# UNIVERSITY OF SOUTH AFRICA

# DEPARTMENT OF CHEMISTRY

(Tel No: 012-429-8004)

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UNISA’S NEW APPLICATION AND REGISTRATION PHASES

APPLICATION PHASE

First-time students at UNISA must apply for admission on the prescribed form which is to be submitted together with the correct application fees, as well as the documents required for registration. Apply on-line: [http://www.unisa.ac.za](http://www.unisa.ac.za) or contact the UNISA Contact Centre at 0861670411 / 0116709000.

Once the data has been recorded the system will allocate a student number which will be confirmed via e-mail, sms or mail depending on the contact details indicated on your application form. A registration package containing the relevant information brochure(s) and registration form will be mailed to you.

Students who already have a UNISA student number proceed directly to the registration phase.

REGISTRATION PHASE

Once a student number has been allocated to an individual, this student number will remain his/her student number at UNISA for all formal qualifications

Honours students may apply on-line for registration after the registration period for the particular academic year has opened.

However, master’s and doctoral students cannot apply on-line and are advised to submit their applications directly to UNISA Sunnyside Campus, Senior Qualifications Counter. When mailing the application, please use: P O Box 392, UNISA, 0003. Regional offices can only forward master’s and doctoral applications to the Muckleneuk Campus.

The registration form together with the minimum instalment required for registration must be submitted before the relevant
closing date. Students must please take note that certain degrees are by selection and have earlier closing dates than the normal registration closing dates. Any documents required for registration submitted must be included here, if not previously submitted.

**Kindly note that only certified copies of academic records issued by the Registrar of the University/Institution concerned are accepted for registration purposes. Degree certificates should not be submitted.**

All applications for master’s and doctoral degrees will be referred to the Section: Postgraduate Qualifications where they will be assessed before being referred to the relevant academic department where the Executive Committee will rule on admission.

If approved, students who have submitted their complete application (i.e. all required documents and minimum fees) will automatically be registered after admission has been approved. Other students will be informed of any remaining conditions to be complied with in order to finalise their registration. All other students will be informed of the outcome of their applications and, where applicable, the minimum study fees paid will be refunded.

The process outlined above may be time consuming in some cases, especially when we approach the various closing dates when most applications are invariably submitted. It is, therefore, essential that prospective students apply well in advance, especially where deadlines set by employers and sponsors have to be met.
THE HONOURS BSc DEGREE

Consult myRules@UNISA and myRegistration@UNISA Postgraduate brochures regarding the general rules for admission to postgraduate studies, documents which must accompany an application for admission, number of modules for which students must register, reregistration, duration of study, applications for cancellation, etc.

Concurrent registration for an undergraduate course/module(s) for non-degree purposes

Students may only with the special permission of Senate register for not more than one undergraduate course or the corresponding number of modules on the same level for non-degree purposes (NDP) concurrently with an honours course, and provided that the NDP course/module(s) has a bearing on their honours studies, or they submit a written justification which is acceptable to the University. Please note that students must apply before the closing date for registration for the undergraduate course/module(s) for permission for concurrent registration.

NB: Prospective students should contact the Chairperson of the Department of Chemistry before submitting their application for registration.

NB: Prospective students should include a copy of their full academic record with their application for registration.

Admission

For admission to the studies for the Honours BSc degree in Chemistry:

(a) students must hold an accredited bachelor's degree in Chemistry or an equivalent qualification;
(b) students must have passed CHE311W-CHE3143, or Chemistry III or an equivalent course with an average of 60% or more within the past five years and must have passed MAT112, MAT113 or equivalent courses. (Students who passed the four third-level modules in Chemistry or Chemistry III with less than 60% or more than five years ago may be permitted to register for a maximum of three modules as decided by the Department);

(c) students whose average for Chemistry III or equivalent is between 55% and 59% and fulfilled the other admission requirements stipulated above may be granted provisional admission taking into consideration the experiences of the candidate in his profession. Such students may be allowed to register for a maximum of three honours modules in consultation with the Chairperson of the Department of Chemistry. Students may not register for any other honours modules in the following year unless he/she has passed the three stipulated honours modules; and

(d) students must have access to practical facilities either in industry or academic institution. In case the student cannot secure laboratory facility, they welcome to contact the Department of Chemistry at UNISA to perform the project on this side. at a mutually agreed date.

