THE Art OF ACCOMPLISHMENT

July 2015

FACULTY OF SCIENCE NEWSLETTER

The Faculty of Science reflects with pride on the achievements of their staff and students. During these past months the staff and students once again excelled in all fields. A research article of Prof Strydom featured in the highly rated *Nature Communications*. UJ world-leading researcher, Prof Mike Hennings, was a finalist at the NSTF-BHP Billiton Awards and Prof Azwinndini Muronga was elected as President of SAIP for the next two years. Prof Ian Duberry, with co-authors, delivered one of the top-10 most downloaded articles and also received the CHROMSA 2015 Award. Prof Ben-Erik van Wyk, along with a co-author, produced a new international book that was launched at a Library event.

Inaugural lectures were delivered (by Prof Bettine Jansen van Vuuren and Prof Marijke Coetzee), a community engagement project was organised by the Department of Zoology educating the community on water safety and 102 undergraduate students; 38 Honours students; 44 Masters students and 18 PhD candidates completed their qualifications and graduated during the Winter Graduation in June. Science students also participated in the PGCRI's three minute thesis presentation competition and walked away with two of the top prices.

We trust that you will enjoy this Newsletter and join us in congratulating all staff members and students mentioned in this edition.

THIS ISSUE FEATURES:

RETHINK. REINVENT.

UNIVERSITY OF JOHANNESBURG

RESEARCH ARTICLE FEATURED IN NATURE COMMUNICATIONS

A research article, *Large Seebeck effect by charge-mobility engineering*, co-authored by Prof André M Strydom from the Department of Physics at the University of Johannesburg (UJ), appeared in the June edition of Nature Communications. The journal ranks among the top three highest impact factor journals among all multidisciplinary science journals.

(Thomson Reuters).

Large Seebeck effect by charge-mobility engineering

The Seebeck effect is a remarkable phenomenon which describes the generation of an electric potential in a conducting material when exposed to a temperature gradient. Equally fascinating is the reverse effect, -namely the cooling effect that a thermoelectric material experiences when an electric potential is applied across its end points. This physics effect has in recent years found its way into everyday life, and refrigerators having no moving parts have already started becoming available commercially in sustainable cooling technology such as in portable cooling boxes. The advantages of developing ever-more efficient cooling technologies are clearly evident. However, a challenge that warrants just as much effort from scientists, is the development of electrical energy from waste heat such as is found in the copious amounts of heat expelled from internal combustion engines in motor vehicles abounding the streets of big cities across the planet.

In this article, a novel approach to crafting higher thermoelectric efficiencies has been found through sheer serendipity. In the authors' work to understand certain unusual features in their studies of strongly correlated electron systems, they stumbled upon an obscure relation between the mobility of charge carriers in a metal, and its Seebeck effect. The subject of the main part of the article deals with carefully synthesized

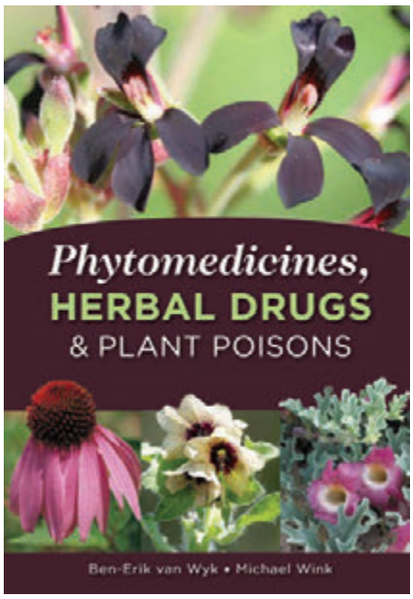
Ni-doped CoSb3, but through collaboration with the group of André Strydom an intriguing connection was established with a ternary rare-earth compound, CeRu2Al10, that has been at the focus of a research project in the UJ Physics group since 2009.

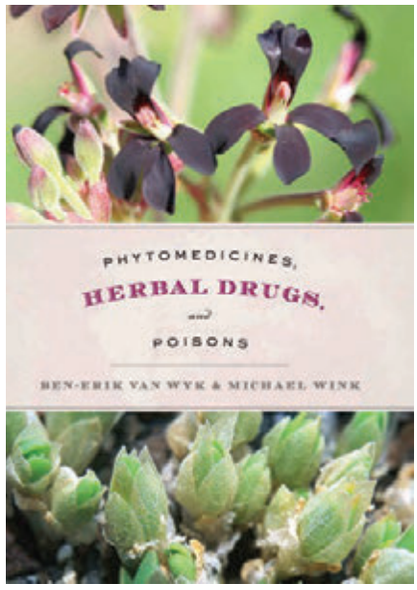
This work profited from Prof Strydom' s appointment as a Visiting Professor at the Chinese Academy of Science in Beijing since 2012, where he has been hosted for a number of research visits to date.

Nature Communications is published by the Nature Publishing Group.

The article can be found at http://www.nature.com/ncomms/2015/150625/ncomms8475/full/ncomms8475.html

Prof Strydom





Professor van Wyk

NEW INTERNATIONAL BOOK ON PHYTOMEDICINES, HERBAL DRUGS AND PLANT POISONS

Professor Ben-Erik van Wyk of the Department of Botany and Plant Biotechnology has recently published a new international book entitled *Phytomedicines, Herbal Drugs and Plant Poisons*. This full colour publication, with more than 780 photographs, was co-published by the prestigious Kew Publishers (Royal Botanic Gardens, UK), the University of Chicago Press in the USA and Briza Publications in South Africa. It was co-authored by the well-known Professor Michael Wink of the Institute for Pharmaceutical Biology at the University of Heidelberg in Germany. The book covers 360 of the most famous and important plants that are socially relevant in terms of their use as medicines, functional foods, drugs and poisons.

The preface of the book, written by Prof Van Wyk, clearly explains the aims and objectives of the publication. *Aide-mémoire to the Medicinal Plant Sciences* or *Natural Products in a Nutshell* could have been equally appropriate titles for this bird's eye view of medicinal and poisonous plants.

The aim was to present the reader with a compact, fully illustrated, multilingual and user-friendly reference guide. The book covers 360 species of commercially relevant and well-known medicinal plants, including those used for their poisonous or mind-altering activities. It also briefly explains the basic concepts related to the botany, chemistry, pharmacology and use of these plants.

