Shaft simulation:

As part of the School’s concerted effort to bring a realist mining environment to life in its Chamber of Mines building, aspects of mine shaft infrastructure have been constructed in one of the stairwells.
In one of our many collaborations with the mining industry, Wits School of Mining Engineering students visited Petra Diamonds’ Cullinan mine near Pretoria in 2018, where they experienced real mining operations.
The Wits School of Mining Engineering is recognised as one of the world’s top ranked mining engineering schools, with among the most expansive academic programmes. It is in 13th place in the Quacquarelli Symonds (QS) Ltd World University Rankings, up from 15th position in 2018 and 22nd in 2017. This ranking makes it the top mining school in Africa and the only African mining school to feature in the global Top 50. It is also the largest mining engineering school in the English-speaking world, and has a stable student and staff population.

The challenges facing mining today are substantial. However, best-practice innovations and technology offer the opportunity for the design and management of high-tech mines that are not only safer but also more productive, environmentally and socially responsible, and economically successful. The School’s curriculum and research programme continue to contribute significantly in addressing these challenges.

The School’s Strategic Plan ensures that the Wits Mining Team can deliver excellence in teaching, research and service – in line with the overarching Wits Vision 2022 of becoming “a leading research-intensive university firmly embedded in the top 100 world universities by 2022”.

As mining requires the skills and technology of several branches of engineering, most of the curriculum for years one and two is common to all branches of engineering. The third and fourth years focus on mining engineering and include mining-specific subjects such as: evaluation of mineral resources and reserves; rock engineering; mine equipment and transportation; mine ventilation, health and safety; environmental engineering; mine financial valuation; and mine design and planning. The School’s undergraduate programme is designed to provide graduates with the engineering knowledge they require as mining engineers.

In conjunction with the South African mining industry, the School has a well-developed programme of postgraduate courses designed to cater for the needs of graduates. These include technical subjects for specialist skills in mining, mineral resource management and evaluation, and rock engineering, as well as mine planning and fundamental principles in mineral economics.

Wits Mining graduates are ready for the challenges of the industry and the School of Mining Engineering at the University of the Witwatersrand is known and respected internationally for the quality of its programmes and graduates.
The Wits School of Mining Engineering

Historically, the School of Mining Engineering occupies a central role in the formation of the University of the Witwatersrand, being the original educational entity around which the university was later established.

The South African School of Mines, formed in 1896 in Kimberley, was transferred to Johannesburg in 1904 and was later renamed the South African School of Mines and Technology. It was from this School – which became the University College Johannesburg in 1920 – that the University of the Witwatersrand emerged on 1 March 1922, as the college was granted full university status.
Since 2015 – when I assumed the role of Head of School – every year has been marked by several positive developments. On behalf of the Wits Mining Team, it is my honour and privilege to share developments for the 2018 academic year.

I am pleased to report that, despite intermittent challenges, the School continues to grow from strength to strength. Its national and international reputation keeps growing. In 2019, the UK-based Quacquarelli Symonds (QS) Ltd World University Rankings placed the School, by subject area, at No. 13 globally among the top mining engineering schools. This was up from No. 15 in 2018 worldwide - still retaining our position as the No. 1 mining school on the African continent. We are also the only mining school in Africa to feature in the Top 50 mining schools worldwide, and the highest-ranked school among the 35 schools at Wits in both 2018 and 2019. The QS World University Rankings system is a relative ranking system that uses a combination of metrics including academic reputation, employer reputation, student:staff ratios, proportion of international staff and students, and citation rate of research outputs. This high ranking speaks to the quality of our graduates, staff, curriculum and research.

Our five-point Strategic Plan adopted in 2015 – and discussed in more detail in this report – is a key contributor to our top performance. The plan’s five Strategic Initiatives are aligned to the university’s Wits Vision 2022 of being “a leading research-intensive university firmly embedded in the Top 100 world universities by 2022”. This plan has served us well since 2015 and will be reviewed in 2019. It is with great pleasure that I am able share the following highlights in 2018, which are underpinned by our strategy:

- The School ratcheted up two notches to 13th place in 2019 on the QS World University Rankings by subject area, maintaining its upward trajectory from 100 in 2016, 22 in 2017, and 15 in 2018.

- The School’s re-designed undergraduate curriculum – which is ‘Mining 4.0’ aligned – was approved by the university for gradual roll-out from 2019. The curriculum was well-received at the two international Society of Mining Professors (SOMP) conferences held in South Africa and China in March and July respectively.

invited the School to share its experience as UBC embarks on introducing a re-designed modern undergraduate curriculum.

- Despite research output cyclicity with the School’s research publication units declining to 24.69 in 2018, it still retained its position among the top three of the seven schools within the Faculty in terms of research output.

