NELSON MANDELA UNIVERSITY

March 2018

News

Upcoming Events

11 -12 April 2018
Fame Lab

17 April 2018
TKF Careers Expo and Launch

19 April 2018
Graduation
09:30
School of Computing Sciences,
Mathematics, Physics, Statistics,
School of Bimolecular & Chemical Sciences)
14:30
School of Environmental Sciences

4-11 August 2018
National Science Week 2018

*subject to change

Faculty of Science Newsletter

A word from the Dean

Welcome staff and students to the first Faculty of Science newsletter for 2018. It has been quite an eventful first term for our faculty as a whole. The year started off on a high note as the faculty saw an increase in first year registered students in comparison to previous years, ground breaking discoveries were made by Prof Jan Neethling and Dr Jaco Olivier from our Centre for HRTEM, which you can read more about on page 5, and we also welcomed three visitors from the prestigious Joint Institute of Nuclear Research in Moscow.

This year's Science Faculty graduation will take place on the13th of April at George Campus and the 19th of April at the South Campus in Port Elizabeth. Graduation is a milestone where we as a faculty celebrate the hard-work and dedication of our students and I look forward to this special occasion.

The Science Marketing team and I have been hard at work preparing for this year's National Science Week which will take place from 4 – 11 August with pre-launch activities starting on the 18th of July to coincide with the centenary of Mandela. For this year's National Science Week we have something special planned, which you will read about in our next edition.

We at the faculty office are so proud of our latest publication and would like for you as staff and students to get involved by sending us your stories, ideas and articles to be featured in our upcoming editions. The newsletter will be produced once every term both electronically and print format.

Thank you to those who contributed to this very special introductory edition of our faculty newsletter. Lastly, I would like to wish you all nothing but the best for the year ahead.

Yours faithfully,
Prof Azwinndini Muronga

Welcome 1st years!

On Saturday **27 January**, Our University hosted its very first, first year Welcoming Ceremony as Nelson Mandela University. The faculty of Science welcomed its first years in the South Campus auditorium with a live stream of the VC's address and entertainment from the South Campus sports centre. The program kicked off at 9am with a musical performance by 2Tone and was MC'd by the charismatic Yanga Lusasa. It was a day of 'firsts' as Prof Muthwa delivered her first welcoming ceremony speech as our institutions new Vice Chancellor and the University's first female VC. At 10am the live stream was turned off and attention was placed on Faculty of Science Dean, Prof Azwinndini Muronga who briefed all our first years on what to expect when entering the University as a first year science student. Emphasise was placed on hard work, with Prof Muronga reassuring parents that their children had chosen the RIGHT faculty. After the Deans address the student were served with refreshments and got to meet their soon to be lecturers and HOD's at the interesting departmental stalls displayed in the auditorium foyer. The 2018 Faculty of Science first year Welcoming Ceremony was a huge success and we expect nothing less for the academic year too.

Seminar

Faculty of Science hosts Russian Scientists from the Joint Institute of Nuclear Research

On the **7th of February**, The Faculty of Science hosted three Russian scientists from the Joint Institute for Nuclear Research (JINR) in Dubna, Russia. On their month long visit to South Africa, Alexander Ayriyan, Hovik Grigorian and David Elvin Alvarez-Castillo joined us for a 90 minute seminar on various topics within their various fields.

The Joint Institute for Nuclear Research is an international intergovernmental organisation who among its latest achievements have synthesised new superheavy elements 113-118 which can be found on the periodic table of elements

First off was Mr Alvarez-Castillo, who spoke about 'Supporting the existence of the QCD critical by compact star observations.' The presentation depicted and broke down the structure of a neutron star. Amongst other things he covered, he talked about Nuclear Interaction and ended off his talk with explaining what occurs when two neutron stars merge

Next was Mr Grigorian who spoke to us about the 'Cooling evolution of neutron stars' and left the audience with the notion that "cold matter is never really cold". Mr Ayriyan rounded off the talk with a brief summary of a 'Bayesian analysis for extracting properties of the nuclear equation of state from observational data' including the Bayesian Theorem to calculate the probability of various events.

The talk was interesting and informative and inspired interesting and inquisitive questions from the audience. The Faculty of Science would like to thank these three scientists for sharing their piece of knowledge with our current and future scientists, we hope that this is the beginning of a fruitful relationship with Nelson Mandela University and the Faculty of Science and we wish them the very best!

Competition
Maths inspires art in unique Bay Competition

High school pupils, university students and teachers across Nelson Mandela Bay are being challenged to use maths to create art, in the city's first Math-Art Competition, which kicks off on March 3.