There are few books that cover the entire spectrum of medicinal, poisonous and mind-altering plants, a wide and complicated field of study. Not only are there thousands of plants species that are used in one way or another, but also many different medicinal systems and cultural groups that each have their own materia medica and their own ways of using plants. This makes for a fascinating and never-ending scientific exploration, to discover and to learn. At the request of readers and publishers, Prof van Wyk and his co-author have attempted to condense a large volume of data and concepts into a limited number of pages, in order to present an affordable yet colourful summary of the most important facts relating to medicinal and poisonous plants from all corners of the earth.

This book should be viewed as a convenient and user-friendly starting point (a desk-top reference guide) to get quick, scientifically accurate answers to basic questions. Those who want to delve deeper into the subject can refer to their two other, more comprehensive reviews: *Medicinal Plants of the World* and *Mind-altering and Poisonous Plants of the World*, as well as the many scientific references that are cited there. In the fast-moving modern world, knowledge has become freely available on an unprecedented scale. There are excellent books on almost any conceivable aspect of medicinal botany and hundreds of thousands of scientific papers describing the details of chemical studies and pharmacological evaluations of plant compounds and extracts. Added to this is the worldwide web, where huge amounts of data can be accessed instantaneously. These sources generally provide the long answers, not the short ones. The target audience of this book covers the full range of readers: interested lay people who may want to use the book as an illustrated encyclopaedia, students of botany and pharmacology who need to prepare for an examination, professional persons working in the commercial environment and even academics and researchers who want to save time and need a quick reference guide and mnemonic aid.

NEW EQUIPMENT FOR SPECTRUM USERS

A High Resolution Transmission Electron Microscope (HRTEM), a Jeol (JEM-2100F) TEM, is a piece of new equipment, funded by the National Research Foundation (NRF) and UJ, for users of Spectrum. Spectrum is the analytical facility of the Faculty of Science where all our equipment is located under one roof.

The TEM is operated by Siyasanga Mpelane, who reports to the Spectrum analytical head Dr Willie Oldewage. Siyasanga is experienced in different material characterization techniques, especially high resolution transmission electron microscopy. They assist users with TEM and provide suggestions on what characterization technique may work best on their studies, suggest proper procedures of HRTEM sample preparation and observations, as well as provide training on sample preparation and interpretation of results. The Jeol 1200 TEM has STEM and EDS capabilities.

Since its invention in the late 1930s the TEM has over the years been greatly technically improved. Unquestionably, no major other equipment has had as far reaching impact on advances in as varied fields of science as the TEM. Recent machines are more robust, particularly in that they can carry various attachments, which allow them to perform different kinds of investigations. Physical, chemical and biological scientists have found the equipment very useful in their work. Compared to the older machines, modern TEMs are more reliable and user-friendly.

SPECTRUM is on the third floor of C1Llab. Staff and students are most welcome to view and use the equipment.

The High Resolution Transmission Electron Microscope

S Mpelane (extreme left) assisting students

Prof Henning

UJ WORLD-LEADING RESEARCHER FINALIST IN NSTF-BHP BILLITON AWARDS

Prof Michael Henning, UJ world-leading researcher on graph theory, used in GPS systems, has been named as a finalist in NSTF-BHP Billiton awards. He is a finalist in the category *TW Kambule Awards: Research and its outputs over the last five to ten years by an individual.*

Prof Henning focuses on the interplay of total domination in graphs and transversals in hypergraphs and is regarded as a world leader in the field.

Prof Henning's research uses graph theory, which is used in every GPS navigation system to find an optimal route to drive on city streets between two points.

Graph theory is the study of graphs, which are mathematical structures used to model a collection of objects (called vertices), some of which are related.

Prof Henning is a Research Professor at the Department of Pure and Applied Mathematics at UJ. He holds a NRF A-rating awarded to *researchers who are unequivocally recognised by their peers as leading international scholars in their field for the high quality and impact of their recent research outputs.*

The National Science and Technology Forum (NSTF) is the most representative and long-standing non-profit body of Science, Engineering, Technology and Innovation (SETI) stakeholders in South Africa. Finalists in the NSTF-BHP Billiton awards are recognised as significant, outstanding contributors to SETI in the country.

CHROMSA AWARD TO UJ RESEARCHER

The Research Group for Plant Metabolomic Studies at UJ was recently honoured with the *Chromatographer of the Year Award 2014* received from the Chromatography Society of South Africa (CHROMSA) in the categories:

- Publications of applications of new chromatographic techniques and
- Publications of established chromatographic technique applications.

The group, under the leadership of Prof Ian Dubery in the Department of Biochemistry, was established approximately five years ago when Prof Dubery and Prof Paul Steenkamp (CSIR) received an NRF grant under the National Equipment Programme (NEP) for a high definition UHPLC-MS instrument. The scientists involved quickly established a research focus area with chromatography-based Plant Metabolomics as theme that included the training of postgraduate students in Bio-Analytical Chemistry, a *scarce-skills* area. To date, seven Masters and Doctoral students have successfully completed their research projects in this focus area.

In addition to the use of metabolomics approaches to investigate the phenotypes of plants responding to pathogen infection, metabolomic tools were also applied to investigate the bio-transformation events in response to treatment with xenobiotic chemicals with the ability to trigger systemic defences in plants. As part of its activities the group evaluated, adapted and developed chromatographic as well as mass spectrometric methods suitable for plant metabolomics research. This included investigations on the effect of chromatographic separation conditions on the chemometric data generated and similarly, the effect ionisation conditions and the resulting mass fragmentation data on clustering of samples from different experimental treatments. Their findings highlight the need for investigating different collision energy settings during MS data acquisition, because these can contribute to coverage of a wider range of the metabolome by UHPLC–ESI–MS and prevent biased results. The results also emphasise that, depending on the initial objective of the undertaken study, optimisation in chromatographic resolution prior to full-scale metabolomics studies should be regarded as a mandatory step.

The group is already internationally recognised through its outputs and contributions to plant metabolomics and has published sixteen papers in international journals since 2012. These publications include applications of new chromatographic techniques and established chromatographic technique applications. Based on these research outputs, members of the group were invited to present talks at national and international conferences and workshops.

In accepting the award from Dr Patricia Forbes, chairperson of CHROMSA, Prof Dubery presented a talk entitled *Metabolomics at the Interface of Chromatography, Mass Spectrometry and Chemometrics.*

YOUNG SCIENTISTS AWARD FOR OUTSTANDING CONTRIBUTIONS IN EARTH SCIENCES

Dr Ashish Dongre, a post-doctoral fellow of Prof Fanus Viljoen, DST Research Chair in Geometallurgy in the Department of Geology, has been awarded a Young Scientists award by the Government of India, in the field of Earth Science.