**Duration**

The minimum period of study for an Honours degree in Chemistry is two years.
Curriculum

The new curriculum comprises of eight fourth-level modules. Students may register for up to four theory modules and the research methodology component of the Honours Research Project during their first year of study and the remaining modules (CHE4805 and CHE4806) during the second year.

In the School of Science and subject to the approval of the chairpersons of the departments concerned students may include not more than two honours papers or four fourth-level modules from another subject(s) in their honours curriculum if the departmental chairpersons are of the opinion that students have sufficient background knowledge to be able to offer such papers/modules and it is in the best interest of students.

Practical work

The practical work may be done in the University's Chemistry laboratories in Pretoria or in laboratories approved by the Department. Details of laboratory facilities and instrumentation must be submitted, on the enclosed prescribed questionnaire, with the application for registration.

Practical work at other Universities

Students may apply to do all or part of their practical work at another university or at an institution recognized by the Senate as a university institution. Such application must be made in writing to the Chairperson of the Department and must be accompanied by a statement from the Chairperson of the Chemistry Department of the university concerned. If the application is successful students will follow the practical course of the university concerned, and the marks allocated will be considered to be the mark for the practical work.
Admission to Examinations

To be admitted to the examination in a module, students must be registered for that module and must complete the assignments for that module in a satisfactory manner by submitting all the assignments on the due dates.

Examination

With the exception of the honours project, there is one three hour written examination paper in each module. For the honours project the student will required to submit an acceptable research proposal and a mini-dissertation and will be required to present one oral seminar in Pretoria. The three components for the research project will comprise the examination mark in this module. To pass a module students shall obtain at least 50% in the examination. For the degree to be awarded with distinction, students shall obtain an average of at least 75% in the ten fourth-level modules.

Retaining of credit for modules passed

Subject to the requirements of the General Rule in the myRules@UNISA brochure, and except with special permission of the Senate, credit for a fourth-level module passed in the School of Science is granted for a maximum period of four successive academic years.

Reregistration

Only students whose performance is satisfactory will be allowed to reregister the following year. Students who are only allowed to register for two modules in the first year must pass both modules to be allowed to reregister.
Tutorial matter

When the registration has been accepted students will be provided with tutorial matter and lists of prescribed books for the modules for which they are registered.

CURRICULUM

BSc Honours

List of modules for the new BSc Honours curriculum

The new honours program comprises of the following Eight compulsory modules:

CHE4801: Inorganic Chemistry 4 (equivalent to and replaces CHE441A)

Coordination Complexes, Electronic structures and bonding in transition metal complexes, Electronic Spectra, colors, Redox and magnetic properties of transition metal complexes, Reaction mechanisms, Introduction to organometallic Chemistry and Catalysis, Introduction to Bioinorganic Chemistry, Synthetic methods in Coordination Chemistry


The fourth edition may also be used. But the 5th edition is highly recommended.

CHE4802: Physical Chemistry 4 [equivalent to and replaces CHE442B]

Molecular and thermodynamic basis for chemical phenomena.

James N Jensen:

CHE4803: Organic Chemistry 4 [equivalent to and replaces CHE443C]

The structure of organic compounds and its relationship to chemical bonding, stereochemistry and reactivity.


CHE4804: Analytical Chemistry 4 [equivalent to and replaces CHECHE444D]

Theory and practice of instrumental methods of analysis: absorption spectroscopy, magnetic resonance, mass spectroscopy, electrometric methods and fundamental electronics.

Skoog, D.A.:

CHE4805: Advanced Physical Inorganic Chemistry

Quantum chemistry, molecular symmetry and group theory

The following textbook is highly recommended for the symmetry and group theory section.


