INFORMATION FOR FIRST-YEAR CHEMISTRY STUDENTS  
Second Semester 2010  
Science Students

This has been drawn up for your assistance and contains important information you need to know about your first-year second semester Chemistry course. **KEEP** this for reference throughout the semester.

1. **MODULE DETAILS**

<table>
<thead>
<tr>
<th>Module Name</th>
<th>Chemical Reactivity</th>
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</thead>
<tbody>
<tr>
<td>Module Code</td>
<td>CHEM 120</td>
</tr>
<tr>
<td>Number of lectures</td>
<td>48</td>
</tr>
<tr>
<td>Number of tutorials</td>
<td>12</td>
</tr>
<tr>
<td>Number of practicals</td>
<td>12</td>
</tr>
<tr>
<td>Lecturers</td>
<td>Chemistry, H Block, Level 3</td>
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<tr>
<td></td>
<td>Dr VO Nyamori</td>
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<tr>
<td></td>
<td>Professor HG Kruger</td>
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<td>Dr MD Bala</td>
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<td></td>
<td>Professor BS Martincigh</td>
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<td></td>
<td>Dr PG Ndungu</td>
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<tr>
<td>School Telephone No.</td>
<td>031-2603109</td>
</tr>
</tbody>
</table>

2. **MODULE CONTENT**

**Organic Chemistry** – Dr Nyamori and Professor Kruger

- Hybridization
- Nomenclature – alkanes, alkenes, alkynes, functional groups
- Isomerism – constitutional, geometric and optical
- Newman projections
- Bond breaking and making in organic synthesis
- Reaction mechanisms – electrophilic addition, free radical substitution, ozonolysis
- Alcohols, aldehydes, ketones and carboxylic acids – organic redox chemistry
- Addition reactions of alkenes and alkynes
- Elimination reactions
- Nucleophilic substitution – $S_N^1$ and $S_N^2$

**Inorganic Chemistry** – Dr Bala

- Group and periodic trends: atomic size, ionic size, ionisation energies
- s- and p-block – the elements and their bonding behaviour in molecules, e.g. $N_2$, $P_4$, $O_2$, $S_8$
- Solid state chemistry: metallic bonding (close packing), atomic solids, ionic solids, molecular solids, polymeric covalent solids, allotropy (e.g. carbon, phosphorus, sulfur), polymorphism (e.g. sulfur, tin)
- Acid-base chemistry: oxo-acids, polyprotic acids and relative acid strength, basic oxides, amphoteric behaviour in oxides and hydroxides
- Industrial processes: Ostwald process, contact process, Haber process, phosphoric acid manufacture, peroxide chemistry, hydrochloric acid manufacture. Other
examples, including environmental examples, can be included at the lecturer’s discretion.

*Physical Chemistry* – Professor Martincigh and Dr Ndungu

- Buffers (preparation and pH calculations)
- Solubility Products
- Phase equilibria and colligative properties of solutions (phase diagrams, vapour pressures of pure substances and solutions, elevation of boiling point, depression of freezing point, osmotic pressure)
- Driving force for reactions (ΔG/ΔS)
- Electrochemistry (Voltaic and electrolytic cells, effect of concentration on cell emf, Faraday’s Law)

3. **LEARNING OUTCOMES**

Upon successful completion of this module you should be able to:

- Perform laboratory procedures with due care and attention to health and safety.
- Exhibit competence and care in the practical manipulation involved in physical measurements, inorganic qualitative analysis and the synthesis and purification of organic chemicals.
- Explain reactions from observations made in the laboratory and explain procedures for separation of cations.
- Apply the principles of reaction stoichiometry to solve a variety of word-problems involving chemical reactions in the gas phase and in solution.
- Apply the principles of equilibrium to acid/base and redox solution chemistry.
- Identify states of reactants and products in qualitative analysis.
- Recognise, predict products and write balanced equations for acid/base, redox and precipitation reactions.
- Systematically draw and name simple organic compounds using IUPAC nomenclature.
- Identify and classify different organic isomers.
- Recognise organic functional groups, predict their reactivity, and describe and explain simple reaction mechanisms.
- Relate energy changes to bond breaking and formation.
- Systematically draw and name simple structures of inorganic compounds.
- Relate inorganic and organic chemistry to products used in everyday life such as polymers and plastics, fuels, detergents, etc.
- Recognise periodic trends and use these to predict reactions.
- Predict the type of bonding present in any chemical species.
- Demonstrate an understanding of the concepts involved in the assignment of configurations to the elements and apply this knowledge to predicting the expected chemistry of the elements of the s- and p-blocks.
- Demonstrate an understanding of, explain and apply the physico-chemical principles underpinning the behaviour of ideal and real gases, ideal solutions and solids.
- Demonstrate an understanding of the principle of enthalpy when applied to chemical and physical change.
- Demonstrate an understanding of, explain and apply the principle of the standard electrode potential.
- Classify reactions as exothermic or endothermic.
4. **TEXTBOOKS**

The recommended textbook for this module is:


and either


or


or


There are also a number of first-year texts available for consultation in the library.

5. **LECTURE TIMETABLE AND VENUES**

The class is split into two groups for lectures.

Check the notice board in the Chemistry Building foyer for information relating to lecture-class room division. You can only attend in one block.

**BLOCK A**

<table>
<thead>
<tr>
<th>Day</th>
<th>Period</th>
<th>Time</th>
<th>Lecture or Tutorial</th>
<th>Venue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>1</td>
<td>7:45 – 8:30</td>
<td>Lecture</td>
<td>G 5</td>
</tr>
<tr>
<td>Wednesday</td>
<td>4</td>
<td>10:30 – 11:15</td>
<td>Lecture</td>
<td>G 5</td>
</tr>
<tr>
<td>Wednesday</td>
<td>5</td>
<td>11:25 – 12:10</td>
<td>Lecture</td>
<td>G 5</td>
</tr>
<tr>
<td>Thursday</td>
<td>7</td>
<td>13:15 – 14:00</td>
<td>Tutorial</td>
<td>a tutorial venue will be assigned to you (refer to the Chemistry notice board in the main foyer of the Chemistry Building)</td>
</tr>
<tr>
<td>Friday</td>
<td>2</td>
<td>8:40 – 9:25</td>
<td>Lecture</td>
<td>G 5</td>
</tr>
</tbody>
</table>

**BLOCK E**

<table>
<thead>
<tr>
<th>Day</th>
<th>Period</th>
<th>Time</th>
<th>Lecture or Tutorial</th>
<th>Venue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>6</td>
<td>12:20 – 13:05</td>
<td>Lecture</td>
<td>T 1</td>
</tr>
<tr>
<td>Tuesday</td>
<td>4</td>
<td>10:30 – 11:15</td>
<td>Lecture</td>
<td>T 1</td>
</tr>
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</table>
6. **TUTORIALS**
All CHEM120 students are placed in tutorial groups and **must** attend a weekly tutorial session. These take place as stated above commencing in the **first week of lectures** on:

- Thursday, 29 July Period 7 for BLOCK A students
- Friday, 30 July Period 7 for BLOCK E students

Check the Chemistry notice board for your tutorial group and venue.

| A class register will be taken at all tutorials and students are expected to attend at least 80% of the tutorials. |

7. **ACADEMIC SUPPORT**
Tutors will be available for one-to-one or small group consultation. They can be found in the tutor “Hot-Seat” room situated in the main front foyer of the Chemistry Building. You will be advised of the times they are available during the first week of lectures.

8. **INTRANET**
Useful material such as notes, worksheets, tutorials, quizzes, solutions, past examination question papers and other supplementary material will be placed on the Chemistry Intranet. The address for the web site is [http://cheminnerweb.ukzn.ac.za](http://cheminnerweb.ukzn.ac.za). Once there you log in with your student number and your password. Click on “Level 1” and then on “CHEM120”.

If you misplace any material that is handed out in class please download a copy from the intranet.