"There is so much maths in art, and so much art in maths," said competition coordinator Carine Steyn from Nelson Mandela University's Govan Mbeki Mathematics Development Centre (GMMDC), which is running the competition in consultation with the university's School of Music, Art and Design (SoMAD), and the Department of Basic Education.

Entrants can turn to nature for inspiration, where flowers are really just parabolas and a snake's skin a masterpiece of symmetry and perfect angles. They can also be inspired by ethno-mathematics – which are mathematically-correct designs that are a part of traditional culture, including Ndebele houses and Xhosa beadwork.

"What we are looking for is beautiful drawings, created using maths."

GMMDC director Prof Werner Olivier, who is the driving force behind this competition, said: "We are piloting the competition this year and hope to make it an annual event.

"The Math-Art Competition also feeds into the broader Science, Technology, Engineering, Arts and Mathematics (STEAM) development work of the GMMDC, and will include pupils and teachers participating in our projects across the province."

This competition is not about artistic technique. It's more about the creativity that emerges out of linking maths and art."

The competition has two main categories – one linked to the Grade 8 to 12 CAPS curriculum, where entrants have to use maths concepts taught at school to design art; and the other an open category, which would include any artwork with a link to maths, including ethno-mathematics.

"The competition is valuable because it crosses discipline boundaries," said Rachel Collett, a lecturer in SoMAD's Visual Arts Department. "In school and at university, subjects are usually taught as separate entities, and there are reasons for this but, of course, all knowledge is actually connected and requires imagination. It's good for learners to explore links between subjects because that can stimulate independent and critical creative enquiry."

Steyn said: "We are encouraging art and maths teachers to enter – and to encourage their pupils to enter too. This competition is not about artistic technique. It's more about the creativity that emerges out of linking maths and art."

The artworks must be two-dimensional and A4 to A2 in size – and relief work cannot be more than 2cm high.

Each entrant must submit a 100 to 200-word essay, explaining the maths-art link in their artwork.

Prizes, which include tablets, cell phones and art classes, will go to the top-placed candidates and to individuals who receive "special recommendations" for outstanding creativity. Entries will be judged in the following sub-categories: Grade 8 to 9 pupils, Grade 10 to 12 pupils, students and teachers.

The competition closes on May 4, with the top entries displayed at a public art gallery in the city (venue to be confirmed) from May 19 to 23.

Winners will be announced on May 25, at GMMDC's annual GeoGebra Conference, which will also be promoting STEAM activities to popularise maths in the classroom.

Visitors at the conference include the Dean of Arts and other delegates from the University of Budapest, which is a keen promoter of STEAM worldwide.

•For more information about the Math-Art Competition, contact Carine Steyn at: mathartcompetition@gmail.com

Competition
Undergraduate Awards

Prof Muronga, Executive Dean of the Faculty of Science, would like to extend an invitation to all 2nd year, 3rd year and Honours students to submit projects for the 2018 Undergraduate Awards.

The Undergraduate Awards is the world's leading undergraduate awards programme, which recognizes top undergraduate work, shares this work with a global audience and connects students across cultures and disciplines.

3rd Year students may submit 2nd Year projects and Honours students may submit 3rd year projects.

Projects must have the following criteria:
•12 000 words max
•A-grade or higher
•Submit up to 3 projects

The categories for projects are as follows:
•Chemical and Pharmaceutical Sciences
•Computer Sciences
•Earth and Environmental Sciences
•Life Sciences
•Mathematics and Physics

Winners and highly commended entrants will get the opportunity to attend the Awards Ceremony in Dublin, Ireland as well as:

•A Gold Medal and a Certificate of Recognition.
•Publication of their winning submission on

The Undergraduate Library.
•A profile of their work published in The Undergraduate Journal.
•Access to the UA Alumni Portal.

If you would like to enter, please register on the Undergraduate Awards website on the following link:
http://www.undergraduateawards.com/
SUBMISSION DEADLINE 12 JUNE 2018

Symposium
SAYAS Symposium Explores Science and Uncertainty

Science and uncertainty was explored at a symposium hosted by the South African Young Academy of Science (SAYAS) on 8 – 9 March 2018 held at the Nelson Mandela University (NMU).