**CHE4806: Advanced Physical Organic Chemistry**

Incorporates the applications of vibrational, electronic, ESR, nuclear magnetic resonance and mass spectroscopy and CD to structure elucidation and specialized topics.


**CHE4807: Environmental Chemistry**

Concepts and advances in Environmental and Industrial Chemistry.

CHE4808: Chemistry Honours Research Project

The purpose of this module is for students to gain comprehensive knowledge of different aspects of research techniques and presentation of scientific information in the form of research proposals, seminars and written reports based on their laboratory work. The Honours Research Project incorporates a Research Methodology component and Mini-Research project conducted under the supervision of a Chemistry staff member. The outcome of a Research Methodology component is a research proposal prepared according to the *Guidelines for the Design of Research Proposal provided to registered students*. The proposal should be approved by the executive committee and upon completion of the project, a comprehensive write up (mini-dissertation) to be submitted to the Chemistry department for evaluation and credit after approval by the supervisor. An oral presentation in Pretoria at the completion of the project is compulsory.

GUIDELINES:

PROJECT MODULE CHE4808

1. Consider facilities available (especially when employed)
2. Negotiate with employer/institution that facilities can be used
3. Make sure that internal supervisor (min. qualification MSc) is available and willing to help with supervision
4. Negotiate with employer that the project can be done during working hours (normally that means the project is of importance to the employer/institution)
5. Contact a lecturer at UNISA to mentor/supervise
6. Make a list of the facilities (instruments) available, propose a project, and work out the approach; this project should include as many disciplines of Chemistry as possible – ideally all of them (i.e. analytical, inorganic, organic, and physical Chemistry)
7. Write up a project proposal, forward to the lecturer for submission to the Departmental Executive for approval.

8. Work on the project and provide regular feedback to the lecturer.

9. On completion, provide a write-up and prepare a seminar presentation in accordance with the criteria used for the examination of the presentation.

10. Present the seminar at UNISA, Department of Chemistry, Pretoria, as examination for CHE4808.

Registration requirements

Students can register for the Research Methodology component in their 1st year of registration.

OLD CURRICULUM

CORE MODULES

CHE441A: Physical Inorganic Chemistry (discontinued for 2011 and is replaced by CHE4801)

Coordination chemistry, Electronic state transitions and spectra, Inorganic reaction mechanisms.

Shriver and Atkins:

CHE442B: Advanced Physical Chemistry (discontinued for 2011 and is replaced by CHE4802)

Molecular and thermodynamic basis for chemical phenomena.

James N Jensen:
CHE443C: Synthetic Organic Chemistry [discontinued for 2011 and is replaced by CHE4804]

The structure of organic compounds and its relationship to chemical bonding, stereochemistry and reactivity.


CHE444D: Instrumental Analysis [discontinued for 2011 and is replaced by CHE4804]

Theory and practice of instrumental methods of analysis: absorption spectroscopy, magnetic resonance, mass spectroscopy, electrometric methods and fundamental electronics.

Skoog, D.A.:

Students who passed the four Core modules in the old curriculum can continue with the following Applied modules, which are only offered for the last time in 2011.

CHE445E: Quantum Chemistry

Development of quantum theory relating to energy levels and bonding in chemical systems.

Appropriate textbook under consideration.

CHE446F: Advanced Organic Spectroscopy

Applications of vibrational, electronic, ESR, nuclear magnetic resonance and mass spectroscopy and CD to structure elucidation.
Che447G: Structural Chemistry

Study of symmetry including group theory and point group designation, stereochemistry and the origin of spectra.

Vincent Alan:
New York

Che449J: Applied Chemistry

Concepts and advances in Environmental and Industrial Chemistry.