9. **LABORATORY PRACTICALS**
CHEM120 students are required to attend **ONE** weekly laboratory session, as follows:

- **either** Monday, Tuesday, Wednesday, Thursday **or** Friday afternoon.

Check the Chemistry notice board for your practical day allocation.

Laboratories commence in the **second week** of lectures (from 2 August). Class lists giving details of bench and locker assignments will be available on the first-year laboratory notice board during the first week of lectures.

| Students who fail to attend at least 80% of laboratory practicals will have their DPs refused, and will NOT be allowed to sit the final examination. |

Any queries regarding practical allocations please see Prof B S Martincigh – Chemistry, H Block, Level 3.
The following items must be obtained **BEFORE** attending the first **LABORATORY CLASS** of the course:

- a copy of the 2010 CHEM120 Practical Manual
- a pair of **Safety Spectacles**
- a **white laboratory coat**
- a **box of matches/lighter**
- a **tea-towel**, and
- a **padlock**  
  (This is for the locker in which you can place your bag and valuables for the duration of the practical. Your padlock must be removed at the end of each practical session.)

The Practical Manual and Safety Spectacles can be obtained from the “Hot-seat” Room situated in the main front foyer of the Chemistry Building during the **first week** of lectures. The cost of the manuals and safety spectacles will be debited to your fee account.

You will **NOT** be allowed into the laboratory without these items. **Nor** will you be able to hire these items from the School.

You should take careful note of which experiments are scheduled for each forthcoming laboratory class, as you are required to read up the details of each experiment and complete the pre-laboratory problems before attending a laboratory session.

10. **LABORATORY PRACTICAL EXEMPTIONS**

   Practical exemptions **may** be granted to those students who are repeating a course given by this School and who attained a sufficiently high standard of work in previous years. Applications for these must be submitted on the prescribed form available from the School Secretary, Mrs Renee Naidoo (Chemistry Foyer – H Block), **as soon as possible**.

   Exemptions come into effect only for those students whose names appear on the exemption list on the School of Chemistry notice board in the main foyer of the Chemistry Building. Students who apply for exemption after laboratory classes have already commenced **must attend** until exemption has been granted.

11. **COMPOSITION OF THE COURSE MARK**

   The Course Mark is made up as follows:
   
   - Class Mark 33%, Examination 67%

   The Class Mark is in turn made up as follows:
   
   - 2 Class Tests 8%, Quizzes and Laboratory Practicals 25%

   A **sub-minimum** of 40% for the Class Mark is a DP requirement. Students who fail to obtain this sub-minimum will have their DPs refused, and will **NOT** be allowed to sit the final examination.
12. CLASS TESTS
There are two formal tests covering the course content. The provisional test dates are:

Monday, 30 August from 17h45 to 18h30
Thursday, 14 October from 17h45 to 18h30

There will be NO supplementary or “make up” tests. Students who miss a test without providing a medical certificate or otherwise satisfactory explanation will be given ZERO. If a student attends less than 50% of the tests for whatever reason, then he or she will be refused a DP certificate.

13. TUTORIAL QUIZZES
There will be five spot quizzes held during the tutorial periods in the tutorial venues. These quizzes are compulsory and count towards your final class mark. You must come prepared for these spot quizzes at each tutorial as you will not be informed beforehand.

Students who fail to attend at least 80% of the tutorial quizzes will have their DPs refused, and will NOT be allowed to sit the final examination.

14. PRACTICAL REPORTS AND PRACTICAL QUIZZES
After each practical you must submit your practical report to your demonstrator for marking. Before leaving the laboratory you must call your demonstrator to your bench. The demonstrator will check that you have put all your equipment in your locker and cleaned your bench. If so, he or she will then stamp and initial your report sheet and take it in for marking.

For certain practicals you will be required to write a practical quiz before you start the practical. The quiz will test material that is to be covered in that particular practical. You should be able to successfully complete the quiz if you have read the practical beforehand and completed the pre-laboratory exercises on the green sheet in the practical manual. These quiz marks will form part of the mark for that particular practical.

