

## **Ceremony 11**

### **Faculty of Science**

- **School of Computing Sciences, Mathematics, Physics and Statistics**
- **School of Biomolecular and Chemical Sciences**

**Saturday, 8 April 2017, 14:30**

**Vodacom NMMU Indoor Sports Centre, South Campus, Summerstrand**



## **CONGRATULATORY MESSAGE**

Graduation is a momentous occasion, representing the crowning moment of all your hard work and the many sacrifices that you and your loved ones have made to reach this milestone.

For us, graduation is the highlight of the university calendar as we witness successful students cross the stage to be capped and enter a new chapter in their lives. Each of you has a unique story to tell.

We salute and applaud your achievement and wish you all the best in your future endeavours. Your time here at the Nelson Mandela Metropolitan University (NMMU) was but a stepping stone towards your future.

We trust that NMMU has equipped you not only with an excellent academic qualification for the many challenges of life and work, but also with life-changing experiences to shape your future.

It is our wish that you will leave here today as proud NMMU graduates who will continue to champion social justice and equality, and be change agents in building a better society and a better world.

Thank you for offering us the privilege of making NMMU a part of your life. Your success is our success, and as NMMU alumni, we look forward to watching your story unfold.

**Congratulations!**

**Ms Santie Botha  
Chancellor**



**Prof Derrick Swartz  
Vice-Chancellor**



## **ABOUT NMMU**

Nelson Mandela Metropolitan University (NMMU) is a new generation university, distinguished by a wide range of study options and access routes open to students. With 450 programmes from certificate through to doctoral level across 130 different career fields, NMMU truly is a comprehensive university.

Founded on more than a century of quality higher education, NMMU nurtures innovation, fosters creativity, embraces technology and develops people to meet the challenges of tomorrow. NMMU is a product of a merger of the University of Port Elizabeth and the PE Technikon in 2005. Prior to such a merger, the Vista University campus of Port Elizabeth was incorporated into the former University of Port Elizabeth. The university has a strong track record of research, working extensively in partnership with business and industry, making NMMU a valued contributor to the socioeconomic development of the region and beyond.

This year (2017), the university has 24530 students and close to 4100 permanent and contract staff, based on seven campuses in Nelson Mandela Bay and George.

### **Leaders**

NMMU's Vice-Chancellor is Professor Derrick Swartz, the Chancellor is Ms Santie Botha and the Chair of Council is Judge Ronnie Pillay.

### **Location**

Six of NMMU's campuses are in Nelson Mandela Bay and one is in George on the Garden Route. The seven campuses are:

- South Campus in Summerstrand (within a 720-hectare private nature reserve)
- North Campus in Summerstrand
- Second Avenue Campus, home to the new "green" Business School, in Summerstrand
- Bird Street Campus which will be a new postgraduate arts hub in Central
- Missionvale Campus in Missionvale
- George Campus in George
- The Ocean Sciences Campus (recently purchased from CSIR)

### **Facilities and supportive teaching and learning environment**

NMMU is privileged to have outstanding facilities. All students have access to well-equipped laboratories, some of which are open 24/7, and free Wi-Fi throughout all its campuses. All the lecture halls are equipped with the latest technology and students have the opportunity of using additional e-learning tools online. The campus libraries and information services network offers a state-of-the-art integrated online system. There are cafeterias, food courts and coffee shops.

A range of opportunities are provided to enhance the academic success of students. These include a first-year orientation programme, peer-facilitated learning opportunities (eg, Supplemental Instruction, e-PAL, tutorials, practicals, mentor programmes, 'Keys to Success' workshops and online resources). NMMU also promotes both in and outside of the class learning to enhance holistic student development. To recognise the learning that takes place outside of the class, NMMU has developed an innovative, electronic co-curricular record system.

The University also offers the finest sporting facilities in the Eastern Cape and numerous venues for conferences, meetings and other special events.

### **Faculties**

NMMU has seven faculties. They are:

- Arts
- Business and Economic Sciences
- Education
- Engineering, the Built Environment and Information Technology
- Health Sciences
- Law
- Science

### **Academic focus areas**

Though NMMU prides itself on its vast range of programme offerings, it has a number of strategic areas in terms of its core business of teaching and learning, research and engagement. They are:

- Health and wellness
- Economic and business development with a focus on job creation and entrepreneurship
- Materials and process development for industry and manufacturing
- Emerging information and communications technology for development
- Environmental and natural resource management
- Culture, communication and language
- Leadership, governance, democracy and justice
- Educational development in support of excellence in teaching, learning and curriculum
- Infrastructure and human settlement development

### **Strategic research areas**

- Biodiversity conservation and restoration
- Coastal marine and shallow water ecosystems
- Cyber citizenship
- Democratisation, conflict and poverty
- Earth Stewardship Science
- Health and wellbeing
- Humanising pedagogies
- Manufacturing technology and engineering
- Nanoscale characterisation and development of strategic materials
- Science, Mathematics and Technology Education for Society
- Strategic energy technologies
- Sustainable human settlement development and management
- Sustainable local economic development

### **Research and Engagement entities**

NMMU has 31 focused faculty based and 7 institution-wide entities (institutes, centres and units) that exist over and above the formal academic structures that are aimed at promoting engagement, research, technology transfer and innovation. They include the likes of InnoVenton; NMMU's Institute for Chemical Technology and Downstream Chemicals; eNtsha, an institute that focuses on seeking solutions through engineering; Earth Stewardship Science Research Institute (ESSRI); and Institute for Coastal and Marine Research. Many are award-winning entities.

### **'Green' endeavours**

In line with its value of respect for the natural environment, NMMU is involved in a large number of "green" initiatives that will not only reduce its own carbon footprint but is also assisting others in seeking renewable energy resource solutions. The university's new Business School, for example, was the first in the country to be awarded four-star "green" accreditation for a public and education building by the Green Building Council of South Africa in 2013. The "green" agenda is supported by the Centre for Renewable Energy, which is recognised as a research leader in the field.

### **International links**

Just over 8% of NMMU's student body comes from 64 different countries outside of South Africa. The Office for International Education fosters relationships and manages inter-institutional linkages to enrich both NMMU staff and students. These partnerships also foster our growing research. NMMU regularly sends students for study abroad opportunities.

### **Reasons to be proud:**

- NMMU's diversity and multiculturalism. Our African students alone come from 34 countries on the continent.
- The High Resolution Transmission Electron Microscopy (HRTEM) Centre, which opened in 2011, is the only place in Africa where scientists can view atoms in line with NMMU's growing prominence for nanoscience.
- More than 40% of NMMU academic staff have doctoral degrees when compared to the national average of 33%.
- New infrastructure like the iconic Engineering block on North Campus and the new Human Movement Science Building complete with a 100m research sprint track on South Campus.
- NMMU has excellent links with industry and business, particularly within the pharmacy, tourism and automotive industries.
- NMMU's ongoing education partnership with Fifa, as one of only two presenters in Africa of an international sports management programme through the Centre International d'Etude du Sport (CIES).
- The success of being the first student racing team from Africa to successfully compete in the Formula Student event in Germany. NMMU students designed and built a racing car to exacting specifications.
- The university was selected in 2012 to facilitate the country's first electric e-mobility programme and technical centre, called the uYilo e-mobility programme.
- NMMU has extensive expertise within the field of friction processing which has resulted in numerous national awards for the patented technology, WeldCore®. This technology has also aligned the strategic partnership between NMMU and Eskom.
- NMMU's accounting and pharmacy students who continue to produce top results in their national external examinations.
- NMMU's international award-winning choir which continues to perform around the globe to wide acclaim.

## **ACADEMIC DRESS**

Special academic attire was designed for office bearers at Nelson Mandela Metropolitan University to be worn at prestigious academic events like graduation.

Each outfit – from that of the Chancellor and Vice-Chancellor to those of the Executive Deans – has been especially selected to signify a particular office, in keeping with attire worn by academics at leading universities throughout the world.

The gowns, caps and hoods of NMMU graduates were similarly inspired and are explained in detail below.

### **Academic dress for graduates at NMMU is as follows:**

#### **Doctoral degrees**

**Gown:** Cardinal red polyester cashmere gown with long pointed sleeves pleated up with blue cord and button and lined with blue satin with 125mm facings and a blue collar.

**Hood:** Full shape hood in cardinal red polyester cashmere lined with faculty colour satin and edged around the cowl with 75mm faculty colour ribbon with 15mm blue ribbon overlaid central. 50mm wide straight neckband in cardinal red polyester cashmere, 25mm faculty colour ribbon in centre of neckband with 15mm blue ribbon overlaid central to faculty ribbon.

**Cap:** Round doctor's bonnet in black velvet with faculty colour cord and tassel.

#### **Master's degrees**

**Gown:** Black gown, long pointed sleeves pleated up with blue twisted double cord and button. Similar cord detail is used.

**Hood:** Full shape blue hood lined faculty colour satin and edged around the outside of the cowl with 75mm faculty colour with ribbon. 50mm straight neckband in blue with 25mm faculty colour ribbon centred.

**Cap:** Black mortarboard with blue tassel.

#### **Postgraduate diplomas**

**Gown:** Black gown, long pointed sleeves pleated up with blue twisted double cord and button. Similar cord detail.

**Hood:** Blue simple shape hood lined silver grey satin. Straight neckband with 15mm faculty ribbon on top edge of neckband and around cowl. 15mm silver grey ribbon on bottom edge of neckband and around cowl spaced 20mm away from the faculty colour.

**Cap:** Black mortarboard with blue tassel.

#### **Bachelor honours degrees**

**Gown:** Black gown, long pointed sleeves pleated up with blue twisted double cord and button. Similar cord detail.

**Hood:** Blue simple shape hood lined silver grey satin with 50mm wide straight neckband in faculty colour. Cowl edged 75mm faculty colour ribbon on the outside. 15mm silver grey ribbon runs along the outer edge of the cowl, overlaid on faculty ribbon and on top edge of neckband.

**Cap:** Black mortarboard with blue tassel.

#### **Four-year bachelor's degrees (including Bachelor of Technology degrees)**

**Gown:** Black gown, long pointed sleeves pleated up with blue twisted double cord and button. Similar cord detail.

**Hood:** Blue simple shape hood lined silver grey satin with 50mm wide straight neckband in faculty colour. Cowl edged 75mm faculty colour ribbon on the outside. Silver grey cord runs along the outer edge of the cowl, overlaid on faculty ribbon and on top edge of neckband.

**Cap:** Black mortarboard with blue tassel.

#### **Three-year bachelor's degrees**

**Gown:** Black gown, long pointed sleeves pleated up with blue twisted double cord and button. Similar cord detail.

**Hood:** Blue simple shape hood lined with silver grey satin with 50mm wide straight neckband in faculty colour. Cowl edged 75mm faculty colour ribbon on the outside.