Higher Degrees in Chemistry

The Department of Chemistry offers the MSc and PhD degrees in Chemistry. The MSc and PhD degree programmes are research degrees which involve the investigation of a particular chemical problem and the subsequent written submission of a dissertation or thesis. Specific details of each of these degrees can be found in the subsequent sections.
The MSc and PhD degree programmes and the research interests of the staff cover all the major areas of modern chemistry: organic, inorganic, physical, analytical and polymer chemistry. The staff members who direct active research groups are indicated on pages 18 to 19 in this brochure. Our MSc and PhD graduates have employment opportunities in government, industry and academia.

Students may qualify for financial support through postgraduate assistantships or research assistantships at UNISA. Some of the research groups receive grants from the NRF for graduate student support.

Original research is the most important part of postgraduate study at UNISA. Students do research in our laboratories in Pretoria and they receive considerable individual attention. The small size of the research groups makes for close interaction within the groups.

The Department is reasonably well equipped for teaching and varied research activities. The Department maintains well funded and well equipped laboratories of moderate size but of outstanding quality. The following instruments are available at the laboratories at UNISA in Pretoria:

* Thermal Analysis instrument Thermogravimetric Analyzer (TGA), Differential Scanning Calorimeter (DSC) and Dynamic Mechanical Analyzer (DMA)

* Gas Chromatograph (GC)

* High Performance Liquid Chromatograph (HPLC)

* Gel-Permeation Chromatography (GPC)

* Fourier Transform Infrared (FT-IR) spectrometer * FT Raman Spectrometer

* 300 FT NMR spectrometer with multi-nuclear capability

* Inductively-Coupled Plasma Optical Emission Spectrometer (ICP-OES)

* Ultra-violet/Visible Spectrophotometer (UV/VIS).
* Refractometer
* Polarimeter
* Fluorescence spectrometer

**THE MSc DEGREE**

**NB:** All prospective students must contact the Chairperson of the Department of Chemistry prior to submitting an application for registration.

See General Rules in the myRules@UNISA brochure.

**Admission**

To be admitted students must hold an accredited Honours BSc degree in Chemistry or an equivalent qualification. The department may recommend that the student concurrently register and pass some honours module(s) selected from UNISA honours program.

In addition students must

(a) have a suitable research topic selected in consultation with the Department;

(b) agree to utilise the laboratory facilities at UNISA or have access to a laboratory or facilities suitable for the research work envisaged; and

(c) select or have access to a suitably qualified supervisor or co-supervisor (with at least an MSc degree) under whose direct guidance the research work can be carried out.

(Normally students who cannot spend at least part of their full-time occupation on research are not accepted for the MSc degree in Chemistry.)
Admission of International Students

A thesis is prescribed for practically all master's degrees, full details of which can be found in the current University Calendar. Written examinations are prescribed for some master's degrees, and these may be written only at South African Missions or approved examination centres.

A student's application for admission will only be considered if, inter alia, the following requirements can be met:

- the student meets the admission requirements detailed in the previous section;
- the topic for the projected thesis and the language medium in which the thesis is to be written can be accommodated by the University. If a dissertation is prescribed for the curriculum of the degree for which admission is sought, a tentative title for the projected thesis and a preliminary scheme of work must accompany a student's application for admission;
- a suitable co-supervisor is available in the country in which the student is resident, unless Senate stipulates otherwise;
- an official academic record is submitted from an accredited university;
- regular and satisfactory communication between the student and supervisor is possible;
- the student gives an undertaking to come to Pretoria, South Africa, or any other centre as approved by the University, if required to do so for a colloquium and/or oral test or other ways of testing if satisfactory alternative arrangements cannot be made in this regard. An oral test may be necessary to assess a student's proficiency and/or progress. In some cases oral examinations are prescribed, and an oral defence of a completed thesis may also be required;
the student submits evidence that he or she complies with the academic requirements for admission to master's studies at the university where the previous highest qualification was obtained.

A student applying for admission to master's studies must also indicate whether he or she wrote an article for his or her honours degree and, if so, must submit a copy thereof.

Curriculum

The curriculum comprises a dissertation and departmental requirements given below.