The symposium entitled: 'Science and (Un)certainty: Exploring Science, Knowledge Production, Communication and Uptake in a Post-truth World' aimed to create a space for meaningful engagement with on-going discussions in institutions of higher learning, and spilling into the public space.
The symposium also interrogated the position of science and of knowledge creation as either a hindrance or a transformative initiative and of the need for certainty in a post-truth world. The symposium provided an opportunity for inclusive debate to explore what science and its different interpretations are, as well as exploring varying bodies of knowledge creation and the current decolonising dilemma.

Prof Catherine Odora Hoppers who holds the South African Research Chair in Development Education at the University of South Africa, gave the keynote address. Prof Azwinndini Muronga, Executive Dean in the Faculty of Science, NMU in his welcome to the delegates to the university made reference to the pursuit of engaging in knowledge creation and various streams of thought.
Other speakers included Prof Alex Broadbent, Professor of Philosophy and Executive Dean of the Faculty of Humanities, University of Johannesburg. Some 30 representatives from various universities in the country attended the symposium.

Exhibitions
Promoting Science Careers in the Bay

This term, the NMU Science Marketing team, together with Scisa, visited 2, week long science expos in Uitenhage, Missionvale and Grahamstown. First was the CEIA Careers Exhibition at Uitenhage/Misionvale from the 19th – 23rd of February.
. This program was mostly aimed at high school learners, from disadvantaged schools/areas, learning about different career paths that were offered by the various institutions at the exhibition. The expo proved to be successful with over a 1000 young school learners from schools around PE, including Kwamagxaki High, Tyhilulwazi High School and Mfesane Senior Secondary School, who came out in numbers with a keen interest in science, technology and the many possible careers to pursue.
The Grahamstown SciFest followed from the 7th -13th of March. This week long event featured an array of experiments and displays from institutions and science centres that catered to primary and high school learners.

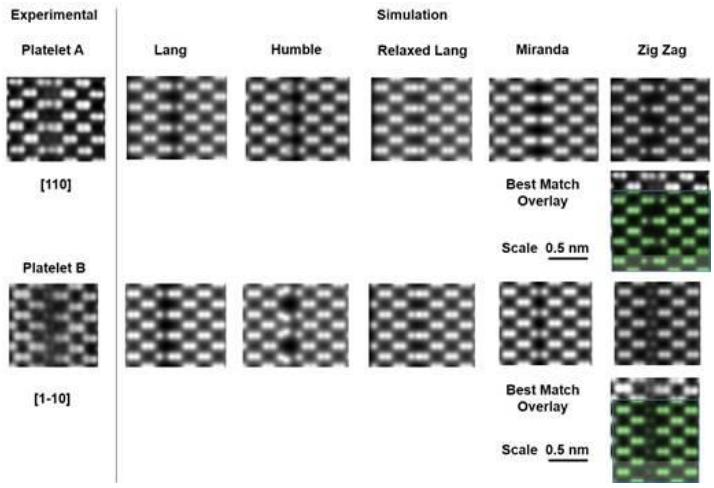
SciFest had daily programs which featured a Laser Show and a Science Picnic in the Park at the Rhodes University Makana Botanical Gardens. The daily highlight of the expo was the Kids Lab where children in grades 2 and 3 learned how to do practical and fun science experiments with various food ingredients.
Attending these events was quite an interesting experience for everyone who attended. It was exciting to see the innovation that occurs in science, and, moreover, seeing students soaking up every part of the experience. We surely hope that everyone who attended these expos was as inspired to create more for science and to inspire others to learn more about science as much as we were

Achievement

South African scientists open new doors for studying defects in diamond

Dr Jaco Olivier and Prof Jan Neethling from the Centre for High Resolution Transmission Electron Microscopy (TEM) at the Nelson Mandela University in Port Elizabeth are celebrating their recent publication in the prestigious Nature Materials*. The paper has caused quite a stir in the scientific community, with a commentary in Nature Materials news & views** and over one thousand views on LinkedIn. This is a true testament to the success of a multimillion rand DST/NRF investment which lead to the establishment of the Centre for HRTEM in October 2011.

The paper*, entitled *Imaging the atomic structure and local chemistry of platelets in natural type Ia diamond*, is the result of collaboration between scientists at the Centre for HRTEM and scientists at the University of the Free State, Wits University, Oxford University, JEOL UK and the Max Planck Institute for Solid State Research. Defects in diamond are of interest because of their effect on the optical and electrical properties of diamond which has sought after applications in fields such as quantum computing. According to Professor Jannik Meyer** from the Physics of Nanostructured Materials Group at the University of Vienna, Austria, the paper has finally determined the structure of the platelet defect in diamond which has been "subject to a significant controversy for more than half a century". Prof. Meyer went on to say that the "work of Olivier and colleagues is a remarkable step forward for characterizing this challenging material, and it also highlights a promising avenue to study defects in diamond where the identification of the platelet structure can be seen as a starting point".



