension skills for science (Comprehension Skills for Science 101)
EUP1501 : End-user computing (practical) (Information systems 1501)

plus 2 of the following:

DSC1510 : Introduction to the business world (Operations Research 1510)
STA1510 : Basic statistics (Statistics 1510)
PLS207B : Philosophy of science (Philosophy 207)
CHE101N : General chemistry A (Chemistry 101)
CHE1502 : General chemistry B (Chemistry 1502)
APM1514 : Mathematical modelling (Applied Mathematics 1514)
AST1631 : General introduction to astronomy (Astronomy 1631)

SECOND LEVEL

This level comprises the following 8 modules, the following 6 of which are compulsory:

PHY2019 : Classical mechanics (Physics 2019)
PHY202A : Electricity and magnetism (Physics 202)
COS211X : Programming: data structures (Computer Science 211)
COS2338 : Numerical methods 1 (Computer Science 2338)
MAT215V : Calculus in higher dimensions (Mathematics 215)
MAT2611 : Linear algebra (Mathematics 2611)

plus any 2 of the following modules:

COS2144 : Programming: contemporary concepts (Computer Science 2144)
COS2213 : Computer organisation (Computer Science 2213)
APM2611 : Differential equations (Applied Mathematics 2611)
PHY204C : Practical work (Physics 204)
PHY206E : Waves (Physics 206)

THIRD LEVEL

This level comprises the following 8 modules, the following 4 of which are compulsory:

PHY302D : Quantum physics (Physics 302)
PHY303E : Statistical physics (Physics 303)
COS3114 : Advanced programming (Computer Science 3114)
APM3711 : Numerical methods 2 (Applied Mathematics 3711)

plus any 4 of the following modules:

COS3216 : Operating systems and architecture (Computer Science 3216)
MAT301S : Linear algebra (Mathematics 301)
MAT305W : Complex analysis (Mathematics 305)
PHY306H : Practical work (Physics 306)
PHY307J : Solid state physics (Physics 307)
PHY308K : Atomic and nuclear physics (Physics 308)
APM3134 : Special relativity and Riemannian geometry (Applied Mathematics 3134)
APM3123 : Mechanics and the calculus of variations (Applied Mathematics 3123)