**Cap:** Black mortarboard with blue tassel.

### **Advanced diploma**

**Gown:** Black gown, long pointed sleeves pleated up with blue twisted double cord and button. Similar cord detail.

**Hood:** Blue simple shape hood lined with silver grey satin with 50mm wide straight neckband. 15mm faculty colour ribbon on top and bottom of neckband around cowl.

**Cap:** Black mortarboard with blue tassel.

### **Diploma**

**Gown:** Black gown, long pointed sleeves pleated up with blue twisted double cord and button. Similar cord detail.

**Hood:** Blue simple shape hood with 50mm wide straight neckband. 25mm faculty colour ribbon on centre of neckband.

**Cap:** Black mortarboard with blue tassel.

### **Faculty colours**

|   |                   |
|---|-------------------|
| Arts:   | Yellow            |
| Business & Economic Sciences:                                     | Plum              |
| Health Sciences:  | Apple green       |
| Law:  | Grey blue         |
| Education:  | Orange            |
| Science:  | Dark green        |
| Engineering, the Built Environment<br>and Information Technology: | Light blue        |
| Business School   | Black and magenta |

**Messrs T. Birch & Co (Pty) Ltd and its subsidiary, Croft Magill & Watson (Pty) Ltd, have been appointed as official robemaker to the University and as contracted suppliers of choice to students for graduation academic attire.**

**The Image Factor has been appointed as the official photographer of the University.**

## **2017 AUTUMN GRADUATION CEREMONIES APRIL 2017**

|                                 |              |  |
|---------------------------------|--------------|--|
| <b>Friday, 31 March 2017</b>    |              |  |
| <b>Ceremony 1</b>               | <b>09:30</b> | George Campus<br>All Programmes  |
| <b>Tuesday, 4 April 2017</b>    |              |  |
| <b>Ceremony 2</b>               | <b>09:30</b> | Faculty of Arts (School of Architecture; School of Music, Art & Design and School of Language, Media & Culture)  |
| <b>Ceremony 3</b>               | <b>14:30</b> | Faculty of Education   |
| <b>Wednesday, 5 April 2017</b>  |              |  |
| <b>Ceremony 4</b>               | <b>09:30</b> | Faculty of Business and Economic Sciences (School of Management Sciences - excluding Undergraduate Diploma qualifications)                                   |
| <b>Ceremony 5</b>               | <b>14:30</b> | Faculty of Arts (School of Governmental & Social Sciences)   |
| <b>Thursday, 6 April 2017</b>   |              |  |
| <b>Ceremony 6</b>               | <b>09:30</b> | Faculty of Business and Economic Sciences (School of Economics, Development & Tourism)   |
| <b>Ceremony 7</b>               | <b>14:30</b> | Faculty of Business and Economic Sciences (School of Industrial Psychology & Human Resources, Graduate School and others)                                    |
| <b>Friday, 7 April 2017</b>     |              |  |
| <b>Ceremony 8</b>               | <b>09:30</b> | Faculty of Engineering, the Built Environment and Information Technology (School of the Built Environment)   |
| <b>Ceremony 9</b>               | <b>14:30</b> | Faculty of Engineering, the Built Environment and Information Technology (School of Engineering)   |
| <b>Saturday, 8 April 2017</b>   |              |  |
| <b>Ceremony 10</b>              | <b>09:30</b> | Faculty of Engineering, the Built Environment and Information Technology (School of Information & Communication Technology)                                  |
| <b>Ceremony 11</b>              | <b>14:30</b> | Faculty of Science (School of Computing Sciences, Mathematics, Physics & Statistics and School of Biomolecular & Chemical Sciences)                          |
| <b>Monday, 10 April 2017</b>    |              |  |
| <b>Ceremony 12</b>              | <b>09:30</b> | Faculty of Science (School of Environmental Sciences)  |
| <b>Ceremony 13</b>              | <b>14:30</b> | Faculty of Law<br><br>Faculty of Business and Economic Sciences (School of Accounting, Postgraduate qualifications including Bachelor of Technology degrees) |
| <b>Tuesday, 11 April 2017</b>   |              |  |
| <b>Ceremony 14</b>              | <b>09:30</b> | Faculty of Health Sciences (School of Clinical Care Sciences and School of Medicinal Sciences)   |
| <b>Ceremony 15</b>              | <b>14:30</b> | Faculty of Health Sciences (School of Behavioural Sciences and School of Lifestyle Sciences)   |
| <b>Wednesday, 12 April 2017</b> |              |  |
| <b>Ceremony 16</b>              | <b>09:30</b> | Faculty of Business and Economic Sciences (School of Accounting – Undergraduate qualifications)  |
| <b>Ceremony 17</b>              | <b>14:30</b> | Faculty of Business and Economic Sciences (School of Management Sciences – Undergraduate Diploma qualifications)   |

## **OFFICE-BEARERS OF THE UNIVERSITY**

### **CHANCELLOR**

MS S BOTHA: BEcon, BEconHons(US)

### **CHAIRPERSON OF COUNCIL**

JUSTICE R PILLAY: BA, LLB(UDW)

### **VICE-CHANCELLOR**

PROF DI SWARTZ: BA(UWC), MA, DPhil, Doctor in Human Rights Law (hc)(Essex University, UK)

### **DEPUTY VICE-CHANCELLOR: INSTITUTIONAL SUPPORT**

DR SW MUTHWA: BA(SW)(Fort Hare), BA(SW)Hons(Wits), MSc, PhD(London University, UK)

### **DEPUTY VICE-CHANCELLOR: RESEARCH AND ENGAGEMENT**

PROF AWR LEITCH: BSc, BScHons, MSc, PhD(UPE)

### **DEPUTY VICE-CHANCELLOR: TEACHING AND LEARNING**

PROF DM ZINN: BA, BAHons, HDE(UCT), MEd, DEd(Harvard University, USA)

### **EXECUTIVE DIRECTOR: FINANCE**

MR MR MONAGHAN: BCom(UPE), BComHons(UNISA), Professional Accountant(SA)

### **EXECUTIVE DIRECTOR: HUMAN RESOURCES**

MS VN BAM: BSocSc(UCT), PGDip(UFH), MBL(UNISA)

### **REGISTRAR**

DR F GOOLAM: BSc, HDE, BEd, MEd(UDW), PhD(UP)

### **PRESIDENT OF ALUMNI ASSOCIATION**

DR R JONAS: BA(UWC), HDE, BAHons(Unisa), MA(UPE), PhD(NMMU)

### **EXECUTIVE DEANS OF FACULTIES:**

#### **ARTS**

PROF MJR BOSWELL: BSocSc, BSocScHons, MSocSc(UCT), PhD(Vrije Universiteit, Netherlands)

#### **BUSINESS AND ECONOMIC SCIENCES**

DR I LAGARDIEN: PGDip, MSc(London School of Economics), PhD(University of Wales)

#### **EDUCATION**

DR SF MOENG: BA, HDE, BEdHons(UPE), MSc(St Cloud State University, USA), DEd(NMMU)

#### **ENGINEERING, THE BUILT ENVIRONMENT AND INFORMATION TECHNOLOGY**

DR OSW FRANKS: BSc MechEng, MInd Admin(UCT), Hons (B&A)(US), PhD (Engineering Science)(USF - USA), Pr Eng

#### **HEALTH SCIENCES**

PROF L PEPETA: MBChB (Unitra), FCPAED(SA), DCH(SA), MMed (Wits)

#### **LAW**

PROF A GOVINDJEE: BA, LLB(RU), LLM(UPE), LLD(NMMU)

#### **SCIENCE**

PROF A MURONGA: BSc,UED(UNIVEN), BScHons, MSc(UCT), PhD (University of Minnesota, USA)

### **DEAN OF TEACHING AND LEARNING**

PROF CD FOXCROFT: BA, BAHons, MA, DPhil(UPE)

### **DEAN OF STUDENTS**

MR LP JACK: NDip(PMA)(EC Technikon), BTech(PM)(PET), BAPhil(US), MCom(UKZN)

## **ORDER OF PROCEEDINGS**

### **ENTRANCE OF ACADEMIC PROCESSION**

*(The congregation is requested to rise while the academic procession enters the hall)*

### **MOMENT OF SILENCE**

Director: Marketing and Corporate Relations  
*(The congregation is requested to remain standing)*

### **CONSTITUTION OF CONGREGATION AND WELCOME**

Vice-Chancellor  
*(The congregation is requested to be seated)*

### **AWARDING OF QUALIFICATIONS**

Vice-Chancellor

### **DISSOLUTION OF CONGREGATION**

Vice-Chancellor

### **NATIONAL ANTHEM**

*(The congregation is requested to stand for the singing of the National Anthem)*

### **DEPARTURE OF ACADEMIC PROCESSION**

*(The congregation is requested to remain standing until the academic procession has left the hall)*

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## **INFORMATION TO MEMBERS OF THE CONGREGATION**

*Members of the congregation are requested:*

- *To rise and remain standing while the academic procession enters and leaves the hall.*
- *Not to leave the hall before the end of the ceremony.*
- *To switch off cellular phones or turn them on silent mode.*
- *Not to move around in the hall.*
- *Not to eat and drink in the hall.*
- *Not to get up and take photographs during the ceremony.*
- *To limit cheering and ululating to a minimum.*



The words **Cum Laude** indicates in the text below that the diploma or degree is awarded with distinction to the candidate/s listed.