The Ministry of Earth Sciences has instituted the Young Researcher/Achiever Awards to encourage excellence in young minds for outstanding research work in the fields related to Earth System Sciences.

The award was presented to Dr Dongre on 27 July 2015 in New Delhi.

Dr Dongre is currently conducting research on the kimberlites of India while registered at UJ.

Prof I Dubery

ARTICLE ONE OF TOP-TEN MOST DOWNLOADED

The article of Prof Ian Dubery and co-authors MI Mhlongo, LA Piater, PA Steenkamp and NE Madala, ***Priming agents of plant defence stimulate the accumulation of mono- and di-acylated quinic acids in cultured tobacco cells***, published in Physiological and Molecular Plant Pathology (PMPP) 2014, Vol 88 pp 61-66, was recognized in the Top-Ten most downloaded articles in the journal during the six months since its publication. Prof Dubery is a Research Professor in the Department of Biochemistry who specializes in Plant Metabolomics and Innate Immunity.

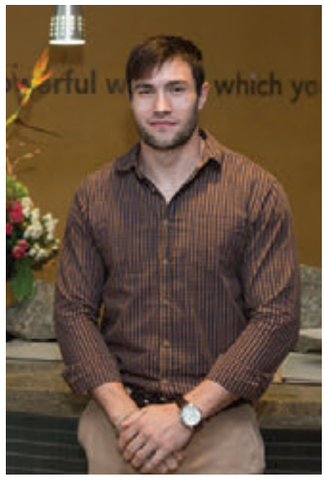
AUTUMN GRADUATION

Doctoral candidates and their promotors with third from left Prof D Meyer, Executive Dean: Faculty of Science; Prof A Parekh, Deputy Vice-Chancellor: Academic; Mrs Mpho Letlape, Deputy Vice-Chancellor: Strategic Services; Prof K Burger: Registrar

WINTER GRADUATION CEREMONY

THE FACULTY OF SCIENCE CELEBRATED THE AWARD OF EIGHTEEN DOCTORAL DEGREES AND 44 MASTER'S DEGREES AT THE WINTER GRADUATION CEREMONY ON 10 JUNE 2015.

DURING THE GRADUATION CEREMONY THE FACULTY HONOURED THE TOP MASTER'S AND HONOURS STUDENTS.



Francois Schulz

FRANCOIS SCHULTZ (PURE & APPLIED MATHEMATICS)

Francois Schulz from the Department of Pure & Applied Mathematics was the recipient of the Chancellor's Medal for the best Master's student in the Faculty for 2014, with a final mark of 90%.

Cheick Kader Toure

CHEICK KADER TOURE (PURE & APPLIED MATHEMATICS)

Cheick Kader Toure from the Department of Pure & Applied Mathematics received the prize for the best BSc Honours student in the Faculty for 2014, with a final mark of 92%.

Our PhD students that graduated on 10 June 2015 with their supervisors

PHILOSOPHIAE DOCTOR (PHD) DEGREES WERE CONFERRED ON THE FOLLOWING STUDENTS:

Agorku, Eric Selorm (Chemistry)

Thesis: Metal and non-metal doped semiconductor photocatalysts for water treatment.

Supervisor: Prof AK Mishra

Co-supervisor: Prof BB Mamba (UNISA)

Co-supervisor: Prof AC Pandey (University of Allahabad, India)

Booyens, Irma (Geography)

Thesis: Innovation and Networking in Tourism for the Competitiveness of the Western Cape regional tourism economy.

Supervisor: Prof CM Rogerson (Faculty of Management)

Daru, Barnabas Haruna (Botany)

Thesis: An evaluation of the phylogenetic diversity of trees in southern Africa.

Supervisor: Prof M van der Bank

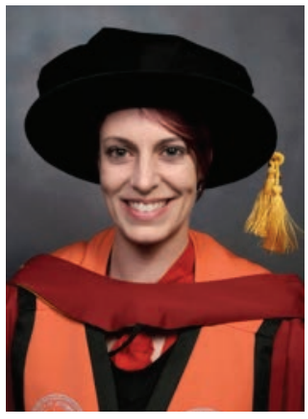
Co-supervisor: Dr TJ Davies (McGill University, Canada)

Dlamini, Phumlani Goodwill (Applied Mathematics)

Thesis: On spectral relaxation and compact finite difference schemes for ordinary and partial differential equations.

Supervisor: Dr M Khumalo

Co-supervisor: Prof SS Motsa (University of KwaZulu-Natal)

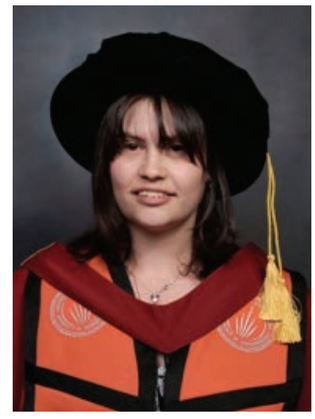


Ferreira, Eloise (Biochemistry)

Thesis: Silver(I) phosphine compounds selectively induce apoptosis in MCF-7 breast cancer cells.

Supervisor: Prof MJ Cronjé

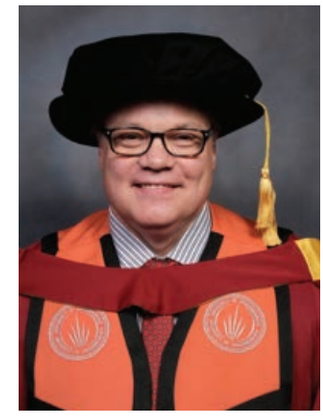
Co-supervisor: Prof R Meijboom



Horne, Tamarisk Kerry (Biochemistry)

Thesis: Aspects of novel *metallo*-porphyrazine derivatives bearing carbohydrate moieties for the establishment of PDT in cancer.

Supervisor: Prof MJ Cronjé



Jordaan, Lodiwikus Johannes (Aquatic Health)

Thesis: Determining the role of catchment geochemistry on the chemistry of water, sediment and fish from impoundments within selected large catchments in South Africa.