- The university awarded two doctorates and 44 Masters degrees in the School in 2018, keeping a positive trend in growth in postgraduate qualifications emanating from the School.

- One of our final year undergraduate students was selected in 2018 to start in 2019 on Anglo American’s prestigious Building Leaders and Shaping Talent (BLAST) programme, which identifies top flyers in their respective fields to spend their first three years after graduating in training on more than one continent.

- The total student population remained fairly stable at about 850 in total – with about 250 postgraduates and 600 undergraduates. The staffing levels also remained fairly constant from 2017 to 2018. Full-time permanent academic staff positions stand at 25, while there are 12 full-time permanent technical and administrative staff positions. The student:staff ratio was about 1:35, reflecting our status as a stable school.

With a stable school such as ours, complemented by its upward trajectory in performance, I am confident that we will remain a top mining engineering school among our peers worldwide. However, it is also my humble opinion that the School has been able to achieve its high levels of stability and performance due to the collective backing that it continues to receive from its Deanery, Vice-Chancellor’s office and the very supportive South African mining industry.
Richard (Dick) Minnitt

After completing his schooling at Krugersdorp High School in 1966, followed by a year of military service at the Voortrekkerhoogte air base in Vaalhalla, Professor Richard (Dick) Minnitt began his career in the earth sciences as a field assistant with Anglo American Prospecting Services in Polokwane (then Pietersburg). He was allocated to geologist John Lawrence, who went on to become CEO of Phelps Dodge in the United States.

Dick’s call to travel meant he had to have a bread-ticket, so he enrolled for a BSc degree in geology and chemistry at the University of the Witwatersrand in 1969. He then chose geology as an Honours course, and was particularly inspired by the lectures from Professor Des Pretorius and Professor Carl Anhaeusser from the Economic Geology Research Unit. These focused on rock structure and rock types in the Barberton Mountain Land. He began an MSc degree under Professor Anhaeusser in 1972, graduating in 1975 with a thesis on “The Geology of the Eastern Part of the Murchison Range between the Quagga Camp Area and the Kruger National Park”. This earned him the Constorphine Medal from the Geological Society of Southern Africa. He then went on to complete a PhD with Professor Pretorius as supervisor – on “The Geological Setting of Porphyry-type Copper Mineralization in the Haib River Area, South West Africa” – in 1979.

Dick joined Anglo American’s Western Deep Levels Gold Mine as a shaft geologist on 3 Shaft (now Tau Tona), before joining Spectral Africa – a remote-sensing subsidiary of JCI. In 1980, Dick started his own consulting company Geotechnics (later GEOBASE) where he worked for the next fourteen years.

Dick’s travels took him to Namibia, Mozambique, Botswana, Zimbabwe and Bolivia. When Dick’s sons reached their teenage years, he looked for more fixed employment with less travel. He began contract teaching postgraduate courses in the School of Mining Engineering, and became a senior lecturer in 1995.

He initially coordinated and presented postgraduate courses in the Graduate Diploma of Engineering (GDE), which became a watermark qualification for those advancing in the mining industry. These courses included Mineral Economics, Minerals Marketing, Mineral Policy and Investment, Beneficiation Economics and Environmental Economics.

As the years passed, the mining industry demanded more postgraduate courses in a wide range of additional subjects. Courses were introduced such as the Theory and Practice of Particulate Sampling, Analytical Techniques and Quality Assurance, Non-Linear Geostatistics, Theoretical and Practical Conditional Simulation, Real Options in Mining Applications, Option Pricing in Mining, Advanced Mine Valuation, Compliance and Reporting in the Minerals Industry and Strategic Planning in Mining.

Involvement in professional associations and societies has been an important part of Dick’s career. He has been registered as an earth scientist with the South African Council for Natural Scientific Professions (SACNASP) since 1982, and is a fellow of the Southern African Institute of Mining and Metallurgy (SAIMM). He is also a fellow of the Geological Society of South Africa (GSSA), and a life member and past-president of the Geostatistical Association of South Africa (GASA). He has been involved in organising committees for numerous conferences.

In 2000, Dick was promoted to Associate Professor in the School, and in 2001 was appointed as the JCI Professor of Mineral Resources and Reserves, a position he held until the end of 2017 when he retired. During his term as JCI Professor, Dick enjoyed two sessions of sabbatical leave, which were important in the development and production of research outputs. Although postgraduate teaching occupied much of Dick’s time, he also taught at undergraduate level, including Technical Valuation for third year students, and Open-pit Mining for fourth year students. He also coordinated the fourth year Final Mine Design project, and undergraduate mining tours for fourth years.