## **NATIONAL DIPLOMA: ANALYTICAL CHEMISTRY**

ADKINS, Candice Abigail  
BARENDSE, Adam Jason  
BEKENTLA, Zinza  
CIKO, Akona  
DALASILE, Devina Latonia  
FANISO, Anathi  
FANTESO, Zintle Gloria  
GOVENDER, Lorisha  
HLEBO, Xolisa  
JONA, Avukonke  
KHOZA, Dunisani Roselet  
KROUTZ, Gaynor Cynthia  
LOETO, Masego Katlego  
MABUNZI, Boy Sibabalo  
MAJIKIJELA, Vuyolwethu  
MAMA, Vuyokazi  
MATHABELA, Ntshembo  
MBEBE, Amkela

MDUNYELWA, Zimkhitha  
MFAZWE, Mesuli  
MQINA, Masixole  
MTEZANKUNI, Ayabulela  
MYA, Mziwanele Michael  
NAMBA, Nobuhle  
NDABA, Xoliswa Nomathemba  
NDABAMBI, Tandokazi  
NGOMA, Unathi  
NGUBANE, Lulama Nomfundo  
NTSHEYIYA, Baxolise  
SAMBUNJANA, Onele  
SIKO, Bonginkosi  
SMITH, Kim Vanessa  
SOLOMON, Lezahn Monique  
SOMLOTA, Simbalalwe Xabiso Mirriam  
TSHISIKULE, Zenta Ondwela

## **NATIONAL DIPLOMA: POLYMER TECHNOLOGY**

CAKWE, Zikhona  
GOLELE, Ndzivalelo  
HLONYANE, Olwethu  
MATYA, Walter Sikhumbuzo  
MBODLA, Ayanga Anelisiwe

MENEMENE, Siphesihle  
MHERE, Kudzai  
MTINI, Thandokazi  
TERBLANCHE, Chrismar  
WITBOOI, Jade Hewbury

## **DIPLOMA IN CHEMICAL PROCESS TECHNOLOGY**

BEKWA, Ntandazo  
BOTUA, Aureore Grace  
CHABULA, Hlanganisa  
CUTALELE, Abongile  
DAKI, Vusikhaya Maxwell  
ERASMUS, Incke  
FRANS, Siyamtanda  
GWAZELA, Indiphile  
KWINANA, Iviwe Chuma  
LEWIS, Ramsey Devin  
MPUSHE, Oyama Theo  
NCWADI, Khanyiso Gideon

NDIMBA, Sinazo  
NDYENGA, Luvuyo  
NGXOKELA, Lungiswa  
NTSHINGA, Siphe  
PHUNGULA, Lwando  
SAIN, Afzal Hamied  
SEFORO, Petronella Mmasie  
SETI, Aliziwe  
VANGA, Khanyisa  
VUSANI, Siyabonga  
ZOZI, Amanda Lungiswa

## **BACHELOR OF COMMERCE (FINANCIAL MODELLING)**

MPHAHLELE, Lekoto

## **BACHELOR OF SCIENCE**

BAARTMAN, Lusindiso Vuyo  
BURDETT, Justin Brandan  
CHIRONGOMA, Rufaro Margaret  
CORNELIUS, Roelien  
COUSINS, Luke Eric  
CUNNINGHAM, Randy Duwayne  
DE LA HARPE, Amy Lynne  
DU PREEZ, Joshua  
FLEUR, Logan Darren  
FUTCHER, Mishale Traci  
GRUEN, Melissa Angelique  
GUNN, Shelby  
GXAKUMA, Lutho  
HEERA, Amilcar  
HOFFMAN, Justin  
JIKANI, Sibabalwe Sipamandla

KLEYN, Tiaan  
KROG, Alain Leon  
LAMOLA, Balobile Rebotile  
LASEVICIUS, Sebastian Henrique  
LESLIE, Jason Denny  
LETSIELO, Mosa Julia  
LUNDALL, Chanelle Anne  
MACKEY, Anje  
MALAHLEKA, Milani  
MATCHABA, Vhunzai Chipso  
MATTHEWS, Nasreen  
MBULAHENI, Thanyelani Pandora  
MFIHLO, Cwayita  
MLAKALAKA, Sekela Esetu Kanyisa  
MUSSON, Courtney Ruth  
MZULWINI, Sboniso Paul

NAGAN, Yurisha  
 NELSON, Wade Anton  
 NGAYEKA, Mbokazi  
 NTSHUDU, Pumeza Sonia  
 PANTSU, Phumeza Noluthando  
 PETRIE, David James  
 PRINSLOO, Cameron Cyril  
 RABE, Juan Arne  
 RUPAPA, Harold Takunda  
 SCHOEMAN, Recardia Laken Simoney  
 SCHOEMAN, Stiaan  
 SENEKAL, Ulrich  
 SERFONTEIN, Curtley Luke  
 SIBARIBOYI, Sinothando  
 TSHAYINA, Sandiso

VAN ROOYEN, Lorika

**CUM LAUDE**

AUSTIN, Joshua Michael  
 BATTESON, Byron John  
 CROSSMAN, Lizelle Anne  
 DUNDERDALE, Christopher Wade  
 KELLY, Justin Michael  
 LEONARD, Brydon Andrew  
 MCKAY, Bradley Neil  
 MCKEE, Sarah Ruth  
 NAUDE, Bianca  
 WESTCOTT, Amy-Rose

**BACHELOR OF SCIENCE INFORMATION SYSTEMS**

ABOUEME ABOUEME, Alain  
 BARKER, Ashleigh Cheryl  
 BOSCOMBE, Jarred Michael  
 GOSSMAN, Gary Christopher  
 JACK, Siphosihle Macxine  
 JOHNSTON, Michael Frank  
 KUPELO, Sibulele Khanya  
 LAHER, Mohammed Ismail

LUDIDI, Athini  
 MAHARAJ, Ranvir  
 MALOPE, Olebogeng  
 MOODLEY, Keegan Brett  
 NGUBANE, Nqobizwe  
 STEYN, Matthew Stephen  
 WITBOOI, Cuan Bryan

**BACHELOR OF TECHNOLOGY: CHEMISTRY**

GELANT, Charmaine  
 GELDERBLOEM, Darren Brandon  
 IBRAHIM, Farhiya Ahmed  
 MADLAVUZA, Nwabisa  
 MAMKELI, Sithenkosi  
 MDUBEKI, Ntokozo  
 MLAMBO, Kwanele Mlungisi Perseverence  
 MPUPUTLA, Mooketsi  
 NDIMA, Lubabalo

OSIILE, Onthatile Charity  
 PIKOLI, Sibongile  
 SETLHAPELO, Mosalashuping Emmanuel  
 SIYOKO, Xoliswa Nelisa

**CUM LAUDE**

RADEMEYER, Dylene

**BACHELOR OF COMMERCE HONOURS**

BAM, Anelisa (*Information Systems and Accounting*)  
 BRAUNSCHEWIG, Rhys  
 (*Computer Science and Information Systems*)  
 CALITZ, Martin Paul  
 (*Information Systems and Business Management*)  
 DEYZEL, Jani Igna (*Mathematical Statistics*)  
 ENSLIN, Dylan Jeremy  
 (*Computer Science and Information Systems*)  
 FANI, Duduetsang Primrose  
 (*Information Systems and Business Management*)  
 IRVINE, Hayley  
 (*Information Systems and Business Management*)  
 KAUNDA, Olganive Monique  
 (*Computer Science and Information Systems*)  
 MAMOMBE, Simbarashe  
 (*Computer Science and Information Systems*)

MBOBO, Yanda (*Mathematical Statistics*)  
 NYONI, Canaan Sithuliso  
 (*Computer Science and Information Systems*)  
 ODENDAAL, Christiaan  
 (*Computer Science and Information Systems*)  
 SANGQU, Melissa Khathala (*Mathematical Statistics*)

**CUM LAUDE**

MILLS, Steven Christopher  
 (*Computer Science and Information Systems*)  
 MLOZA BANDA, Clara  
 (*Computer Science and Information Systems*)  
 NKOANA, Makgoka Alex (*Mathematical Statistics*)  
 WATCHURST, Lee (*Mathematical Statistics*)

**BACHELOR OF SCIENCE HONOURS**

BANDA, Peter (*Computer Science*)  
 BOPAPE, Karabo Michael (*Formulation Science*)  
 BOTES, Rhys Cameron (*Computer Science*)  
 BROOKS, Clarissa Eleanor (*Computer Science*)  
 DAMONS, Jose Lance George (*Formulation Science*)  
 DE JAGER, Lize (*Chemistry*)

DE KLERK, James Carmichael (*Computer Science*)  
 DE KOCK, Alison Lousie (*Microbiology*)  
 DE VILLIERS, David James (*Applied Mathematics*)  
 FULLARD, Minnaar-Colin (*Computer Science*)  
 GADA, Abongile (*Formulation Science*)  
 GALLANT, Enrique Romario Marlin (*Computer Science*)

HICKSON, Matthew Victor (Chemistry)  
 HLABANA, Relebohile Gladys (Chemistry)  
 HOAREAU, Michel Antoine Nicky (Mathematical Statistics)  
 JONAS, Ayabonga Lulonwabo (Applied Mathematics)  
 KARANJA, Daniel Sabwa (Computer Science)  
 MACKINNON, Ashley Robyn (Computer Science)  
 MATHYE, Ayanda (Mathematical Statistics)  
 MBURI, Irene Achola (Computer Science)  
 MCQUIRK, Michael Craig (Computer Science)  
 MNGCELE, Lizalise Sive Nqaba (Mathematical Statistics)  
 NAUDE, Meggan Kate (Computer Science)  
 PADAYACHY, Thashen Murugasen (Computer Science)  
 PHENYANE, Siphamandla Sifiso (Computer Science)  
 SATHDEO, Shanay (Chemistry)  
 SMIT, Henneli (Computer Science)  
 SWANEPOEL, Jean-Andre (Computer Science)

TASANA, Anele Ruth (Chemistry)  
 THERON, Lucien (Computer Science)  
 TSIPA, Phuti Cedrick (Chemistry)  
 WILDERVANCK, Adriaan Frederik (Computer Science)

#### **CUM LAUDE**

AGHERDIEN, Rasheed (Formulation Science)  
 DU PLESSIS, Francois Hendrik (Computer Science)  
 GROBLER, Tyla (Chemistry)  
 GUMEDE, Jabulani Innocent (Chemistry)  
 MABUTO, Briswell (Chemistry)  
 POONGAVANAN, Jenicca (Mathematical Statistics)  
 POTGIETER, Jacques Louis (Computer Science)  
 RAMASAMY, Vania Djemila (Chemistry)  
 SCHEUN, Waldo Edward (Computer Science)  
 SNYMAN, Dillon Jandre (Mathematics)  
 WAGNER, David Ariel Janos (Computer Science)  
 WOODCOCK, Guillaume Geris (Chemistry)

#### **BACHELOR OF SCIENCE HONOURS IN BIOCHEMISTRY**

MOODLEY, Thashini  
 REDDY, Shanika  
 SEPHTON, Abigail  
 VAN LOSENOORD, Wynand

#### **CUM LAUDE**

MOORE, Dannielle Keagen  
 YOUNG, Carly

#### **BACHELOR OF SCIENCE HONOURS IN FORMULATION SCIENCE**

MOEKETSI, Ezekiel Baker

#### **CUM LAUDE**

DUBE, Cleopatra Thulani  
 FERREIRA, Sarah - Lee

#### **BACHELOR OF SCIENCE HONOURS IN MICROBIOLOGY**

DAWSON, Kyle-Richard

#### **MASTER OF COMMERCE (RESEARCH)**

ESTERHUYSE, Maxine Pier – **Cum Laude**  
 (Computer Science and Information Systems)  
 Title of dissertation:  
 A BEST PRACTICE e-LEARNING ENVIRONMENT FOR SOFTWARE TRAINING