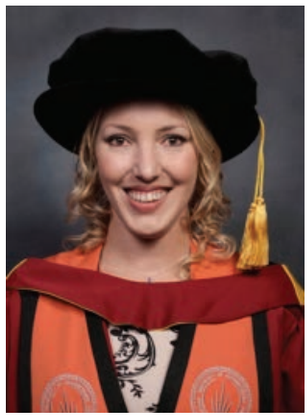
Supervisor: Prof V Wepener

Co-supervisor: Prof JM Huizenga (North-West University)

Kimemia, David Kimani (Environmental Management)

Thesis: Transition to Clean Household Energy in South Africa: Safety, Health and Low Carbon.

Supervisor: Prof HJ Annegarn



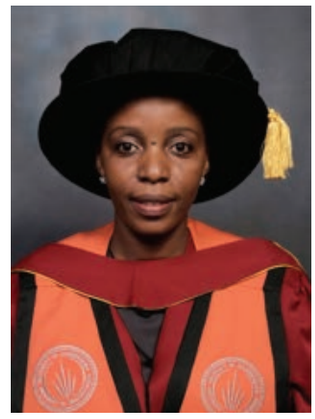
Lee, Claire Alexandra (Physics)

Thesis: Measurement of track-based missing transverse momentum in proton-proton collisions at $\sqrt{s}$ = 8 TeV centre-of-mass energy with the ATLAS detector.

Supervisor: Prof SH Connell

Co-supervisor: Prof K Assamagan (Brookhaven National Laboratory, USA)

Co-supervisor: Dr R Mazini (Academia Sinica, Taiwan)



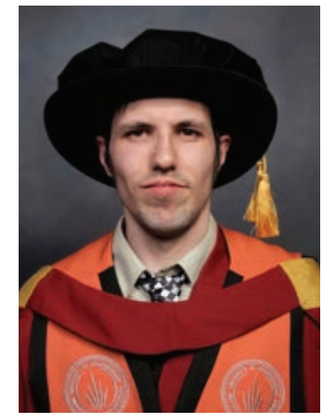
Lukhele, Lungile Patricia (Chemistry)

Thesis: Toxicity of double-walled carbon nanotubes to algae, macro-invertebrates and fish.

Supervisor: Prof BB Mamba

Co-supervisor: Prof V Wepener (North-West University)

Co-supervisor: Dr N Musee (CSIR)



Marcon, Alister Justin (Mathematics)

Thesis: Semitotal Domination in Graphs.

Supervisor: Prof MA Henning

Marcon, Sinclair Antony (Mathematics)

Thesis: Disjunctive Domination in Graphs.

Supervisor: Prof MA Henning

Maré, Leonie Pauline (Geology)

Thesis: Geothermal history of the Karoo Basin in South Africa inferred from magnetic studies.

Supervisor: Prof MO de Kock

Co-supervisor: Prof B Cairncross

Co-supervisor: Prof H Mouri

Muhire, Innocent (Environmental Management)

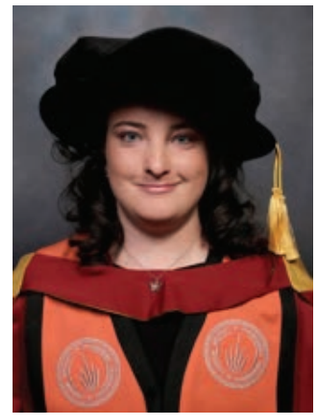
Thesis: Climate change and Variability and their Impacts on the Yields of Major Food Crops in Rwanda.

Supervisor: Prof F Ahmed

Obuah, Collins (Chemistry)

Thesis: Ferrocenylpyrazolyl nickel(II) and palladium(II) complexes as pre-catalysts for ethylene and higher ?-olefins reactions.

Supervisor: Prof J Darkwa

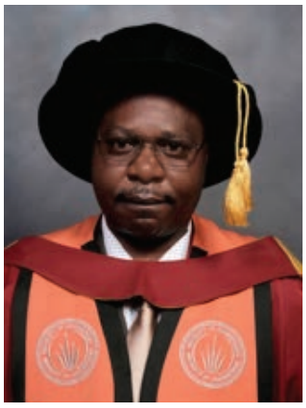


Robinson, Claudette (Mathematics)

Thesis: Algebraic methods for hybrid logics.

Supervisor: Prof WE Conradie

Co-supervisor: Prof CJ van Alten (University of the Witwatersrand)



Vunain, Ephraim (Chemistry)

Thesis: Nano-space confinement of pre-selective catalysts for hydroformylation of 1-octene.

Supervisor: Prof R Meijboom

Co-supervisor: Dr K Jalama (Department of Chemical Engineering)

ABSENT: Naicker, Viroshan (Mathematics)

Thesis: Disjunctive Total Domination in Graphs.

Supervisor: Prof MA Henning

INAUGURAL LECTURES

Prof Bettine Jansen van Vuuren from the Department of Zoology, delivered her inaugural address on 29 April 2015 with the theme, *Genetic information as a cornerstone for conservation biology.*

Prof Marijke Coetzee from the Academy of Information Technology and Software Engineering, delivered her inaugural address on 20 July 2015 entitled, *Not All Trust Is Created Equal.*

ZOOLOGY COMMUNITY ENGAGEMENT

The Department of Zoology organized its annual community engagement activity in April 2015 for learners from the Kliptown Youth Programme (KYP) in Soweto. This initiative started in 2013 and the focus is primarily on creating awareness about water pollution and water quality monitoring through educational activities.

The Klipspruit is a highly polluted river that flows through Kliptown, Soweto, near Johannesburg. Consequently, there is a potential health concern for the people using the river for various activities and for the animals that inhabit this aquatic ecosystem. This was the motivation for the research projects of students Jaco du Plessis (Hons) and Thato Bengu (MSc) supervised by Dr Cobus van Dyk from the Department of Zoology. Both students are currently doing their respective research projects on aspects of the biological integrity of the Klipspruit and its tributaries. These studies include water quality analyses, macro-invertebrate analyses as well as fish health assessments.

A part of their research projects is to engage with the community at some level to create awareness about the current state of the river. This year, the day started with a short lecture on the use of aquatic organisms (fish and macro-invertebrates) as indicators of aquatic pollution. A practical exercise was done where the collection of macro-invertebrates and the *in situ* measurement of physico-chemical water quality parameters were demonstrated. The learners were given the opportunity to sample both the Klipspruit that flows through the Kliptown informal settlement and the Braamfonteinspruit near the Johannesburg Botanical Gardens for comparative purposes. Back on the UJ campus, the learners were given the opportunity to identify the macro-invertebrates using a microscope and to make conclusions on their findings by comparing the results between the two rivers.

