

Programmes offered in the Department of Chemistry

- Diploma in Analytical Chemistry
- Advanced Diploma in Analytical Chemistry
- Diploma in Polymer Technology
- Diploma in Chemical Process Technology
- BSc Chemistry (Major) and BSc Honours (Chemistry)
- Honours in Formulation Science
- MSc (Chemistry)
- MSc (Industrial Chemistry)
- MSc (Nanoscience)
- PhD (Chemistry)

Institutes linked to the Department of Chemistry InnoVenton

Institute for Chemical Technology is a formally registered Research Institute at the Nelson Mandela University whose principal research focus is in Product and Process Development. The Institute strives to be self-sustaining through income generated from services to industry, income from technology transfer projects and royalties from patents. The Institute incorporate the Downstream Chemicals Technology Station, a Government funded initiative to make available high level research, technological services and training to technology based Small and Medium Enterprises, and South African industry as a whole.

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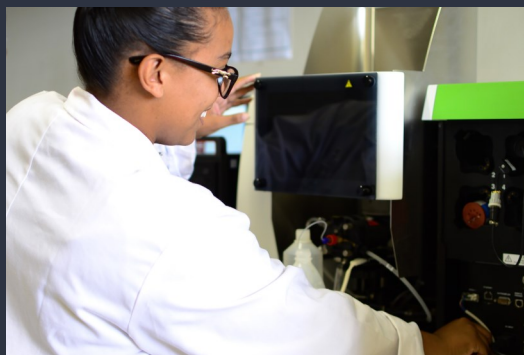
Centre for Rubber Science and Technology

The Centre for Rubber Science and Technology (CRST) draws on Nelson Mandela University's historic experience in chemical rubber science and technology. Its activities include the advancement of rubber related research and development programmes across various disciplines such as Chemistry, Environmental Science and Computer Science; training for the needs of the rubber and tyre manufacturing industries within South Africa; and providing analytical and technical services to the South African rubber and tyre manufacturing and recycling industry.

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Department of Chemistry

Diploma in Analytical Chemistry
Advanced Diploma in Analytical Chemistry

Programme Overview

The Diploma in Analytical Chemistry is a three year programme designed through consultation with representatives from various Chemical Manufacturing Industries. The programme provides extensive practical training ranging from the classical analytical methods to the more advanced and sophisticated instrumental analysis methods currently employed in the modern chemical industry.

The specialized knowledge and skills based training coupled with the integration of Professional Skills in both theoretical and practical components of the Analytical Chemistry courses provides a solid foundation for the more applied courses given in the second half of the programme. At this stage, students are trained to collect samples and carry out analyses using conventional analytical methods such as Volumetric and Gravimetric Titrimetry whilst observing all sampling, sample preservation, storage and transportation protocols. The more advanced Analytical Chemistry courses focuses on the use of modern instruments such as Gas Chromatographs, Liquid Chromatographs (HPLC), Thermal analysis (TGA, DSC), auto-titrators, ultraviolet and infrared spectrometers, atomic absorption and emission spectrometers, for the analysis of various samples e.g. pharmaceuticals, detergents, foods and beverages, water, etc. This together with training in the use of generic and specialized computer software serves to prepare the student for the Work Integrated Learning (WIL) component which is carried out in their final year of study, in a recognized chemical laboratory; where the skills and knowledge acquired in the two year formal course is applied under real life working conditions.

Students who have successfully completed the Diploma in Analytical Chemistry with an average 60% pass may proceed to the Advanced Diploma in Analytical Chemistry.

Graduate Attributes

Graduates will develop the following skills during their course of study so as to qualify for entry level positions in industrial chemistry laboratories.

- Perform basic laboratory operations such as weighing, measure precise volumes, heating, transfer solids accurately from one vessel to another, etc.
- Using conventional and modern procedures for the quantitative analysis of organic and inorganic compounds.
- Proficiency in standard techniques used in industry.
- Using qualitative and quantitative methods to analyze various samples.
- Expertise in compiling and processing laboratory data, writing scientific reports and submitting results using computerized software.
- Following Good Laboratory Practice (GLP), Standard Operating Procedures (SOP), current Good Manufacturing Practices (cGMP) compliance as well as respecting workplace hazardous materials information systems (WHMIS) regulations.

Students also develop skills in effective written and oral communications and develop attitudes and skills required to maintain professional competence beyond graduation.

Career Opportunities

Analytical Chemists make use of their theoretical and practical knowledge of chemistry, instrumentation, computers and statistics to solve problems in all areas of chemistry for various chemical manufacturing industries. In most industrial environments, complex analytical problems are most likely solved by a team of scientists with varying technical expertise in specific areas of Analytical Chemistry. The role of the Analytical Chemist is to identify what type of information is required to solve the problem and to offer solutions based on their findings. Thus, necessitating the importance of critical thinking and problem solving skills and attributes.

They play an integral role in ensuring the safety and quality of food, pharmaceutical products and drinking water, assist physicians with the diagnosis of diseases, assure compliance with environmental and other regulatory bodies.

Analytical Chemists often work in service related jobs and are employed in industry, academia and government. They conduct basic laboratory research, method development and validation, perform process and product development, design instruments used in analytical analysis; work in sales and marketing of chemical products and instruments; customs and excise, forensic activities, police and regulatory activities.

Typical Job Functions

- Perform qualitative and quantitative analysis.
- Sample, define, isolate, concentrate and preserve samples for analysis.
- Validate and verify results through calibration and standardization.
- Perform separations based on differential chemical properties.
- Develop new analytical methods .
- Interpret data in proper context.
- Communicate their results and conclusions to other scientists.

Admission requirements

To study for the Diploma in Analytical Chemistry you will need:

- Admission Points Score of 34.
- Minimum National Senior Certificate (NSC) requirements for a diploma must be met.
- English, Afrikaans or isiXhosa (home language or first additional language) on at least level 3 (40-49%).
- NSC achievement rating of at least 4 (50-59%) for Mathematics.
- NSC achievement rating of at least 4 (50-59%) for Physical Sciences.
- Applicants with an Admission Points Score between 24 and 33 may be referred to write the Access Assessment Test before a decision is made on whether to admit the applicant to the course.

Curriculum: Diploma in Analytical Chemistry

Year 1 (Full time attendance)

Analytical Chemistry 1
General Chemistry 1
Computer Skills 1
Mathematics 1
Physics 1
Analytical Chemistry 2
Inorganic Chemistry 2
Organic Chemistry 2
Physical Chemistry 2



Year 2 (Full time attendance)

Analytical Chemistry 3A and 3B Theory
Analytical Chemistry 3A and 3B Practical
Computer Skills for Analytical Chemistry
Statistics for Analytical Chemistry
Introduction to Quality Assurance
Inorganic Chemistry 3A and 3B
Organic Chemistry 3A and 3B
Physical Chemistry 3A and 3B
Mathematics 2



Year 3 (One Year Work Integrated Learning)

Chemical Industry Practical
Chemical Project

Curriculum: Advanced Diploma in Analytical Chemistry

One year full time study

Advanced Analytical Chemistry 1
Advanced Analytical Chemistry 2
Material Chemistry Analysis
Data Analysis in Chemistry
Chemical Industrial Control
Organic Chemistry Analysis
Sample Handling
Inorganic/Polymer Chemistry Analysis