Supervisor: Dr BM Scholtz

KAPESO, Mando Mulabita – **Cum Laude**  
 (Computer Science and Information Systems)  
 Title of dissertation:  
 AN INTERNET OF THINGS (IOT) MODEL FOR FIELD SERVICE AUTOMATION

Supervisor: Dr BM Scholtz

SALEH ZADEH, Seyed Amirsaleh – **Cum Laude**  
 (Computer Science and Information Systems)  
 Title of dissertation:  
 THE SELECTION AND EVALUATION OF A SENSORY TECHNOLOGY FOR INTERACTION IN A WAREHOUSE ENVIRONMENT

Supervisor: Prof AP Calitz  
 Co-supervisor: Prof JH Greyling

## MASTER OF SCIENCE (RESEARCH)

BLOOM, Carri-Ann – **Cum Laude**  
(*Biochemistry*)

Title of dissertation:

*THE EFFECTS OF TERPENOIDS ON THE EXPRESSION AND FUNCTION OF CYTOKINES AND ADIPOKINES IN PRE-ADIPOCYTES AND DIFFERENTIATED ADIPOCYTES*

Supervisor: Prof CL Frost  
Co-supervisor: Dr R Levendal

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BOYCE, Anneme  
(*Chemistry*)

Title of dissertation:

*DEVULCANIZATION OF MODEL COMPOUNDS BY A VARIETY OF DIPHENYL DISULFIDES*

Supervisor: Prof CD Woolard  
Co-supervisor: Dr SP Hlangothi

---

CAMILLE, Ned Lonni Michel – **Cum Laude**  
(*Biochemistry*)

Title of dissertation:

*THE ACTION OF SUTHERLANDIA FRUTESCENS ON MACROPHAGE DIFFERENTIATION AND FUNCTION*

Supervisor: Prof GB Dealtry

---

DAVOREN, Brandon Hilton  
(*Chemistry*)

Title of dissertation:

*TRIBOCORROSION PROPERTIES OF FRICTION STIR WELDED AND LASER WELDED TITANIUM ALLOY*

Supervisor: Prof EE Ferg  
Co-supervisor: Prof DG Hattingh

---

DLAMINI, Phumla Patience – **Cum Laude**  
(*Physics*)

Title of dissertation:

*OPTICAL FIBRE MEASUREMENT FOR CLOCK TONES IN TELESCOPE NETWORKS*

Supervisor: Prof TB Gibbon  
Co-supervisors: Prof AWR Leitch and Dr RRG Gamatham

---

DU PREEZ, Christiaan  
(*Physics*)

Title of dissertation:

*INVESTIGATION INTO THE EFFECT OF GRAPHITIZATION ON THE STATIC MECHANICAL PROPERTIES OF SERVICE EXPOSED ASTM A515 Gr.65 STEAM PIPE METAL*

Supervisor: Dr JE Westraadt  
Co-supervisors: Profs JH Neethling and DG Hattingh

---

EASTWOOD, Grant  
(*Computer Science and Information Systems*)

Title of dissertation:

*USING COMPUTER VISION TO CATEGORIZE TYRES AND ESTIMATE THE NUMBER OF VISIBLE TYRES IN TYRE STOCKPILE IMAGES*

Supervisor: Prof CB Cilliers  
Co-supervisor: Dr KA Naude

---

GAMEDZE, Nombuso Faith  
(*Textile Science*)

Title of dissertation:

*OPTIMISING SYZYGIUM CORDATUM DYE EXTRACTION AND SUBSEQUENT COTTON DYEING INCORPORATING ORGANIC ELECTROLYTES*

Supervisor: Prof L Hunter  
Co-supervisor: Prof PE Zwane

---

GRAVETT, Andrew Scott – **Cum Laude**

(*Computer Science and Information Systems*)

Title of dissertation:

ANT COLONY OPTIMISATION-BASED ALGORITHMS FOR OPTICAL BURST SWITCHING NETWORKS

Supervisor: Dr MC du Plessis  
Co-supervisor: Prof TB Gibbon

---

HASINJATOVO MANDANIRINA, Nambinintsoa Romeoh

(*Physics*)

Title of dissertation:

WAVELENGTH-MODULATION SPECTROSCOPY FOR THE EVALUATION OF THE PHOTORESPONSE OF SOLAR CELLS

Supervisor: Prof MC Wagener  
Co-supervisor: Prof JR Botha

---

JOOSTE, Daniel Victor

(*Chemistry*)

Title of dissertation:

ASSESSMENT OF THE HOST PROPERTIES OF SELECTED OPTICALLY PURE, RACEMIC AND ACHIRAL COMPOUNDS

Supervisor: Dr B Barton

---

KAPP, Konrad Phillip – **Cum Laude**

(*Mathematical Statistics*)

Title of dissertation:

OPTIMAL CYCLE DATING OF LARGE FINANCIAL TIME SERIES

Supervisor: Prof IN Litvine

---

MATTHEWS, Cameron – **Cum Laude**

(*Chemistry*)

Title of dissertation:

SYNTHESIS, CRYSTAL STRUCTURES AND MOLECULAR MODELLING OF RARE EARTH COMPLEXES WITH BIS(2-PYRIDYLMETHYL)AMINE: AIM TOPOLOGICAL ANALYSIS AND LIGAND CONFORMATION SEARCH

Supervisor: Dr A Abrahams

---

MENTE, Pumza

(*Chemistry*)

Title of dissertation:

MAIZE STALK FIBRE REINFORCED NATURAL RUBBER/TYRE-TREAD RECLAIMED RUBBER COMPOSITES

Supervisor: Dr SP Hlangothi  
Co-supervisors: Profs CD Woolard and TE Motaung

---

MNCI, Mhlali

(*Mathematical Statistics*)

Title of dissertation:

STATISTICAL MODELLING APPLIED TO PERCEPTIONS OF FRAUD

Supervisor: Mr WJ Brettenny  
Co-supervisor: Prof GD Sharp

---

MOYO, Mcquillan

(*Chemistry*)

Title of dissertation:

SYNTHESIS OF L-MENTHYL GLYOXYLATE, AN IMPORTANT INTERMEDIATE IN THE MANUFACTURE OF ARVs, USING FLOW CHEMISTRY TECHNOLOGY

Supervisor: Prof P Watts

---

MUKASVANGA, Clibert

(*Chemistry*)

Title of dissertation:

SYNTHESIS OF FLUORESCENT POLYMERS AND STUDIES OF THEIR POTENTIAL APPLICATIONS AS CHEMOSENSORS FOR METAL IONS

Supervisor: Dr N Mama

---

NARE, Keith Dumisani  
(*Chemistry*)

Title of dissertation:

*FORMULATION DEVELOPMENT AND THERMORHEOLOGICAL PROPERTIES OF CRUMB RUBBER/EVA MODIFIED BITUMEN*

Supervisor: Dr SP Hlangothi  
Co-supervisor: Prof CD Woolard

---

PAZI, Sisa

(*Mathematical Statistics*)

Title of dissertation:

*STATISTICAL METHODS FOR THE DETECTION OF NON-TECHNICAL LOSSES: A CASE STUDY FOR THE NELSON MANDELA BAY MUNICIPALITY*

Supervisor: Prof GD Sharp  
Co-supervisor: Ms CM Clohessy

---

PRINGLE, Nadine Alex – **Cum Laude**

(*Biochemistry*)

Title of dissertation:

*CHARACTERIZATION OF A GLYCATED GELATIN MODEL TO EXPLORE THE THERAPEUTIC PROPERTIES OF MACROFUNGI IN DIABETIC WOUND HEALING: AN IN VITRO STUDY*

Supervisor: Prof M van de Venter  
Co-supervisor: Dr TC Koekemoer

---

SAGANDIRA, Clodius Ray – **Cum Laude**

(*Chemistry*)

Title of dissertation:

*EXPLORING ACYL AZIDES CHEMISTRY IN CONTINUOUS FLOW SYSTEMS*

Supervisor: Prof P Watts

---

#### **MASTER OF SCIENCE IN NANOSCIENCE (COURSEWORK)**

NGONGO, Sinoyolo

Title of treatise:

*MICROSTRUCTURE AND PROPERTIES OF ZIRCONIUM-SILICIDE SURFACE LAYERS ON ZIRLO FOR IMPROVED NUCLEAR FUEL CLADDING*

Supervisor: Prof JH Neethling  
Co-supervisor: Dr A Janse van Vuuren

---

#### **MASTER OF SCIENCE IN TEXTILE SCIENCE (RESEARCH)**

BRITZ, Lizaan

Title of dissertation:

*A COMPARISON OF THE COMFORT PROPERTIES, MEASURED WITH A SWEATING MANIKIN (WALTER TM), OF CLOTHING CONTAINING DIFFERENT FIBRES*

Supervisor: Prof L Hunter  
Co-supervisor: Dr AF Botha

---

#### **MASTER OF TECHNOLOGY: CHEMISTRY (RESEARCH)**

MKWAKWI, Kwakhanya

Title of dissertation:

*SYNTHESIS AND CHARACTERISATION OF LANTHANIDE COMPLEXES WITH O,O-DONOR LIGANDS: TOWARDS A NEW GENERATION OF HYDROPHOSPHONYLATION CATALYSTS*

Supervisor: Dr A Abrahams

---

## DOCTOR OF PHILOSOPHY

AKWI, Faith Mary  
(*Chemistry*)

Title of thesis:  
SCALABLE CHEMISTRY INVOLVING DIAZONIUM SALTS

Supervisor: Prof P Watts

---

BOIYO, Duncan Kiboi  
(*Physics*)

Title of thesis:  
OPTIMIZATION OF FLEXIBLE SPECTRUM IN OPTICAL TRANSPORT NETWORKS

Supervisor: Prof TB Gibbon  
Co-supervisors: Prof AWR Leitch and Dr RRG Gamatham

---

BRETENNY, Warren James  
(*Mathematical Statistics*)

Title of thesis:  
EFFICIENCY EVALUATION OF SOUTH AFRICAN WATER SERVICE PROVISION

Supervisor: Prof GD Sharp

---

CHADA, Sravanthi  
(*Chemistry*)

Title of thesis:  
A NEW SYNTHETIC APPROACH FOR PREPARATION OF EFAVIRENZ

Supervisor: Prof P Watts

---

CLOHESSY, Chantelle May  
(*Mathematical Statistics*)