15. MULTIPLE CHOICE TESTING
The quizzes and examinations will contain multiple choice questions (MCQs).

16. STUDENT CENTRAL
You can view your marks for practicals, tests, and quizzes and ultimately your class mark on Student Central. These will be updated regularly. Please check that your marks are reflected correctly. If there is a mistake tell your lecturer in charge of the tutorial or practical.

The address for Student Central is: http://sc.ukzn.ac.za.
Log in with your student number and then the four digits requested: two for the day of your birth and two for the month of your birth. For example, if you were born on 1 January then the four digits are 0101.
17. **E-MAIL**
At times we will e-mail you important module information. Please check your e-mail account on a regular basis. You can make use of the student LANs for this. There is the Govan Mbeki LAN and the Telematics LAN both of which can be found in the Govan Mbeki Building. There is also the Green LAN in F-Block for your use.

Again, to log in here you use your student number and your password is the six digits of your date of birth (DDMMYY). So if you were born on 1 January 1985 the requisite six digits are 010185. You then click on the “Groupwise” icon to access the University mailer.

If you experience any difficulties phone the Student Helpdesk on extension 7818 (or 031-260 7818).

18. **DULLY PERFORMED (DP) CERTIFICATES AND ATTENDANCE MATTERS**
A DP certificate is granted to each student who has satisfactorily performed the class work for each semester and is an essential requirement for entering the relevant examination.

Chemistry is a practical science and knowledge of chemical laboratory techniques is one of the objectives of all chemistry courses. A DP certificate will be REFUSED to any student who has not attended the required minimum number (80%) of laboratory sessions and tutorials, irrespective of the reasons for absences, or attained the Class Mark sub-minimum as specified above.

Students unable to attend a laboratory class or test for medical or other unavoidable reasons must present their medical certificates or other supporting documentation to Mrs C Magwaza in the front office situated in the Chemistry Building Foyer as soon as possible after returning to campus. There will be no “make-up” practicals.

19. **EXAMINATIONS**
Rules and regulations covering examinations are set out in the handbook of the Faculty of Science and Agriculture, and students should familiarise themselves with these. Examinations on the material covered in the second semester are held in November.

CHEM120 students write a 3 hour paper in November.

The pre-requisite for progression into Level II Chemistry modules is a mark of at least 55% in the second semester CHEM120 Chemical Reactivity module. Students with a mark in the range 50–54% will obtain credit for CHEM120, but will also qualify for a special examination to give them a further opportunity to achieve the required 55%.

20. **PLAGIARISM**
Plagiarism is defined as the submission or presentation of work, in any form, which is not one’s own without acknowledgement of the source(s). It is an attempt to deceive the reader that the work or ideas presented are your own, whereas, in fact they are the words/ideas of others.
With regard to essays, reports and dissertations, a simple rule should be used when deciding if it is necessary to acknowledge sources. If you obtain information from an outside source, that source must be acknowledged. Another rule to follow is that any direct (verbatim) quotation must be placed in quotation marks and your wording should clearly indicate that the item is not your own work and the source immediately cited. The mere inclusion of the source in a bibliography shall not be considered sufficient acknowledgement.

This applies to all work contributing to assessment, including laboratory reports and projects. All assessed work must be your own individual effort. **Copying of laboratory reports, for example, is plagiarism.** You may share data, where appropriate, but the calculations, answers to assignment questions and the discussion of results **must be your own work.**

Work referred to from Internet sources must also be acknowledged as above, with the web address (URL) of the source included and the date it was accessed.

21. ENTRY INTO BSc (Applied Chemistry)
Because of space limitations in our laboratories we unfortunately need to limit numbers for this Programme. During the second semester students who wish to pursue this Programme will be asked to submit an application form. Entry into the programme will be based on merit.

**Professor B S Martincigh**
(First Year Chemistry Co-ordinator)
July 2010
I acknowledge that I have received a copy of the course outline for this module.

Name: ________________________________ (Please print)

Student Number: __________________________

Signature: ______________________________