Dissertation

The dissertation consists of a report on research work carried out by the student under guidance of a supervisor from the Department of Chemistry, assisted, when necessary, by a co-supervisor who may be appointed from outside the University.

Departmental requirement

Students must present two seminars to the Department, one on project proposal at the beginning of the research and the other on progress report before they are allowed to submit a dissertation. The seminars should be given at the department and students should contact the Chairperson of the Department in order to arrange for the seminar(s) to be presented. An assessment panel will assess the seminar.

Duration

The minimum period of study for the degree is one year.
Registration

Students registering for the first time may register as from 1 July for the following academic year, but must register before 7 March.

Reregistration

Students must register each year before 7 March for the degree. Reregistration is subject to satisfactory progress being made with the research project as reflected in the progress report.

Submission of dissertation

Candidates who wish to receive the MSc degree at the April/May graduation ceremony the following year must

(a) inform the Registrar in writing by 30 September of their intention to submit the dissertation;

(b) submit a draft of the dissertation to the supervisor not later than 15 October; and

(c) submit the required number of examination copies of the dissertation, bound between soft covers to the Registrar not later than 30 November.

For the September graduation ceremony the dates are 15 April, 30 April and 15 June respectively.
THE PhD DEGREE

NB: All prospective students must contact the Chairperson of the Department of Chemistry prior to submitting an application for registration.

See General Rules in the myRules@UNISA brochure.

Admission

To be admitted students must hold an accredited MSc degree or equivalent qualification and satisfy the Senate as to their proficiency in Chemistry. The department may recommend that the student concurrently register and pass some honours modules selected from UNISA honours program.

In addition students must

(a) have a suitable research topic selected in consultation with the Department;

(b) agree to utilise the laboratory facilities at UNISA or have access to a laboratory or facilities suitable for the research work envisaged; and

(c) select or have access to a suitably qualified supervisor or co-supervisor (with a PhD degree or equivalent qualification) under whose direct guidance the research work can be carried out.

(Normally students who cannot spend at least part of their full-time occupation on research are not accepted for the PhD degree in Chemistry.)

Admission of International Students

A thesis is prescribed for all doctorate degrees, full details of which can be found in the current University Calendar. Written examinations are prescribed for some doctoral degrees, and these
may be written only at South African Missions or approved examination centres.

A student's application for admission will only be considered if, inter alia, the following requirements can be met:

- the student meets the admission requirements detailed in the previous section;
- the topic for the projected thesis and the language medium in which the thesis is to be written can be accommodated by the University. A tentative title for the projected thesis and a preliminary scheme of work must accompany a student's application for admission;
- a suitable co-supervisor is available in the country in which the student is resident, unless Senate stipulates otherwise;
- an official academic record is submitted from an accredited university;
- regular and satisfactory communication between the student and supervisor is possible;
- the student gives an undertaking to come to Pretoria, South Africa, or any other centre as approved by the University, if required to do so for a colloquium and/or oral test or other ways of testing if satisfactory alternative arrangements cannot be made in this regard. An oral test may be necessary to assess a student's proficiency and/or progress. In some cases oral examinations are prescribed, and an oral defence of a completed thesis may also be required;
- the student submits evidence that he or she complies with the academic requirements for admission to doctoral studies at the university where the previous highest qualification was obtained.

A student applying for admission to doctoral studies must also indicate whether he or she wrote a dissertation for his or her master's degree and, if so, must submit a copy thereof.
Curriculum

The curriculum comprises a thesis and departmental requirement depicted below.

Thesis

The thesis consists of a report on the research work carried out by the student under guidance of a supervisor from the Department of Chemistry, assisted, when necessary, by a co-supervisor who may be appointed from outside the University.

Departmental requirement

Students must present two seminars to the department, one on research proposal at the beginning and the other on progress report before they are allowed to submit a thesis. The seminars should be given at the department and students should contact the Chairperson of the Department in order to arrange for the seminar(s) to be presented. An assessment panel will assess the seminar.

Duration

The minimum period of study for the degree is two years.