Title of thesis:  
STATISTICAL VIABILITY ASSESSMENT OF A PHOTOVOLTAIC SYSTEM IN THE PRESENCE OF DATA UNCERTAINTY

Supervisor: Prof GD Sharp  
Co-supervisors: Dr J Hugo and Prof EE van Dyk

---

MBAVA, Willard  
(*Mathematics*)

Title of thesis:  
MODELLING DISPERSAL PROCESSES IN PREDATOR-PREY SYSTEMS WITH INFECTION IN THE SUPER-PREDATOR

Supervisor: Prof JYT Mugisha  
Co-supervisor: Prof JW Gonsalves

---

MVUBU, Mlando Basel  
(*Textile Science*)

Title of thesis:  
STUDIES ON ACOUSTIC PROPERTIES OF NONWOVEN FABRICS

Supervisor: Prof RD Anandjiwala  
Co-supervisor: Dr A Patnaik

---

NEGLUR, Rekha Raghurama  
(*Chemistry*)

Title of thesis:  
PHYSICAL PROPERTIES OF SOLID-STATE ERYTHROMYCIN DERIVED COMPOUNDS

Supervisor: Dr D Grooff

---

NGORORABANGA, Jean Marie Vianney  
(*Chemistry*)

Title of thesis:  
SYNTHESIS AND INVESTIGATION OF THE CHEMOSENSING PROPERTIES OF NOVEL FLUORESCENT TRIAZORYL COUMARIN-BASED POLYMERS

Supervisor: Dr N Mama

---

ODAME, Felix  
(Chemistry)

Title of thesis:

*BENZOYL ISOTHIOCYANATES DERIVED LIGANDS AS POTENTIAL HIV-1 PROTEASE INHIBITORS AND THEIR REACTIONS WITH GOLD IONS*

Supervisor: Prof ZR Tshentu  
Co-supervisors: Prof CL Frost and Dr K Lobb

---

OKERIO, Jasper Mosomi  
(Chemistry)

Title of thesis:

*THE ASSEMBLY OF p-ARYL TRIAZOLE FOLDAMERS INTO DOUBLE AND OTHER SUPER HELICAL STRUCTURES*

Supervisor: Dr N Mama  
Co-supervisor: Prof B Klumperman

---

OKULLO, Michael  
(Physics)

Title of thesis:

*CHARACTERIZATION OF PHOTOVOLTAIC DEVICES USING LARGE AREA LIGHT BEAM INDUCED CURRENT MEASUREMENTS*

Supervisor: Dr FJ Vorster  
Co-supervisors: Prof EE van Dyk and Dr W Okullo

---

PEREIRA, Melanie Claire  
(Biochemistry)

Title of thesis:

*AN IN VITRO EVALUATION OF ANTI-BREAST CANCER ACTIVITY OF NOVEL, HETEROCYCLIC AROMATIC COMPOUNDS IN COMBINATION WITH CURCUMIN*

Supervisor: Dr H Davids

---

SNYDERS, Charmelle Delray  
(Chemistry)

Title of thesis:

*AN INVESTIGATION OF THE MORPHOLOGICAL AND ELECTROCHEMICAL PROPERTIES OF SPINEL CATHODE OXIDE MATERIALS USED IN LI-ION BATTERIES*

Supervisor: Prof EE Ferg

---

TSHIFULARO, Cyrus Alushavhiwi  
(Textile Science)

Title of thesis:

*COMPARATIVE PERFORMANCE OF NATURAL AND SYNTHETIC FIBRE NONWOVEN GEOTEXTILES*

Supervisor: Prof RD Anandjiwala  
Co-supervisor: Dr A Patnaik

---

VAN NIEKERK, Xandri  
(Chemistry)

Title of thesis:

*RHENIUM COMPLEXES OF BENZAZOLE DERIVATIVES*

Supervisor: Prof TIA Gerber

---

#### **DOCTOR OF TECHNOLOGY: CHEMISTRY**

CHIGONDO, Fidelis

Title of thesis:

*CONTINUOUS FLOW SYNTHESIS OF SILICON COMPOUNDS AS FEEDSTOCK FOR SOLAR-GRADE SILICON PRODUCTION*

Supervisor: Prof P Watts  
Co-supervisor: Prof B Zeelie

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## **DOCTORAL DEGREE CITATIONS**

# THE DEGREE OF DOCTOR OF PHILOSOPHY (CHEMISTRY)

**FAITH MARY AKWI**

**Previous qualifications:**

2010 BSc (Industrial Chemistry)

2013 MTech (Chemistry)

Makerere University

Nelson Mandela Metropolitan University

**Thesis:**

*SCALABLE CHEMISTRY INVOLVING DIAZONIUM SALTS*

In South Africa today, there is acceptance across government and industry that a key challenge to the future growth and sustainability of the chemical sector is to increase local manufacturing. Current manufacturing protocols have been the same for decades; and they are no longer competitive in the global market. NMMU is working to provide a step change in chemical manufacturing technology that will increase the availability and affordability of a variety of chemical products, with particular emphasis on South Africa's needs, in order to make the country more self-reliant.

The diazotization of amines is an industrial process of great importance in the fine chemical, specialty, pharmaceutical and dye industries; however, the explosive nature of diazonium salts necessitates extreme care in their use. Consequently, the low-internal volumes associated with continuous-flow processing, using micro-reactor technology, affords a safe route to perform such reactions.

In her thesis, Faith Akwi presents a substantive study on the use of micro-reactors for the *in situ* generation and use of diazonium salts, to prepare a variety of azo compounds. Through rigorous design of experiments, which enabled the fast screening and optimization of reaction parameters, such as the diameter of the reactor, temperature, pH and flow rates, she has successfully devised protocols that facilitate the safe and easy synthesis of azo compounds in micro-reactors with excellent yields within the shortest time possible.

The candidate also extended her study to the use of phase-transfer catalysis in the continuous-flow synthesis of these compounds; where the advantages of combining these two techniques of chemical processing were elegantly showcased.

To round up her study, she performed scalability studies on the established chemical-processing protocols. It was demonstrated that the processes could be scaled by using continuous-flow techniques. Moreover, the use of cheaply available materials that mimic the physical characteristics of micro-reactors provided a comparable product output.

Three peer-reviewed papers were published on this research. The candidate has presented her results at national conferences, as well as at the 4<sup>th</sup> Asia-Pacific Chemical and Biological Microfluidics Conference, held in Vietnam.

# **THE DEGREE OF DOCTOR OF PHILOSOPHY (PHYSICS)**

**DUNCAN KIBOI BOIYO**

**Previous qualifications:**

2009 BSc (Physics/Mathematics)  
2013 MSc (Physics)

Moi University, Kenya  
University of Eldoret, Kenya

**Thesis:**

*OPTIMIZATION OF FLEXIBLE SPECTRUM IN OPTICAL TRANSPORT NETWORKS*

The telecommunication industry faces tremendous bandwidth demands from drivers beyond traditional Internet applications, such as emails and browsing. It now includes social and business networking, video and voice conferencing, smart phones and tablet computers, video and TV-over-Internet services, as well as cloud computing. In order to cope with these trends, there is the urgent need to research advanced technologies for flexible, intelligent optical networks. These networks should be capable of adapting and optimizing themselves automatically in real time, according to the rapidly changing dynamics, including system impairments and user requirements.

In this work, the network performance was optimized by using wavelength-division multiplexing (WDM), along with flexible spectrum techniques. Such techniques include wavelength adjustment, wavelength conversion, switching, add-drop multiplexing and bitrate variable transmission. This was achieved through simulation and experimental implementation for both short-haul and long-haul networks. In particular, VCSEL-to-VCSEL laser-wavelength conversion and switching were demonstrated for the first time, to a spectral width of 600 GHz in the 1550 nm transmission window.

This approach was shown to be effective for adding and dropping wavelength channels, which is crucial for alternate-data routing during fibre breaks and wavelength-channel collisions. Furthermore, flexible spectrum techniques were developed to overcome a range of system impairments, such as chromatic dispersion, cross-talk, polarization-mode dispersion and attenuation for bitrates of 10G bps up to 76 km reach. Duncan's work provides a significant contribution in research to next-generation telecommunication networks. His work has been published extensively, both locally and abroad.

# THE DEGREE OF DOCTOR OF PHILOSOPHY (MATHEMATICAL STATISTICS)

**WARREN JAMES BRETTEENY**

**Previous qualifications:**

|      |                                  |  |
|------|----------------------------------|--|
| 2007 | BSc ( <i>cum laude</i> )         | Nelson Mandela Metropolitan University |
| 2008 | BSc Honours ( <i>cum laude</i> ) | Nelson Mandela Metropolitan University |
| 2010 | MSc ( <i>cum laude</i> )         | Nelson Mandela Metropolitan University |

**Thesis:**

*EFFICIENCY EVALUATION OF SOUTH AFRICAN WATER SERVICE PROVISION*

In recent years, South Africa has experienced numerous service-delivery protests. These protests are a result of the lack of delivery of basic services, such as water and sanitation (amongst others). To address this matter, local governments have taken part in benchmarking initiatives (National Benchmarking Initiative, Municipal Benchmarking Initiative) and regulation programmes (Blue Drop, Green Drop) – in an effort to improve the quality of potable water and sanitation services. The latter of these services focuses on the quality of the water services delivered; but neither of these focuses on the efficiency, with which this delivery is achieved.

This study develops both non-parametric (data-envelopment analysis) as well as parametric (stochastic-frontier) methods to assess the efficiency of water-service provision in South Africa over a six-year period from 2005 to 2010. Subsequently, the method which is most suited for use in the South African context is proposed. In addition, this study demonstrates how these methods can be used to determine the effectiveness of bench-marking initiatives, namely, the National Benchmarking Initiative, in improving the efficiency of water-service provision. Furthermore, developments in the selection of  $m$  in the  $m$ -out-of- $n$  bootstrap procedure for the bias correction of efficiency evaluations is established through a simulation study.

The inclusion of efficiency evaluations in South African bench-marking initiatives provides new and important insight into the standard of water-service delivery. As such, the techniques developed in this study illustrate how efficiency analysis can enhance bench-marking initiatives in South Africa.

# THE DEGREE OF DOCTOR OF PHILOSOPHY (CHEMISTRY)

**SRAVANTHI CHADA**

**Previous qualifications:**

2007 BPharm

2008 MPharm (Pharmaceutical Sciences)

Kakatiya University

Kakatiya University

**Thesis:**

*A NEW SYNTHETIC APPROACH FOR PREPARATION OF EFAVIRENZ*

The morbidity and mortality from major diseases are much more devastating in Africa than in other regions of the world. For example, in 2012 there were 25 million people with HIV/AIDS in sub-Saharan Africa, comprising 70% of the global total. In 2012, life expectancy in sub-Saharan Africa was 55 years, compared with 78 years in the USA. Increased access to antiretroviral drugs (ARVs) has lowered the incidence; however, many Africans are still not receiving the necessary treatment. Beyond the human suffering, there is also the economic impact of the disease.