By using high resolution transmission electron microscopy and microstructure simulation techniques, Olivier and colleagues succeeded in matching the structure of the platelet defect in diamond to the zigzag structure of Barry and co-workers proposed in 1985 (see Figure below). This work has solved a 70 year old debate; and in so doing has opened new doors for "uncovering the vast zoo of defects with unknown structures"** in diamond. **Figure Caption: Qualitative comparison of high resolution images of two platelets (A and B) to simulations of selected platelet models [Olivier EJ, Neethling JH**, Kroon RE, Naidoo SR, Allen CS, Sawada H, van Aken PA and Kirkland AI *Imaging the atomic structure and local chemistry of platelets in natural type Ia diamond* Nature Materials **17**, 243–248 (2018)**].**

This step forward in the microstructural characterisation of defects is the result of advances in aberration corrected microscopy. Modern high resolution microscopes have unprecedented resolving power and allow for the direct viewing of the atomic structure of materials. Without the double aberration corrected atomic resolution microscope at the Centre for HRTEM, South African scientists would not have had the infrastructure necessary to perform such cutting-edge research.

The DST/NRF-funded Centre for HRTEM was established in 2011 with the main aim of providing the enabling equipment infrastructure and expertise for nanoscale materials research and innovation in the country. Additional financial contributions came from the Nelson Mandela University, Sasol, the Department of Higher Education and Training and GHO Ventures in the USA. The establishment of the Centre was in response to the urgent need for an advanced electron microscopy facility in South Africa, coupled with the need to develop human capacity skilled in the use and interpretation of modern TEM. Such a facility is vital to support technology development and innovation in-line with national imperatives such as minerals beneficiation, the transformation towards a knowledge-based economy, energy security and the support of long-term nanoscience research.

Since its launch in October 2011, the Centre for HRTEM has established itself as a leading international research facility, and is the leading facility for advanced microscopy on the African continent. By combining state-of-the-art facilities with extensive local and international networks with leading industrial partners and universities, the Centre for HRTEM supports research in strategic areas such as power plant materials (including steels and ceramics used in nuclear power plants, and steels used in coal-fired power plants), nanoparticle catalysts, polycrystalline diamond compacts and other ultra-hard materials used in cutting and drilling tools, and platinum and titanium alloys as part of minerals beneficiation. Current collaborators include Sasol; Eskom; Hulamin; the DST-NRF Centre of Excellence in Strong Materials at the University of the Witwatersrand; the DST-NRF Centre of Excellence in Catalysis at the University of Cape Town; the Mechanical Engineering Departments at the Nelson Mandela University, Stellenbosch and UCT; the Russian Joint Institute for Nuclear Research; Element Six in the UK and in South Africa; The Ohio State University, Idaho National Laboratory and Westinghouse in the USA; Oxford University, the University of Manchester and King's College London in the UK; the Max Planck Institute in Stuttgart, Germany; and the University of Linköping in Sweden.

For more information about the Centre for HRTEM and its services, visit chrtem.mandela.ac.za or contact Marisa Kolver on 041-504 4283.

*__Olivier EJ, Neethling JH__, Kroon RE, Naidoo SR, Allen CS, Sawada H, van Aken PA and Kirkland AI *Imaging the atomic structure and local chemistry of platelets in natural type Ia diamond* Nature Materials **17**, 243–248 (2018)

Meyer J *Diamond Platelet Structure: Resolving the controversy* Nature Materials **17, 210–211 (2018)

From the students

Successful Information Day with Assistance from Game Ranch Students

The Game Ranch Management students of Addo Campus (North Campus) was part of the organisation of a very successful Glenconnor Agricultural Association Information Day which was held on the 14th of March. The students aided with the days' preparations involving registration, catering, parking, braai and other tasks. The program for the day was focused towards the latest developments in the agricultural sector with very insightful topics. Some of the guest speakers included Theo de Jager, president of the World Farmers' Organisation, discussed reshaping agriculture in Africa explaining that Africa is the food basket of the future. Hydrologist Prof Roland Schulze highlighted the effect of climate change in future farming; Dr Leon de Bryn, a veterinary surgeon discussed new tactics in parasite control; Adv. Gerrie Nel represented Afriforum highlighted legal principles in the industry; and Neil Dodds, chairman of Eastern Cape Game Management Association (ECGMA) and Wildlife Ranching South Africa (WRSA), explained the importance of both ECGMA and WRSA. The information day was a success with approximately 300 people attending, and the Association hopes to have this event again in the future. The Nelson Mandela University students were well presented on this day and the commitment of the campus was highly appreciated by the representatives.