Registration

Students registering for the first time may register as from 1 July for the following academic year, but must register before 7 March.
Reregistration

Students must register each year before 7 March for the degree. Reregistration is subject to satisfactory progress being made with the research project as reflected in the progress report.

Submission of thesis

Candidates who wish to receive the PhD degree at the April/May graduation ceremony the following year must

(a) inform the Registrar in writing by **30 September** of their intention to submit the thesis;

(b) submit a draft of the thesis to the supervisor not later than **15 October**; and

(c) submit the required number of examination copies of the thesis, bound between soft covers, and the same number of copies of the required scientific article to the Registrar not later than **30 November**.

For the September graduation ceremony the dates are **15 April**, **30 April** and **15 June** respectively.
TEACHING STAFF

Prof MJ Mphahlele  
BSc Hons (UFH), MSc (UP), PhD (Rhodes)  
Organic Chemistry: Research interests: Organic synthesis, studies of reaction mechanisms and application of spectroscopic methods (NMR, MS and FT-IR), quantum chemical calculations (semi-empirical, ab initio and DFT) and X-ray crystallography to structural problems.

Prof MM Nindi  
BSc (Hons) (Kingston), MSc (WSU, USA), PhD (WSU, USA), Analytical Chemistry. Research interest: Study of a number of compounds (veterinary drugs, antibiotic, etc) in biological systems and secondary metabolites of natural products using sample preparation (SLM, SPE), MS and LC-MS. In addition we are also interested in aquatic environmental monitoring of organic residues.

Prof SO Paul  
MSc (Natal), MPhil (Southampton), PhD (Witwatersrand); Physical Chemistry; Research interests: Spectroscopy and related theoretical studies.

Prof CA Summers  
BSc (UWC), MSc, PhD (Akron), HED; Organic Chemistry; Research interests: Physical organic chemistry, Organic polymer synthesis, Solid-phase synthesis.
**Prof GJ Summers**  
BSc (UWC), BSc (Hons) (Stellenbosch), MSc, PhD (Akron), HED; Organic Polymer Chemistry; Research interests: Organic polymer synthesis, macromolecular engineering, polymers.

**Prof F Tafesse**  
BSc, Chemistry (Addis Ababa University), MSc, Organometallic (Addis Ababa University), PhD Bio-inorganic (Boston University); Research interests: Biomimetic studies, Metal ion mediated hydrolysis and condensation of phosphate esters, Synthesis and characterization of organometallic complexes.

**Dr S Dube**  
BTech (University of Zimbabwe), MSc, PhD Analytical Chemistry (Loughborough University); Research Interests: Method development for separation techniques such as Capillary Electrophoresis/ Capillary Electrochromatography and HPLC. Fabrication of open tubular columns for CEC. Applications of CE/CEC and HPLC for organic pollutants, natural products, proteins.
DETAILS OF LABORATORY FACILITIES FOR CHEMISTRY HONOURS PRACTICAL

1. Name of student: ........................................  2. Student number: ........................................

3. Signature: ..............................................  4. Date: ......................................................

5. **Name of laboratory where the practical work will be carried out:**
   .................................................................................................

6. **Particulars of person(s) under whose guidance the practical work will be carried out:**
   (a) Name: ................................................... .................................................................
      Qualifications: .......................................... Signature: .............................................
      Tel No: .................................................. Date: ..................................................
      **Branch of Chemistry in which guidance will be given:**
      .................................................................................................

   (b) Name: ................................................... .................................................................
      Qualifications: .......................................... Signature: .............................................
      Tel No: .................................................. Date: ..................................................
      **Branch of Chemistry in which guidance will be given:**
      .................................................................................................

   (c) Name: ................................................... .................................................................
      Qualifications: .......................................... Signature: .............................................
      Tel No: .................................................. Date: ..................................................
      **Branch of Chemistry in which guidance will be given:**
      .................................................................................................

7. **Details of project(s), if any, in which the student is involved:**
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8. **A list of instruments in the laboratory to which the student has access for practical work must be attached.**