South Africa currently imports all of the Active Pharmaceutical Ingredients (APIs) required for antiretroviral drug production. The imports, mainly from India, cost the government nearly R5 billion per year for just HIV medicines. In addition, other diseases, such as TB and malaria also cost massive amounts of money. While South Africa has a number of companies that formulate medicines, it does not have an established pharmaceutical industry to manufacture the required APIs.

Current manufacturing protocols have been the same for decades; and they are not competitive in a global market; since new advanced technology, such as continuous-flow techniques need to be introduced, in order to address this problem.

In her thesis, Sravanthi Chada presents a substantive body of research into the development of a cost-effective process for the synthesis of Efavirenz: one of the main drugs used in South Africa to treat AIDS. She initially developed a new route to prepare Efavirenz by using traditional-batch chemistry. The research was then extended to use continuous-flow reactors to prepare the drug, where detailed optimisation studies were conducted at each stage. It was demonstrated that the desired isomer of Efavirenz could be prepared in an overall yield of 51% and in 99% optical purity.

The research is currently submitted for patent protection; and it is now being published. A South African company is very excited about the methodology; and we are currently investigating ways to commercialise this technology in South Africa, with the vision to reduce the cost of drugs – to enable more people to have access to these live-saving medicines.

# THE DEGREE OF DOCTOR OF PHILOSOPHY (MATHEMATICAL STATISTICS)

**CHANTELLE MAY CLOHESSY**

**Previous qualifications:**

|      |                              |  |
|------|------------------------------|--|
| 2009 | BSc                          | Nelson Mandela Metropolitan University |
| 2010 | BScHons ( <i>cum laude</i> ) | Nelson Mandela Metropolitan University |
| 2012 | MSc ( <i>cum laude</i> )     | Nelson Mandela Metropolitan University |

**Thesis:**

*STATISTICAL VIABILITY ASSESSMENT OF A PHOTOVOLTAIC SYSTEM IN THE PRESENCE OF DATA UNCERTAINTY*

This thesis derives and proposes statistical techniques suitable to improve estimates and methods in the feasibility assessments of photovoltaic (PV) systems. The use of these techniques is illustrated for a case study of a 1MW PV system proposed for the Nelson Mandela Metropolitan University South Campus in Port Elizabeth, South Africa.

The results from the study provide strong support for the analytical methodology of multivariate-profile analysis and interval-estimate plots for the assessment of solar-resource data. A unique view to manufacturing process control in the generation of energy from a PV system is identified. This link between PV energy generation and process control is lacking in the literature; and it is exploited in this study.

Variance-component models are used to model power output and energy yield estimates of the proposed PV system. The variance components are simulated by using the Bayesian simulation techniques. Bayesian tolerance intervals are derived from the variance components; and they are used to determine what percentage of future power output and energy yield values falls within an interval with a certain probability. The results from the estimated tolerance intervals were informative; and they provided the expected power outputs and energy yields for a given month and a specific season. The models provide novel improvements on the current techniques used to assess the energy output of a system.

# THE DEGREE OF DOCTOR OF PHILOSOPHY (MATHEMATICS)

**WILLARD MBAVA**

**Previous qualifications:**

|      |  |                        |
|------|--|------------------------|
| 1994 | Bachelor of Science General Degree         | University of Zimbabwe |
| 1995 | Bachelor of Science Special Honours Degree | University of Zimbabwe |
| 1998 | Master of Science Degree in Mathematics    | University of Zimbabwe |

**Thesis:**

*MODELLING DISPERSAL PROCESSES IN PREDATOR-PREY SYSTEMS WITH INFECTION IN THE SUPER-PREDATOR*

Willard Mbava formulated mathematical models to assess the challenges of a prey-predator-super-predator ecosystem by using the data from the Kruger National Park to study impala-cheetah-lion interactions.

The cheetah is one of the species under threat of possible extinction; as it is frequently killed by the lion, in order to reduce competition for prey; and the study noted that this additional mortality has the potential to eliminate the cheetah species altogether.

Its population remains very low, despite impala providing an abundant source of food for both the cheetah and the lion species. In the absence of the lion, impala and cheetah have a stable co-existence; provided that the output/input ratio of the cheetah biomass does not exceed the impala-carrying capacity. Thus, the elimination of the large predators from an ecosystem may allow the medium-predator density to improve.

The disease, bovine tuberculosis, sometimes affects the lion-population dynamics. The co-existence of all the species in the presence of a disease in the lion population was shown to be globally stable. The cheetah population thrived in the total absence of the lion population – rising to twice its initial values.

The presence of disease in lions cannot be used as a biological control for the cheetah population; since at a high rate incidence of disease, the study predicts that the lion population would rapidly become extinct.

Willard's study identified critical biological thresholds and parameters for the global stability and survival of the cheetah, thereby providing a significant contribution to the conservation of endangered species in South Africa.

# **THE DEGREE OF DOCTOR OF PHILOSOPHY (TEXTILE SCIENCE)**

**MLANDO BASEL MVUBU**

**Previous qualifications:**

|      |  |  |
|------|--|--|
| 2004 | BSc (Physics and Applied Mathematics)      | University of KwaZulu-Natal                      |
| 2007 | Higher Certificate (Adult Basic Education) | University of South Africa                       |
| 2010 | MSc (Textile Engineering)                  | Technical University of Liberec (Czech Republic) |

**Thesis:**

*STUDIES ON ACOUSTIC PROPERTIES OF NONWOVEN FABRICS*

The main aim of this study is to optimize the process parameters of needle-punched non-woven fabrics by employing a Box-Behnken factorial design for achieving the maximum sound-absorption coefficient. The influence of the fibre type, the depth of needle penetration and the stroke frequency on the sound-absorption properties were studied. The results show that for a process, such as needle-punching, which is influenced by multiple variables; it is also important to study the interactive effects of the process parameters for achieving the optimum-sound absorption. A maximum sound-absorption coefficient of 47% (0.47) is obtained from the optimized parameters.

Furthermore, to test the practical significance of the study; the effect of varying air gaps between the needle-punched non-woven fabrics and the commercially used extruded-polystyrene sheet was systematically investigated. It was found that the sound-absorption coefficient improves with the increase in the air-gap size up to 15mm – after which the sound absorption decreases slightly with further increases in the air gap up to 25mm.

# THE DEGREE OF DOCTOR OF PHILOSOPHY (CHEMISTRY)

**REKHA RAGHURAMA NEGLUR**

**Previous qualifications:**

1983 BSc (Chemistry/Biochemistry)

Bombay University, India

1985 MSc (Chemistry)

Bombay University, India

**Thesis:**

*PHYSICAL PROPERTIES OF SOLID-STATE ERYTHROMYCIN DERIVED COMPOUNDS*

The use of active pharmaceutical ingredients in solid-dosage formulations requires a thorough understanding of their solid-state complexities and their associated physical properties. This is important; since the use of a particular drug in its solid modification can influence solubility properties and ultimately the bioavailability of the drug.

The drugs Erythromycin, Roxithromycin and Azithromycin belong to the class of macrolide antibiotics with a broad spectrum of activity against many gram-positive bacteria. Some of their many uses include the treatment of respiratory-tract infections, as well as opportunistic infections in immunocompromised patients suffering from HIV and cancer. This study investigated the preparation and characterization of the hydrate, anhydrate, crystalline and amorphous forms of the macrolides.

Novel thermal characterization techniques, spectroscopic analysis and controlled physical stability studies established the role of water activity on the drugs' hydration state and their phase-transformation behaviour. The nature and extent of crystal water interactions, studied at the molecular level, accounted for the various solid-state forms produced under varied conditions of controlled temperature and humidity. The amorphous phases exhibited greater hygroscopicity and water-sorption behaviour relative to their crystalline phases. Their use in solid-dosage formulations could, therefore, be potentially beneficial to drug-solubility improvement, toxicity and bioavailability.

The thesis has contributed to an increased understanding on how water activity, temperature and the nature of polymorphs govern drug-thermodynamic stability and the consequent implications for drug-aqueous solubility and therapeutic effect. The research outputs included an accepted publication in a highly cited international journal and two conference presentations at local and international level.

# THE DEGREE OF DOCTOR OF PHILOSOPHY (CHEMISTRY)

**JEAN MARIE VIANNEY NGORORABANGA**

**Previous qualifications:**

|      |         |   |
|------|---------|---|
| 2010 | BSc     | Kigali Institute of Science and Technology (KIST) |
| 2012 | BScHons | Nelson Mandela Metropolitan University            |
| 2013 | MSc     | Nelson Mandela Metropolitan University            |

**Thesis:**

*SYNTHESIS AND INVESTIGATION OF THE CHEMOSENSING PROPERTIES OF NOVEL FLUORESCENT TRIAZORYL COUMARIN-BASED POLYMERS*

The candidate's thesis is based on the synthesis of fluorescent polymers, and their application in the detection of environmentally toxic metal ions. The research contributes to the development of new coumarin-based fluorescent polymers using "click" polymerization. These polymers were subsequently used as chemo-sensors for the detection of metal ions in both organic solvents and water – with a specific response towards mercury (II), copper (II), aluminium (III) and iron (III) cations.

The absorption and emission properties of the polymers were used to signal the presence of metal ions *via* the changes induced by their presence. These methods indicate the application of the polymers as chemo-sensors for detecting and quantifying the amount of ions present in water.

From the research conducted, one paper has been published in an internationally peer-reviewed journal; and two articles are currently under review for possible publication. The results have also been presented in two international conferences.

# THE DEGREE OF DOCTOR OF PHILOSOPHY (CHEMISTRY)

**FELIX ODAME**

**Previous qualifications:**

2002 BScHons (Chemistry)

Kwame Nkrumah University of Science and Technology

2009 MPhil (Chemistry)

University of Ghana

**Thesis:**

*BENZOYL ISOTHIOCYANATES DERIVED LIGANDS AS POTENTIAL HIV-1 PROTEASE INHIBITORS AND THEIR REACTIONS WITH GOLD IONS*

South Africa is one of the largest producers of gold worldwide; and as part of the beneficiation strategies, there is a drive use gold in non-traditional applications, such as in medicine. This study was directed at the use of gold (I) complexes as anti-HIV agents. The Human Immuno-deficiency Virus (HIV) is one of the most challenging epidemics of the 21<sup>st</sup> century.