All the high school learners that participated in this activity have Life Science as a subject and many indicated an interest in pursuing tertiary studies in a science-related field at the UJ. The day was concluded with a tour of the aquatic research facilities of the Department of Zoology. Once the research projects are completed, representatives of the KYP will be invited to the departmental colloquium where the results will be presented. It is hoped that the research findings will support the motivation for the much needed rehabilitation of the Klipspruit River.

Dr Cobus van Dyk explains to the learners how to use the hand-hold water quality meters and how to record the physico-chemical water quality parameters.

Back in the laboratory, leaners identified the different macro-invertebrates collected.

Some of the learners from KYP and UJ postgraduate students Jaco du Plessis (middle) and Thato Bengu (far-right) during the UJ campus tour.

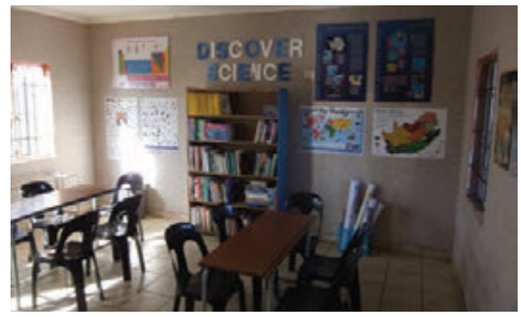
The Department of Zoology made 190 scarves for distribution to needy students in their 67 minutes for Mandela.

67 MINUTES FOR MANDELA

This year, the Faculty of Science devoted 67 minutes on Mandela Day to the KYP in Soweto. The mission of the KYP is to *provide opportunities that will enable our young people to rise out of poverty.* One of their primary activities is the tutoring of primary and high school learners. Marketing manager of the KYP, Ms Nelisiwe Walaza, was consulted to identify an activity that would address a specific need of the youth program and that would make a meaningful contribution towards their tutoring program. It was decided to transform one of the empty and bare tutoring venues into a class room that is more conducive for learning, especially with regards to science. This activity was also fitting in terms of the *Education and Literacy* theme of Mandela Day. Staff of the various departments within the Faculty donated science-related books and various educational charts. On 17 July, representatives of the Faculty transformed the venue into a science-themed, colourful class room to be used by all the learners at the KYP.

The KYP centre in Soweto.

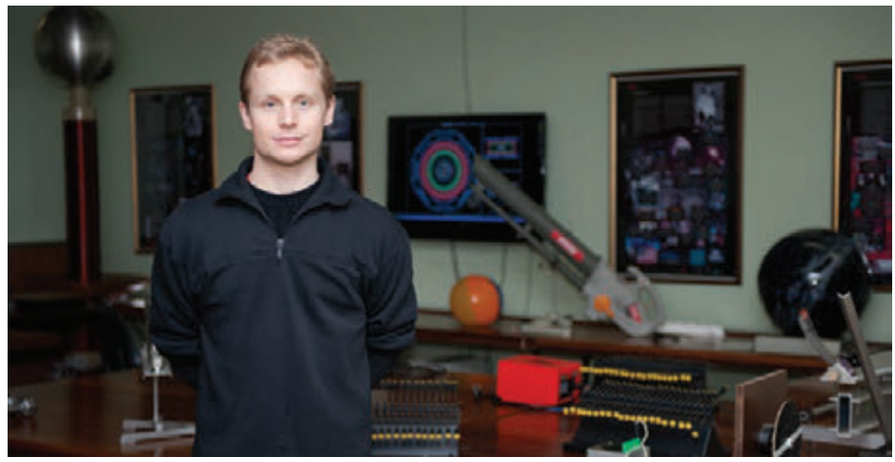
Representatives from the Faculty of Science and the KYP. From left: Ms Anna Molekwa (Department of Geology); Mr Craig Mahlasi, Mr Sithembiso Khumalo and Ms Maru Ramashapa (Department of Geography, Environmental Management and Energy Studies); Ms Nelisiwe Walaza, Marketing Manager at KYP; Dr Cobus van Dyk (Department of Zoology and chairperson of Faculty of Science Community Engagement Committee).



The tutoring venue before and after the transformation.

ICCWS 2015 AWARD TO UJ IT STUDENT

Victor John Jaquire, a Masters' student of Prof Basie von Solms's from the Academy of Computer Science and Software Engineering won the award for best Masters Project and presentation at the International Conference on Cyberwarfare and Security (ICCWS 2015). Postgraduate presentations from across the whole world were presented.



STARTED AS A SET STUDENT AND ENDED WITH A PHD IN PHYSICS

Dr Garreth Kemp started his studies in the Department of Physics at UJ as a SET student in the Foundation Programme. He excelled as a student and completed his BSc *cum laude*, BSc Honours *cum laude* and his MSc *cum laude* in Astrophysics.

He then enrolled to read for a doctorate in theoretical Physics at WITS, as at the time there were no theoretical Physics members of staff at UJ Physics who could supervise in Garreth's chosen field of study. He completed his PhD studies and a PhD in Physics was awarded to him at a WITS graduation ceremony.

In the meantime Garreth has re-joined the Department of Physics at UJ as a temporary lecturer.

TOP STUDENT ACHIEVERS ACKNOWLEDGED IN GEOLOGY

The Department of Geology at UJ recently celebrated its annual acknowledgment to the best performing students in 2014. The student with the highest average marks in Geology first, second, third and Honours year received a certificate and various prizes. The Yule Crosby Rand Pioneers award was also presented to the top third year student.

Jacolene Herbst also received the Geology Society of South Africa's (GSSA) best Geology Honours student award for 2014. This award is adjudicated by the Fellows of the GSSA and recognizes the best Geology Honours student registered in a Department of Geology at a university in South Africa.

First Year student prize winners, left to right: Harvey Phenya, Glen Mabunda, Prescilla Lesejane and Andrew Brown

Best Second Year student, Robyn Ormond

Best Honours student, Jacolene Herbst

Best Third Year student, Joshua Tsatsi

ACADEMY RUNS INTO TOP SPOT AT MICROSOFT IMAGINE CUP

Students from the Academy of Computer Science and Software Engineering (ACSSE) at UJ once again demonstrated their flair for innovation at the national leg of the annual Microsoft Imagine Cup, hosted at the CSIR. Thirty-five entries were received from all universities across South Africa, from which twelve finalists were chosen. Of these twelve finalists, five represented the ACSSE in three distinct categories: Games; World Citizenship and the flagship Innovation category.

