

## 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)
- B Sc 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 incorporates 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.

### Contact information

**Ms Louise Hamilton**  
Technical Manager  
T +27 41 504 3953  
E [info@mandela.ac.za](mailto:info@mandela.ac.za)  
W <http://supportservices.mandela.ac.za/commercial-services>

## 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.

### Contact information

**Dr Percy Hlangothi**  
Director of CRST  
T +27 41 504 2437  
E [percy.hlangothi@mandela.ac.za](mailto:percy.hlangothi@mandela.ac.za)  
W <http://supportservices.mandela.ac.za/commercial-services>

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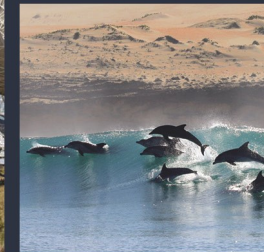
**NELSON MANDELA**  
UNIVERSITY

**Faculty of Science**

## Enquiries

**Dr Nicole Vorster**  
Programme Coordinator  
T 041 504 3599 / 3281  
E [nicole.vorster@mandela.ac.za](mailto:nicole.vorster@mandela.ac.za)  
W [chem.mandela.ac.za](http://chem.mandela.ac.za)

**Ms Fiona Heilbron**  
Faculty Officer: BSc and Honours  
T 041 504 2679  
E [fiona.heilbron@mandela.ac.za](mailto:fiona.heilbron@mandela.ac.za)  
W [chem.mandela.ac.za](http://chem.mandela.ac.za)



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**Department of Chemistry**

**BSc (Honours) Formulation Science**

## Programme Overview

The degree in BSc (Honours) Formulation Science has been developed to provide the consumer products industries in South Africa with skilled formulators who understand and can apply the theoretical principles of blending various raw materials and active ingredients in different phases to produce stable, homogeneous, and useable consumer products, as well as to develop entrepreneurial skills for the establishment of SMEs.

Formulation Science is concerned with the knowledge and practice of blending and mixing of various components (chemical compounds) in a way that they do not react, but interact to provide a final product with very specific desirable properties or functions. Examples of formulated products include personal care products such as cosmetics; personal hygiene products (soaps, toothpastes, etc.); household chemical products (cleaning agents, polishes, waxes, etc.); pharmaceutical products; processed food products; paints and varnishes; adhesives; industrial chemical products (fuels and lubricants); industrial explosives; mining chemicals; water treatment chemicals and many more.

This unique degree offers in one package, the scientific principles of consumer and industrial product formulation and blending, as well as the practical application in various consumer product industries. It is a multidisciplinary course drawing on various aspects of chemistry, chemical engineering, biochemistry, pharmacy, physics, physiology, statistics, business, etc. A compulsory research project involves the development/ formulation of a new product with the goal of possible commercialisation.

## Graduate Attributes

Graduates will develop and exhibit the following intellectual, practical and transferrable skills during their course of study so as to be competitive and employable. In this specific programme, they will have the ability to apply

- technologies and practical skills for the production of formulated consumer products;
- the principles of formulation science to develop new consumer products, improve existing ones, and/or solve formulation problems;
- advanced experimental design methodologies to design testing protocols for product integrity, stability and efficacy;
- the principles of "mixtures" to design and optimise formulations and blends for specific product properties or actions;
- regulatory constraints on new consumer product development;
- principles of technological economics and marketing to evaluate commercial opportunities for new consumer products; and
- new product development protocols.



## Career Opportunities

A formulation chemist is involved in the development of new products or improvement of existing products and can work in various industries such as:

- Paints, coatings and adhesives
- Cosmetics and personal care
- Cleaning and household chemicals
- Agro-chemicals
- Pharmaceuticals
- Food



A formulation chemist can also be self-employed (an entrepreneur).

## Admission requirements

To study for the BSc Honours in Formulation Science degree you will need any one of the following qualifications:

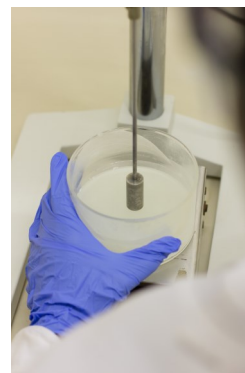
- BSc (Chemistry major)
- B Chem Eng
- B Pharm
- B Tech (Chemistry)
- Advanced Diploma in Analytical Chemistry

Selection of suitable candidates will further be based on the outcome of an interview, a written motivation and an aptitude test.

## Curriculum:

Modules offered over one year (full-time) or two years (part-time):

- Product Analysis and Testing
- Consumer Product Regulatory Frameworks
- Formulatory Statistical Methodologies
- Technology of Formulations
- Formulation Science
- Formulation Project
- Innovation and Entrepreneurship



## Research activities

The Chemistry Department offers postgraduate programmes at Masters (MSc) and Doctorate (PhD) levels in Chemistry. Research in the Department is focused on the following areas:

- |                            |                        |
|----------------------------|------------------------|
| Battery chemistry          | Polymer Chemistry      |
| Solid state transitions    | Metal ion separation   |
| Nanomaterials              | Analytical chemistry   |
| Microalgae technologies    | Catalysis              |
| Natural products chemistry | Fuel Chemistry         |
| Supramolecular chemistry   | Bioinorganic chemistry |

## Masters Programmes:

MSc (Chemistry),  
MSc (Industrial Chemistry),  
MSc (Nanoscience)

### Admission requirements

A BSc Honours degree or an equivalent qualification as determined by committee.

## Doctoral Programme:

PhD (Chemistry)

### Admission requirements

MSc (Chemistry) or MSc (Nanoscience)

## Research Chair: Professor Paul Watts Microfluidic Biochemical Processing

Professor Paul Watts' research aim is to develop a continuous flow methodology to investigate how small production platforms can enhance chemical manufacture within the South African economy. In addition, research will be undertaken to investigate the integration of synthesis and purification within continuous flow systems.

Research interests include:

- Micro reactor and continuous flow synthesis
- Green chemistry
- Process intensification and process analytical technology
- Pharmaceutical manufacture
- Catalysis (and biocatalysis) in continuous flow reactors
- Drug formulation
- Nanochemistry

### Contact information

Prof. Paul Watts  
T +27 41 504 3694  
E paul.watts@mandela.ac.za  
W <http://research.mandela.ac.za/Research-Chairs>