In the quest to design a new set of sulphur-containing protease inhibitors, capable of attachment to gold (I), the de NOVO approach to drug design was employed, in which the active-site co-ordinates from the crystal structure of protease bound to ritonavir (a known anti-HIV drug) were used. Molecular scaffolds, based on the benzoyl isothiocyanate derivatives of structurally diverse diamines were then screened. Novel tetrazatricyclics, triazateracyclics, benzothiazole and dithiourea derivatives have been designed, synthesized and characterized. The compounds have been tested for their activity against the HIV-1 protease enzyme, as well as the cytotoxic effects on white blood cells. The cell viability tests showed that most of the tested compounds were not cytotoxic. In the enzyme-inhibition studies, some of the compounds showed good promise – especially the dithiourea ligands – with a percentage inhibition of HIV-1 protease up to 97% at 100  $\mu$ M of the inhibitor.

However, the initial proposal was based on the strategy of the dual effect of gold (I) complexes with ligands functioning as active-site inhibitors; while the gold (I) interacts with sulphuryl residues on the enzyme through allosteric binding. The gold (I) binding to the enzyme is yet to be proven; since the formation of the gold (I) complexes resulted in unusual reactions. This work, therefore, has also presented for the first time a novel gold-catalysed dethiocyanation of thiourea derivatives, leading to the formation of benzamides.

# THE DEGREE OF DOCTOR OF PHILOSOPHY (CHEMISTRY)

**JASPER MOSOMI OKERIO**

**Previous qualifications:**

2010 BScHons

2012 MSc

Egerton University, Kenya  
Nelson Mandela Metropolitan University

**Thesis:**

*THE ASSEMBLY OF p-ARYL TRIAZOLE FOLDAMERS INTO DOUBLE AND OTHER SUPER HELICAL STRUCTURES*

In his thesis, the candidate studied the comparative assembly of poly (aryltriazole) derivatives in the presence and absence of a template, using UV-Vis, CD, STEM and fluorescence-imaging microscopy. He successfully demonstrated that polymeric strands can assemble into well-defined super-helical structures, which include double helices. The study revealed that factors, such as solvent quality, side-chain chirality and template structure play a crucial role in controlling and/or guiding the assembly of the helical structures.

Changing the solvents (DMF and water) may alter Van der Waal's forces and the surface-free energy, thereby influencing the order of the polymer's random coils into double-helical structures *via* solvophobic-induced arrangement. Furthermore, the candidate proposed mechanisms for the assembly of the double helices, showing the intermediate steps and products formed. These results present a facile strategy for the fabrication of polymeric materials into super-helical structures with stable morphologies.

These polymeric structures can find a use in drug-delivery systems, chirality-induced selective catalysis and in cation/anion identification through changes in the photo-physical properties of the polymer upon the introduction of these anions.

The results from this work have been presented in three international conferences; and a manuscript is currently under review for possible publication in an internationally peer-reviewed journal.

# THE DEGREE OF DOCTOR OF PHILOSOPHY (PHYSICS)

**MICHAEL OKULLO**

**Previous qualifications:**

|      |                                |  |
|------|--------------------------------|--|
| 1992 | Diploma in Secondary Education | Institute of Teacher Education, Kyambogo |
| 2003 | Bachelor of Education          | Kyambogo University                      |
| 2012 | MSc (Physics)                  | Kyambogo University                      |

**Thesis:**

*CHARACTERIZATION OF PHOTOVOLTAIC DEVICES USING LARGE AREA LIGHT BEAM INDUCED CURRENT MEASUREMENTS*

Photovoltaic (PV) modules form the basic building blocks in small and large-scale PV plants that generate electricity from sunlight. Their optimal performance is crucial in the successful operation of PV installations. In this study, a non-destructive technique, called Large-Area Light Beam-Induced Current (LA-LBIC) mapping was refined and employed to characterise crystalline silicon, thin film (amorphous silicon, copper indium diselenide, and copper indium gallium diselenide) and Fresnel concentrator photovoltaic modules.

In the LA-LBIC technique the point-illuminated photo-generated current from a PV module is analysed and mapped at various bias levels, in order to locate, study and identify the various features and defects found in a module. One of the main complexities that was highlighted and clarified in this study was the interpretation of the variations of the LBIC signal between series-connected cells, within an encapsulated finished module.

By varying the intensity and the wavelength composition of the LBIC light source, more information about the nature of defects and their influence on the performance of the modules was obtained. A partly illuminated and a point-illuminated circuit model of a PV module was further refined and used to explain the perturbations on the observed LBIC signals.

Mr Okullo also used complementary techniques to aid in the identification of module and cell defects. These included dark- and point-illuminated light I-V measurements, as well as the associated parameter extraction, Electro-luminescent (EL) imaging and Infrared (IR) imaging. This study contributes to a more detailed understanding of the various current-transport mechanisms in finished photovoltaic modules.

# **THE DEGREE OF DOCTOR OF PHILOSOPHY (BIOCHEMISTRY)**

**MELANIE CLAIRE PEREIRA**

**Previous qualifications:**

2001 BSc (Biochemistry and Microbiology)

University of Port Elizabeth

2003 BSc Hons (Biochemistry)

University of Port Elizabeth

2012 MSc (Biochemistry)

Nelson Mandela Metropolitan University

**Thesis:**

*AN IN VITRO EVALUATION OF ANTI-BREAST CANCER ACTIVITY OF NOVEL, HETEROCYCLIC AROMATIC COMPOUNDS IN COMBINATION WITH CURCUMIN*

Nearly two thirds of all breast cancers are classified as oestrogen-receptor positive, with anti-oestrogen therapy being the primary treatment option; however, the inefficacy of most chemotherapeutics has motivated extensive investigations of alternatives. Numerous studies have demonstrated the advantages of using a combination therapy with naturally-derived agents, as an alternative, due to the higher therapeutic efficacy.

The novel, synthetically derived polycyclic aromatic hydrocarbons (coded Rau 008, Rau 010, Rau 015 and Rau 018) belong to the amino-naphtho-quinone class of compounds. The use of curcumin, the active constituent of turmeric, as an adjuvant to current chemotherapies, has been reported; whilst the amino-naphtho-quinones have shown potential as anti-cancer agents in various tumour-cell lines. The aim of this study was thus to evaluate the effects of the compounds alone, and in combination with curcumin, in oestrogen-dependent and oestrogen-independent breast-cancer cells, as well as other oestrogen-responsive tumours (osteosarcoma and endometrial cancer cells).

Synergistic interactions were identified by using a combination index and isobologram analysis, leading to the identification of Rau 015+curcumin and Rau 018+curcumin, as the most effective combinations, displaying anti-proliferative, anti-oestrogenic, anti-metastatic and anti-angiogenic effects. These findings point to the influence of curcumin in the responsiveness of both oestrogen-dependent and oestrogen-independent tumours, suggesting that combination therapy involving amino-naphtho-quinone derivatives and curcumin may offer a new approach in the treatment of breast and related cancers.

# THE DEGREE OF DOCTOR OF PHILOSOPHY (CHEMISTRY)

## CHARMELLE DELRAY SNYDERS

### Previous qualifications:

|      |                                       |  |
|------|---------------------------------------|--|
| 2008 | National Diploma Analytical Chemistry | Nelson Mandela Metropolitan University |
| 2009 | Baccalaureus Technologiae (Chemistry) | Nelson Mandela Metropolitan University |
| 2011 | Magister Scientiae (Chemistry)        | Nelson Mandela Metropolitan University |

### Thesis:

#### *AN INVESTIGATION OF THE MORPHOLOGICAL AND ELECTROCHEMICAL PROPERTIES OF SPINEL CATHODE OXIDE MATERIALS USED IN LI-ION BATTERIES*

The global uptake over the last two decades of lithium-ion based batteries into a range of portable applications has increased significantly, where many modern households make use of them in one way or another – with portable head-lamps, cellphones and electric vehicles being the more recent technology – that is driven by the global initiatives around carbon-emission reduction and climate change. This thesis was mainly based on the material characterization of the positive active material used in Li-ion batteries, following two synthesis routes. The work investigated the phase transitions that occur during the synthesis of a well-known cathode material, namely the doped manganese-oxide spinel. By using *in-situ* temperature powder x-ray diffraction, as well as thermal gravimetric analysis, the student was able to carefully monitor the phase modifications; as the material changes from a typical amorphous gel to a crystalline electrochemically active material. By using full-pattern Rietveld refinement of the diffractograms, the student was able to show that the active phases had already formed at a much lower temperature than that reported in the literature, with a significantly smaller crystalline size.

This would result in the final material having a larger active surface area. Subsequently, the student showed that the aqueous phase of the material could be continuously spray-dried at a relatively low temperature – to form nano-based particles of the electro-active material when compared with the conventional batch-processed material. The student made use of advanced Electrochemical Impedance Spectroscopy to compare the lithium-ionic conductivity of the materials made, thereby concluding that there was an improvement in performance, when used in a lithium-ion battery. Aspects of the work were published as articles in two peer-reviewed journals, with a third article currently under review – and presented as posters at two international conferences.

The results of her work have also contributed to the university's involvement in the national electric-vehicle programme, uYilo, where the understanding and development of lithium-ion batteries forms part of the country's green-energy initiative.

# THE DEGREE OF DOCTOR OF PHILOSOPHY (TEXTILE SCIENCE)

**CYRUS ALUSHAVHIWI TSHIFULARO**

**Previous qualifications:**

2010 Masters in Textile Technology  
2000 BSc with Mathematics and Physics major

Technical University of Liberec  
University of Venda

**Thesis:**

*COMPARATIVE PERFORMANCE OF NATURAL AND SYNTHETIC FIBRE NONWOVEN GEOTEXTILES*

The aim of this work was to establish a range of suitable process parameters which can be utilized to produce needle-punched non-woven fabrics for geotextile applications. The effect of depth of needle penetration, stroke frequency and mass per unit area on the fabric properties, namely, tensile strength, puncture resistance, pore size, water permeability and transmissivity were analysed.

In addition, the effects of various chemicals, namely, 10% ammonium hydroxide (NH<sub>4</sub>OH), 10% sodium chloride (NaCl) and 3% sulphuric acid (H<sub>2</sub>SO<sub>4</sub>) solutions on degradation of the fabric were also studied. The results showed that density, thickness and the nominal weight of the needle-punched non-woven fabrics were related to each other; and they were influenced by the stroke frequency, the depth of the needle penetration and the feed rate of the needle-punching process. The increase in the nominal weight of the fabrics also increased the thickness and the density of the fabrics.