After a grueling day of presentations to a panel of judges (who hail from a variety of companies including: Microsoft, CSIR and the International Labour Organisation), the winners were announced. Team Dynamic Overload from the ACSSE walked away with the prestigious Innovation Award for their interactive and immersive physical development system (HexaFit), breaking the boundaries of personal fitness via gamification. The team, mentored by Deon Cotterrell, consisted of Stefan Cronje, Karabo Moroe, Ryan Nair and Ryno Strydom.

Dynamic Overload will now continue to represent South Africa at the regional Africa and Middle East Semi-Finals.

Dynamic Overload: Ryan Nair, Deon Cotterrell, Stefan Cronje, Ryno Strydom, Karabo Moroe

Prof Muronga

PROF MURONGA ELECTED AS NEW PRESIDENT OF SAIP

Prof Azwinndini Muronga from the Department of Physics and Director of the UJ Soweto Science Centre was elected as the new President of the South African Institute of Physics (SAIP) at the annual SAIP Conference from 29 June - 03 July 2015 in Port Elizabeth. The announcement of the election was endorsed on 3 July 2015. Prof Muronga's term of office is for the next two years.

The SAIP was established in July 1955 and has grown to a membership of approximately 10% of its members being from other African countries or further abroad. It has diversified to the extent that there are a number of Divisions within the SAIP, concentrating on more specific fields, whilst participating in the general activities of the Institute.

The objectives of the SAIP are to promote study and research in physics and related subjects and to encourage applications thereof, to further the exchange of knowledge among physicists by means of publications and conferences, to uphold the status of and ensure a high standard of professional conduct among physicists and to co-operate with other institutes or societies, to the benefit of both.

SCIENCE PARTICIPATED IN PGCRI THESIS COMPETITION

UJ's first 3-minute thesis competition in May saw the Faculty of Science walk away with the second and third place.

The competition required registered PhD students and/or recent UJ PhD graduates summarising and highlighting their PhD projects using only one PowerPoint slide. The judging panel consisted of representatives from academia, industry and the NRF. The first prize was a tablet with two-years of data.

Twelve speakers, five from Science and seven from Humanities, took part in the competition. Presentations ranged from scientific to humanitarian topics. Science was represented by the Academy of Computer Science and Software Engineering, Departments of Botany and Plant Biotechnology (two PhD presenters), Geology and Physics.

The first prize was awarded to Ms Yolandi Coetser for her presentation on *The use of animals in Art: An ethics for Aesthetics*, a somewhat disturbing subject that illustrated cruelty to animals used in the name of art. Dr Bertus Smith from Geology who spoke on his recently awarded PhD topic *The geometallurgical characterization of the Merensky Reef at Bafokeng Rasimone mine*, South Africa was placed second and Ms Candice Louw from the Academy of Computer Science and Software Engineering with her topic *Towards a smartphone application user security competency evolution (SAUSCE) model*, third.

The visiting judges were unanimous in their praise of the concept and the quality of all the presentations.

The competition was organized by the Postgraduate Centre, Research and Innovation (PGCRI).

Dr Albertus Smith (second place)

Ms Candice Louw (third place)

Ms Susan Jacobs (fifth place)

Dr Barnabus Daru (seventh place)

Mr Bezeng Simoen (Tenth place)

GEOLOGIST FORGES NEW SPECIALITY IN SA

Prof Hassina Mouri from the Department of Geology is laying the local groundwork for the establishment of medical geology, a field still in its infancy, as a bona fide discipline in South Africa and Africa. The International Geological Congress scheduled for Cape Town in 2016, which promises to attract thousands of international delegates, will provide further impetus to her efforts. Together with some eminent international scientists, Prof Mouri is preparing a special session dedicated to this emerging field of science to take place at this congress.

Medical geology is interdisciplinary by necessity, bringing together geological, medical and science professionals of all types and specialities, from geoscientists to toxicologists, epidemiologists to biotechnologists etc.

The field may be in its infancy in South Africa and in Africa in general, but Prof Mouri has some ambitious ideas to take this field further. She has become medical geology's most ardent advocate in South Africa.

By the end of July 2015, she presented her on-going projects at the 6th International Medical Geology Conference in Portugal. In August she will be traveling to Nigeria, where she is invited by the Pan-African University – Institute of Earth and Life Science, Ibadan, to give lectures in Medical Geology for postgraduate students.

Dr Linda Mtwisha of the NRF, Acting Executive Director: Institutional Engagement and Partnership Development (IEPD) presenting Prof Kinnaird, DST-NRF CIMERA Co-Director with a thank you gift, while Prof Beukes, DST-NRF CIMERA Director looks on.

SUCCESSFUL NRF SCIENCE FOR SOCIETY LECTURES RETURNED TO UJ

The NRF Science for Society Lectures Series returned to the UJ with the theme of *Seeks to bridge the divide that exists between science and community issues in an effort to help society relate to how science, research and technology positively impact on our day-to-day lives and on future generations.*

The latest NRF Science for Society Lecture, entitled *Economic Geology Research: What makes South Africa the World's most valuable piece of Mineral Real Estate*, looks at both sides of the coin - from the country's position as a major producer as well as at the research being carried out under the auspices of the DST-NRF Centre of Excellence for Integrated Mineral and Energy Resource Analysis (CIMERA). South Africa's mineral riches are significant not only for their economic value but also for their potential to unlock the history of early life on Earth.

The speakers were Prof Nicolas Beukes: Research Professor of Geology and Director of the DST-NRF CIMERA at UJ and Prof Judith Kinnaird: Associate Professor of Economic Geology in the School of Geosciences at the University of the Witwatersrand and Director of the Economic Geology Research Institute.

JOURNALISTS COVERING 25TH AFRICAN UNION SUMMIT VISIT DST-NRF CIMERA

The 25th African Union Summit Conference was held in South Africa in June 2015 and was covered by a large contingent of both local and overseas journalists. The NRF, the funding arm of the Department of Science and Technology (DST), together with Brand SA, requested DST-NRF CIMERA to host a group of journalists, as part of highlighting the NRF's flagship Centres of Excellence programme.

At UJ, the visit by the group of nine journalists began in the Council Chambers where Prof Bruce Cairncross, Head of the Department of Geology, welcomed all.