"We involve our students in industry events such as the Glenconnor Agri-info Day to provide them with insightful information and expose the students to major role-players in the industry which also provides for good networking opportunity." Says Retief Celliers, Head of Department for Agriculture and Game Management at Mandela University.

Achievement

PASS Excellence Award for Faculty Staff Member

Eleven university staff members received Nelson Mandela University PASS Excellence Awards for 2017.

The PASS Awards is an annual event that celebrates and recognises the achievements of the University staff. The purpose of the Engagement Awards is to recognise and reward excellence linked to academic engagement and to promote the integration of teaching and learning, research and engagement.

There are four main categories 1) Engagement through Community Interaction, Service and Outreach; 2) Engagement through Teaching and Learning; 3) Engagement through Professional /Discipline Based Service Provision; 4) Engagement through Research and Scholarship

Eric Bashman from the Department of Chemistry received an award in the category Peromnes level 13 to 17. Mr Bashman also received acknowledgment for freeing up significant laboratory space, thanks to his creative solutions and hard work.

Were you actively involved with Engagement work at Nelson Mandela University during 2017? Then you should consider applying for the university's Engagement Excellence Awards

For more information visit: http://caec.mandela.ac.za/Engagement-Information-and-Development/Engagement-Excellence-Awards

Achievement
First Advanced Diploma in Analytical Chemistry students to graduate

Three students will be the first to graduate in the Advanced Diploma in Analytical Chemistry, which was introduced last year.
The focus of this programme, which replaced the traditional BTech in Analytical Chemistry, has moved to a more advanced set of skills on certain key instrumentation commonly used in the chemistry-related industry, says programme leader Chemistry's Prof Ernst Ferg.
The qualification equips students with training in a more advanced and specialised field of analytical chemistry.
The skills training relates to equipping the potential analyst with the ability to plan, organise and execute complex analyses on specialised laboratory equipment, followed by the ability to deal with resultant data and the conversion and interpretation of the data to applied knowledge.
Students are exposed to the use of analytical chemistry in the context of inorganic, materials, polymers, organic compounds and its use in industrial control systems. They are also equipped to undertake first-line maintenance and fault finding on analytical equipment.
The new programme forms part of the Department of Higher Education's initiative in restructuring the university's programmes.
"The aim is for these graduates to be more employable in modern analytical laboratories within production and process chemical industries such as the petrochemical, mining, pharmaceutical, rubber/polymers, and cement, catalysis, and government departments," says Prof Ferg.
Other fields include forensics and water chemistry and universities and science council's technical departments. Graduates can further develop their skills by becoming specialists in certain techniques and work within the large industrial sector of analytical instrument suppliers or agencies.
He said students with the qualification could also opt to study further in the field of analytical chemistry by doing a related honours course and follow the natural progression to higher postgraduate qualifications.

Achievement
Honour for Chair

Professor Paul Watts' Chair in Micro/fluidic Bio/Chemical Processing was recently upgraded from Tier 2 to Tier 1.
Research Chairs are established at Tier 1 or Tier 2 level based on the candidate's research record of accomplishment and standing and postgraduate student and postdoctoral fellow training track record. Tier 1 Chairs are for established researchers recognised internationally as a leader in their field and/or who have received international recognition for their research contributions. Prof Watts holds a B1 NRF rating.

Prof Watts' research further develops the continuous flow methodology to investigate how small production platforms can enhance chemical and pharmaceutical manufacture within the South African economy. The integration of synthesis and purification within continuous flow systems is also investigated.

Directors of School

DoS: Biomolecular and Chemical Sciences
Prof G. Dealtry

DoS: Computer Science, Mathematics, Physics and Statistics
Prof J. Wesson

DoS: Environmental Sciences
Dr. D. du Preez

DoS: Natural Resource Management
Dr. A. Schmidt

Heads of Department

HoD: Biochemistry and Microbiology
Dr. H. Davids

HoD: Chemistry
Prof Z. Tshentu

HoD: Computing Sciences
Dr. B. Scholtz

HoD: Mathematics and Applied Mathematics
Prof J. Maritz

HoD: Physics
Prof A. Venter

HoD: Statistics
Dr. W. Brettenny

HoD: Agriculture and Game Management
Mr. R Celliers

HoD: Botany
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HoD: Geosciences
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