The tensile strength and the puncture resistance of the fabrics increased with the increases in stroke frequency, depth of needle penetration, and the fabric's mass per unit area. Higher tensile strength and higher puncture resistance were achieved in the needle-punched non-woven fabrics produced from 100% PP fibres. Consequently, they are suitable for some load-bearing geotextile applications, such as reinforcement and separation. However, higher water permeability was achieved in the fabrics produced from 100% kenaf fibres; therefore, they are ideal for geotextile applications, wherever good water permeability is required. Higher values for transmissivity were obtained in the fabrics produced from a blend of 50/50% PP/kenaf fibres; therefore, they were considered to be more suitable for drainage applications.

# THE DEGREE OF DOCTOR OF PHILOSOPHY (CHEMISTRY)

**XANDRI VAN NIEKERK**

**Previous qualifications:**

2012 BSc

Nelson Mandela Metropolitan University

2013 BScHons

Nelson Mandela Metropolitan University

2014 MSc (*cum laude*)

Nelson Mandela Metropolitan University

**Thesis:**

*RHENIUM COMPLEXES OF BENZAZOLE DERIVATIVES*

This study was an extensive project on the synthesis and characterization of new compounds of the metal rhenium, with a wide variety of benzothiazole and imidazole derivatives, with the aim of producing pharmaceuticals which could act as diagnostic agents for the early detection of Alzheimer's Disease (AD). AD is a neurodegenerative disorder, for which techniques are desperately needed to assist in diagnosing and treating the disease.

Beta-amyloid aggregation is one of the most important pathological processes in the progression of the disease. In this study, the derivatives of benzazoles, with an ability to accumulate in the brain, were labelled with rhenium ions. The approach was to produce stable rhenium complexes in a variety of oxidation states, which contain unco-ordinated benzothiazole aromatic rings, which would intercalate with the beta-amyloid sheets via pi-pi interactions, hydrogen-bonding and other intermolecular bonding interactions. Many such successful synthetic routes were developed.

Several major contributions were also made to extend the boundaries of knowledge on basic co-ordination chemistry, which would impact in other fields of inorganic chemistry. In a ground-breaking result, the improved stability of a metal complex by monodentate co-ordination and hydrogen-bond formation between ligands over the traditional covalent bond stability of bidentate co-ordination in a metal complex was observed.

It was shown that rhenium (I) ions prefer nitrogen donor atoms, rather than sulphur atoms. The opposite is true for rhenium (V) ions, which impact on the design of the stable metallodrugs of rhenium. Benzazole ligands were also designed, which reduce rhenium (V) to rhenium(III); and this opens up a whole new area of research in high-oxidation state transition of metal-co-ordination chemistry.

The study also produced examples of sensitizing the rhenium metal in some of its oxidation states to have a preference for specific donor atoms in multi-donor ligand systems, which had not been observed in similar co-ordination environments before.

The major results of this study were published in various publications in the international literature; and the impact is such that many post-graduate studies will be initiated from these novel results.

# THE DEGREE OF DOCTOR OF TECHNOLOGY (CHEMISTRY)

**FIDELIS CHIGONDO**

**Previous qualifications:**

2003 BScHons (Chemistry)

2012 MTech (Chemistry)

Midlands State University  
Tshwane University of Technology

**Thesis:**

*CONTINUOUS FLOW SYNTHESIS OF SILICON COMPOUNDS AS FEEDSTOCK FOR SOLAR-GRADE SILICON PRODUCTION*

We were all inconvenienced a few years ago by “load shedding”, when there were massive power shortages. Solar power makes enormous sense in countries, such as South Africa, which have long sunny days; however, the solar cells consisting of very high purity silicon wafers are prohibitively expensive. This is quite ironic – given that South Africa mines 130,000 tonnes of silicon per year, most of which, however, is exported for typically \$1/kg. However, to subsequently import solar-grade silicon (99.9999% purity) costs approximately \$20/kg; while electronic-grade silicon (99.9999999% purity) can cost more than \$250/kg. Consequently, the ability to generate a low-cost methodology to produce such compounds – in a state of high selectivity – within the country, would be highly advantageous.

In his thesis, Fidelis Chigondo presents a substantive amount of research into the development of continuous-flow reactor systems for the synthesis of trialkoxysilanes – a key intermediate in the synthesis of solar-grade silicon. Through a rigorous design of experiments, studying the catalyst, the solvent, the temperature and the reaction time, he demonstrated that the desired compound could be prepared in the form of 98% selectivity.

The thesis was, subsequently, extended to study the disproportionation of the trialkoxysilanes into monosilane: a versatile fine chemical. It was found that environmentally friendly solvent-free conditions could be used to prepare monosilane in 100% yield, using a variety of low-cost catalysts; the research is currently being extended to the realm of commercialisation.

The research has been patented in the UK; and it is currently being patented elsewhere. To date, two peer-reviewed papers have been published on this research. The candidate has presented his results at national conferences, as well as at an international Green Chemistry and Engineering Conference in Maryland (USA). There is little doubt that the candidate has made a significant contribution in establishing continuous-flow technology in South Africa.



## **VISION**

**To be a dynamic African university, recognised for its leadership in generating cutting-edge knowledge for a sustainable future.**

## **MISSION**

**To offer a diverse range of quality educational opportunities that will make a critical and constructive contribution to regional, national and global sustainability.**

To achieve our vision and mission, we will ensure that:

- Our values inform and define our institutional ethos and distinctive educational purpose and philosophy.
- We are committed to promoting equity of access and opportunities so as to give students the best chance of success in their pursuit of lifelong learning and diverse educational goals.
- We provide a vibrant, stimulating and richly diverse environment that enables staff and students to reach their full potential.
- We develop graduates and diplomates to be responsible global citizens capable of critical reasoning, innovation, and adaptability.
- We create and sustain an environment that encourages and supports a vibrant research, scholarship and innovation culture.
- We engage in mutually beneficial partnerships locally, nationally and globally to enhance social, economic, and ecological sustainability.

## **VALUES**

### **i. Respect for diversity**

- We reflect and serve diverse regional, national and global communities
- We promote an open society where critical scholarship and the expression of a multiplicity of opinions and experiences are actively encouraged
- We foster an environment in which diversity is appreciated, respected and celebrated
- We are committed to accessibility, inclusivity and social justice

### **ii. Excellence**

- We promote, recognise and reward excellence in our teaching, learning, research and engagement
- We promote, recognise and reward excellent service delivery to all our stakeholders
- We provide a supportive and affirming environment that enables students and staff to reach their full potential
- We adopt innovative approaches to promote excellence in our institutional policies, structures, processes and systems

### **iii. Ubuntu**

- We are a people-centred university
- We respect the dignity of others
- We recognise our mutual interdependence
- We promote compassionate and responsible citizenship

### **iv. Integrity**

- We act with integrity and accept responsibility for our actions
- We behave in an ethical and professional manner
- We conduct our activities in an accountable and transparent manner
- We ensure the integrity of our information, systems and processes

**v. Respect for the natural environment**

- We care about the environment and recognise our responsibility to conserve, protect and properly manage natural resources for ourselves and future generations
- We promote the integration of sustainability principles into our academic practices, institutional operations and design of physical infrastructure
- We encourage mutually beneficial and sustainable approaches to community service and engagement
- We inspire students and staff to embrace environmentally friendly practices

**vi. Taking responsibility**

- We acknowledge our personal responsibility for ethical behaviour towards others
- We assume responsibility for the achievement of personal and institutional goals
- We accept responsibility for our actions and the consequences thereof
- We provide an environment that encourages students and staff to take responsibility for their academic and professional endeavours

**EDUCATIONAL PURPOSE AND PHILOSOPHY**

- We provide transformational leadership in the service of society through our teaching and learning, research and engagement activities.
  - To achieve this we are committed to developing the human potential of our staff and students in the full spectrum of its cognitive, economic, social, cultural, aesthetic and personal dimensions in the pursuit of democratic citizenship.
- We adopt a humanising pedagogical approach that respects and acknowledges diverse knowledge traditions and engages them in critical dialogue in order to nurture a participative approach to problem-posing and -solving, and the ability to contribute to a multi-cultural society.
- We inspire our stakeholders to be passionate about and respectful of an ecologically diverse and sustainable natural environment.
- We will be known for our people-centred, caring, values-driven organisational culture that will allow all members of the university community to contribute optimally to its life.

## **CONGRATULATORY MESSAGE FROM THE ALUMNI ASSOCIATION**

Congratulations on your achievement! You are now an alumnus of NMMU. We would like to take this opportunity to introduce you to the NMMU Alumni Association.

Once you have obtained your NMMU certificate, diploma or degree you become an alumnus of the university and a member of the NMMU Alumni Association. The Association is recognised by the NMMU Council as a structure of the University. The Association supports and enhances the realisation of the University's vision and mission through maintaining and expanding positive relationships with its members.

The University can be supported in a variety of ways including sharing news, expertise, skills, networks and contributions in cash and kind. Cash donations to the Alumni Fund are used to fund bursaries, projects and the NMMU Capital and Endowment Campaign. Every contribution makes a difference. Donations can be made online as well.

Join our existing alumni chapters nationally and internationally or help establish new ones to maintain and build our networks. We encourage you to remain active NMMU ambassadors.

### **The role of the Alumni Relations Office**

The Alumni Relations Office is responsible for the day-to-day management and running of the Alumni Association, the University Shop and all matters related to alumni relationship building.

We kindly request all alumni to ensure that we have your latest contact details to invite you to chapter socials and networking events as well as provide you with information regarding alumni and NMMU achievements. You are also requested to send us news regarding your or fellow alumni achievements and interesting experiences for publication in our newsletters and on the website.

Please visit our website for more information <http://alumni.nmmu.ac.za> or e-mail us at [alumni@nmmu.ac.za](mailto:alumni@nmmu.ac.za) or join our Facebook page **NMMU Alumni**. Other contact details include tel. +27 41 504 3935 and fax +27 41 504 1417. You are also most welcome to visit the Alumni Relations Centre on the North Campus in Port Elizabeth.

Remember to buy your memorabilia from the University Shop during graduation.

**We look forward to hearing from you. Stay connected to your *alma mater!***

## **NATIONAL ANTHEM**

**Nkosi Sikelel'i-Afrika,  
Maluphakanyisw'uphondo lwayo,  
Yizwa imithandazo yethu,  
Nkosi Sikelela, thina lusapho lwayo.**

**Morena boloka setjhaba sa heso,  
O fedise dintwa le matshwenyeho.  
O se boloke, O se boloke setjhaba sa heso,  
Setjhaba sa South Africa.**

**South Africa.**

**Uit die blou van onse hemel,  
Uit die diepte van ons see.  
Oor ons ewige gebergtes  
Waar die kranse antwoord gee.**

**Sounds the call to come together,  
And united we shall stand.  
Let us live and strive for freedom,  
In South Africa our land.**