Prof Nic Beukes, from the Department of Geology, UJ and Director of DST-NRF CIMERA, gave an overview presentation on the objectives of the CoE and its importance in the context of the South Africa's mining industry in particular, and in Africa, in general.

Prof Beukes

Prof Michiel de Kock from the Department of Geology, UJ, on the left, took the group to SPECTRUM, UJ's state-of-the-art analytical facility.

Prof Jan Kramers from the Department of Geology, UJ, explained the Argon-Argon rock dating instrument to the journalists covering the AU Summit meeting.

Prof Fanus Viljoen later described how the Mineral Liberation Analyser (MLA) worked.

VISITING PROFESSOR EDUCATES HONOURS STUDENTS

Dr Frank von Delft visited the Department of Biochemistry to present the annual protein crystallography course to the Honours students. Apart from being appointed as a Visiting Professor in the Department, Dr Von Delft has been head of the PX protein crystallography group at Oxford University since the start of the Structural Genomics Consortium in 2004. In 2012 he also joined Diamond synchrotron as head of beamline I04-1.

CONFERENCES

Dr Patric Njobeh

RESEARCHER ADVOCATES POSSIBLITIES OF COLLABORATION

Dr Patric Njobeh from the Department of Biotechnology and Food Technology at UJ presented a public lecture entitled: *Mycotoxicology Related Research at the University of Johannesburg, South Africa: Opportunities for Joint Research Collaboration* at the Federal University of Technology, Minna in Nigeria. In his talk he stated that research collaboration between FUT, Minna and UJ would facilitate researchers' exchange of information and technology sharing as well as the possibility of joint supervision of postgraduate researches. Dr Njobeh further maintained that future specific research programmes and collaborations between UJ and FUT, Minna are bound in the areas of safety evaluations and measures to improve food and feed safety; database development; ameliorate toxicity and to assess exposure levels & development of nanosensors in detecting pathogens and chemical hazards in food, feeds and water.

DEPARTMENT OF APPLIED CHEMISTRY ON SUSTAINABLE WATER

The third International Conference on Emerging Technologies for Clean Water is hosted by the Department of Applied Chemistry, UJ, in partnership with India and UK, from 3-5 August 2015. The Conference provided a platform for various stakeholders from Africa, India and the UK to discuss scientific issues, share knowledge, network, and look at innovation opportunities in water testing, prevention of water pollution, water purification/treatment and recycling of wastewater. It provided a means for academics, government officials/policy makers, funders, users and industries to discuss challenges and scope out areas for collaborations between various stakeholders among the three countries. Topics of discussion: Issues in water quality - both groundwater and surface water; drinking water testing and purification: the Science and Emerging Technologies from Labs; wastewater management- monitoring and treatment; water and Sanitation challenges; water and health issues; water and the rural communities; needs of industry, municipalities and policymakers and new products, services and technologies from Industries.

THIRD ANNUAL CONFERENCE ON HIGH ENERGY ASTROPHYSICS IN SOUTHERN AFRICA HELD AT UJ

The third annual Conference on High Energy Astrophysics in Southern Africa (HEASA) was held at UJ in June 2015. The aim of HEASA is to promote multiwavelength astronomy in Southern Africa and to build national and international collaborations.

Scientific topics covered at this Conference were Gamma-ray, X-ray, Optical and Radio observations Theory of Active Galactic Nuclei, Gamma-Ray Bursts, Pulsars, Supernovae, Novae, Cataclysmic Variables, Astroparticle Physics of Cosmic Rays, Neutrinos and Dark Matter Observational Cosmology in connection with Multi-wavelength Astronomy.

The Conference was organised by the Astroparticle Physics Group in the Department of Physics at UJ.

PHYSICS CONFERENCE IN SORBONNE

Prof Giovanni Hearne and Dr Emanuela Carleschi discuss new ideas at the International workshop on strong correlations and angle-resolved photoemission spectroscopy (CORPES15). CORPES15 is an interdisciplinary workshop whose scope is situated at the crossroads between photoemission spectroscopy and many-body theory. This high level Conference is held every two years and attracts participants from high-level institutions worldwide. This year's Conference took place at the Medical Faculty of the Sorbonne University in central Paris, which was founded in the mid 12th century. Prof Hearne, Dr Carleschi and Dr Bryan Doyle all presented current work of theirs at the Conference.

CONFERENCE REFLECS ON SUCCESS RATE OF FIRST YEARS

Dr Melanie Jacobs, Head of the Unit for Programme, Enrolment and Quality Management, and Estherna Pretorius, First Year Experience Coordinator, attended a conference in Johannesburg and one in Melbourne on First Year Seminar Research. At both Conferences they reported on *First Year Mathematics performance*.

The Faculty of Science offers a First Year Orientation Seminar for first year science students to ease problems in transition from school to university.

The programme consists of a ten hour language course, a six hour laboratory skills and a ten hour problem solving skills session. These modules are presented by dedicated academics and support staff in the Faculty. Student mentors (senior students) take responsibility for getting to know the students better.

Dr Melanie Jacobs

Estherna Pretorius

ZOOLOGY ALUMNI DINNER

The Department of Zoology hosted its 2015 alumni dinner so that current staff members can reconnect with past graduates. It also creates an opportunity for current Zoology postgraduates to meet and interact with some of their predecessors and people who have achieved great success in their respective careers. The evening specifically focused on alumni who are currently working in the environmental consulting field or in research or conservation. Represented at the event were multiple environmental consulting firms including international companies like Golder Associates, as well as the Council for Scientific and Industrial Research, the National Zoological Gardens, the Endangered Wildlife Trust and analytical services like Waterlab. It was indeed a great networking opportunity for all and a proud showcase for the success achieved by some of the many past graduates of the Department of Zoology.

The event was held at the Kerzner Unit of the School of Tourism and Hospitality on the Bunting Road Campus of the UJ. The programme included a short overview of the current status and achievements of the Department of Zoology by the HOD, Prof Annemarie Avenant-Oldewage as well as a perspective from the Dean of the Faculty of Science, Prof Debra Meyer. Mr Donavan Henning, a Zoology alumnus and current senior consultant at Nemai Consulting was invited as the guest speaker and provided some valuable insight for current Zoology postgraduates who would like to pursue a career as environmental consultants.

Zoology alumni: Top: Dr L de Wet (*Waterlab*); Mr S van Staden (*SAS Environmental*); Dr R Heath (*Golder Associates*); Mr M Jonker (*Ecotone Freshwater Consultants*); Mr D Henning (*Nemai Consulting*); Dr A de Klerk (*CSIR*). Middle: Mr N Neervoort (*Knight Piésold Consulting*); Mr B Grant (*Strategic Environmental Focus*); Mrs A Briel (*Knight Piésold Consulting*); Dr L de Klerk (*CSIR*). Front: Mr D Kindler; Mr R Tate (*Digby Wells Environmental*); Dr R Watson (*Royal HaskoningDHV*); Prof A Kotze (*National Zoological Gardens*); Ms K Marnewick (*Endangered Wildlife Trust*).

NEW APPOINTMENTS IN THE FACULTY

The Faculty of Science wants to extend a warm welcome to new staff members in the Faculty.

NAME	POSITION	DEPARTMENT
Dr Farhahna Allie	Researcher	Biochemistry
Mr Bhekisisa Dlamini	Lecturer	Biotechnology & Food Technology
Ms Lee-ann Foster	Lecturer	Geography, Environmental Management & Energy Studies
Prof Gijsbert Hoogendoorn	Associate Professor	Geography, Environmental Management & Energy Studies
Dr Jeremie Lehmann	Senior Lecturer	Geology
Dr N Madala	Senior Lecturer	Biochemistry
Mr Lee Madeley	Instrument Scientist	Chemistry
Dr Makhubela Banothile	Senior Lecturer	Chemistry
Mr Mpelane Siyasanga	Instrument Scientist	Spectrum
Prof Patrick Ndungu	Associate Professor	Applied Chemistry
Dr Nomngongo Philiswa	Lecturer	Applied Chemistry
Prof Oluwafemi Oluwatobi	Associate Professor	Applied Chemistry
Mr Francois Schulz	Lecturer	Pure and Applied Mathematics
Ms Simango Nombuso	General Assistant	Applied Chemistry
Ms Elize Smit	Lecturer	Chemistry
Ms Leandri Snyman	Faculty Officer	Deans Office
Prof Sebastian Tappe	Associate Professor	Geology
Ms Rene Tong	Head Technician	Botany

Alexander, winner of the competition, stands next to Mrs Marina Myburgh, the winter school presenter from Crawford College Sandton.

LEARNERS FLOCKED TO UJ FOR IT WINTER SCHOOL

The Delpi winter school was held from 6 to 10 July 2015. The winter school is held annually since 2009, and has the focus to prepare grade 12 learners, who take IT as subject, for their practical programming exam. The winter school is now very popular and was attended by 80 grade 12 learners from schools as far as Limpopo, the Free State and Pretoria. There were learners from Crawford College: Lonehill, Abbotts College, Bastion, City Deep Adult Learning Centre, Clapham High, Cornerstone College, Crawford College: Lonehill, Crawford College: Pretoria, Curro College Hazeldean, Dinamika, Eldoraigne, Hoërskool Ben Viljoen, Hoërskool Dinamika, Hoerskool Linden, Hoërskool Noordheuwel, Hoërskool Randburg, Hoërskool Sasolburg, Hoërskool Uitsig, Hyde Park, Itshupeng Secondary School, Jeppe High School, Leeuwenhof Akademie, Midrand High, Monument, Northcliff High, Parktown Boys, Pietersburg Hoërskool, Prestige College, Rand Park Ridge, Roshnee Islamic High and St Dominic's Welkom.

A programming competition for a bursary of R10 000 to study IT in the Academy for Computer Science and Software Engineering was won by Alexander Budnitsky, who is a learner from Northcliff High. Learners had to implement the hang man game, and were very creative in their interpretation of the game. This year there were many participants in this competition who want to study IT at UJ, and we look forward to welcoming them at UJ in 2016.

JUNIOR SCIENTIST WORKSHOP: 30 JUNE – 1 JULY GRADE 5 – 7

The Junior Science Workshop in the Faculty of Science, organised by Dr Amina Nel from the Department of Zoology, for grade 5 –7 learners was successfully held during the June winter school holiday.

At this exciting and stimulating workshop the children were exposed to a university environment with the opportunity to work in research laboratories. The children were divided into three groups and could choose which groups to attend. The groups included:

GROUP 1:

Day 1: DNA extraction (Grade 7)

Children learnt more about DNA through a short lecture and a hands-on practical.

Day 2: Dissection (Grade 7)

The children got the opportunity to dissect a cow's heart, eyes or kidneys.

GROUP 2:

Day 1: Economical plant (Grades 5 and 6)

Children were taught how to use their body's senses to touch, taste and smell their way through a fun day exploring economical plants like Aloe and Rooibos, along with some *master chef* spices like mint & rosemary.

Day 2: Vertebrate Skeletons (Grades 5 and 6)

Children learnt more about vertebrate skeletons and how animals have adapted to survive in their unique environments.

GROUP 3:

Day 1 & 2: Ecology (Grades 5 and 6)

During this session children learnt more about water pollution. Children got the opportunity to build a water cycle and a water filter. Children were introduced to a microscope and had the opportunity to view live microscopic organisms under the microscope.

Each group/program also included a tour of the campus introducing the children to the library, a lecturing venue and the student centre.

LEARNERS VISITING SCIENCE STALL AT A UJ OPEN DAY

Learners attending the mini Open Day of the University visiting the stall of Science. Dr Lizette Piater and Dr Edwin Madala from the Department of Biochemistry conducted the experiment Gene in a bottle.

THE SCIENCE CENTRE EXTENDING ITS BORDERS

The Soweto Science Centre was established in 2010 to open the door of knowledge for school children, teachers and the community of Soweto and those of the surrounding regions.

The Centre aims to address some of the challenges faced by our country in the areas of Mathematics, Science, Engineering and Technology. The Centre is also a necessity in the community because it not only encourages learners to do well in matric, but it also prepares them for the challenges of university.

Prof Azwinndini Muronga is the Director of the Science Centre.

The Science Centre has been invited by Minister Nalendi Pandor to participate at an Imbizo Exhibition in Reitz, the Free State.

The UJ Science Centre Mobile Lab was also at the an Imbizo Exhibition in Reitz

While UJ students and school learners in Gauteng were on Easter recess, the UJ Soweto Science Centre assisted grade 10-12 learners in mathematics and science for the whole two weeks recess period. Classes started at 07:45 and ended at 15:00. Learners also wrote a test of which results were released during a parent meeting at the SSC in May 2015.

FACULTY OF SCIENCE
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