As his involvement with the sampling fraternity developed, Dick’s research interests moved towards the technical disciplines of particulate sampling and geostatistics. This highlighted the benefits of being in the School of Mining Engineering and the academic environment, as staff could gravitate towards and develop their own areas of interest and expertise.

While at the School, Dick was rated as a C3 researcher by the National Research Foundation (NRF), and saw twelve PhD students and numerous MSc students graduate under his supervision. He has published over 70 articles in peer-reviewed journals and on three occasions (2008, 2014 and 2017) has been the recipient of the SAIMM Silver Medal for articles published in their journal. In 2017, he was awarded the Pierre Gy Sampling Gold Medal for excellence in teaching and application of the theory of sampling; the award was from the World Conference in Sampling and Blending, sponsored by the Australasian Institute of Mining and Metallurgy (AusIMM) and Australia’s Commonwealth Scientific and Research Organisation (CSIRO).

Dick acted as reviewer of mineral economics related articles for the international journal Resource Policy, and has on numerous occasions acted as a reviewer for articles in the areas of mining, minerals, metals and materials.

Dick retired to KwaZulu-Natal in 2017 and holds the position of Professor Emeritus in the School of Mining Engineering. He continues to teach courses to postgraduate students in the MSc programme in the School.
Prominent Wits University alumni in the mining industry

Patrice Motsepe  
Founder and Executive Chairman: African Rainbow Minerals & Non-Executive Chairman: Harmony Gold

Tony Trahar  
Former Chairman: Anglo American plc

Nick Holland  
CEO: Gold Fields

Neal Froneman  
CEO: Sibanye Resources

Ivan Glasenberg  
CEO: Glencore International

Dr Richard Stewart  
Executive VP Business Development: Sibanye Resources

Lazarus Zim  
Founder: Afripalm Resources & former CEO: Anglo American Corporation of South Africa

Prominent Wits Mining alumni in the mining industry

Dr Gys Landman  
CEO: Detnet

Mike O'Hare  
COO: AngloGold Ashanti South Africa Operations

Phillip Tobias  
COO: Harmony Gold

Dennis Tucker  
Founder & Owner: Qinisele Resources

Thando Mkatshana  
CEO Platinum Division: African Rainbow Minerals (ARM)

Peter Freyberg  
CEO: Glencore Coal Global Division

Mzila Mthenjane  
Executive Head - Stakeholder Engagement: Exxaro

Gopolang Makwokwe  
VP: Ivanhoe Mines

Mrs Thabile Makgala  
Executive – Mining: Impala Platinum

James Morotoba  
VP Mining: Foskor Limited

Professor Gordon Smith  
Executive Head - Technical & SHE: Anglo American Platinum

Harold Motaung  
CEO: Atlatsa Resources

John Wallington  
Executive VP: Sibanye Resources (Coal & Energy), former CEO: Coal of Africa & former CEO: Anglo American Coal

Velile Nhlapo  
CEO: Alexander Forbes Resources

Bheki Khumalo  
CEO: Silica Quartz

Percy Ntuthuko Khoza  
MD: Zikhona Investments

Thabo Dube  
CEO: Mine Health and Safety Council (MHSC)

William Joughin  
Chairman: SRK Consulting & Vice-President (Africa): International Society for Rock Mechanics (ISRM)

David Msiza  
Chief Inspector of Mines: Department of Mineral Resources (DMR)

Reginald Demana  
CEO: Wescoal

Wayne Robinson  
Executive VP: Sibanye-Stillwater, SA Operations

Jacob Mothomogolo  
Projects Executive: Wesizwe

Robert van Niekerk  
Executive VP: Sibanye-Stillwater, SA Region

Lemogang Pitsoe  
CEO: Alexkor

Robin Barry  
CEO: Sentula Mining

Dalikhaya Rain Zihlangu  
CEO: Eyabantu Capital Consortium & Independent Non-Executive Director: Exxaro

Howard Marsden  
Mining Executive: Petra Diamonds

*Please advise us of our other prominent alumni in the mining industry who you are aware of and may have been missed from the list.
The School uses the framework tabulated below for tracking and reporting on progress on each of the School’s five Strategic Initiatives. This framework assists the School in prioritising its actions going forward. More details on progress in each of the Strategic Initiative are found later in this report.

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>😞</td>
<td>Some progress made, but not satisfactory</td>
</tr>
<tr>
<td>😊</td>
<td>Progress is satisfactory and there is room for improvement</td>
</tr>
<tr>
<td>😊😊😊</td>
<td>Progress is more than expected</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Strategic Initiative</th>
<th>Rating</th>
<th>2017/2018 progress</th>
<th>Actions Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>01 Increase normalised research output</td>
<td>😊😊😊</td>
<td>Normalised research publication units declined compared to 2017, although the School remained in the top three schools out of seven schools in the Faculty for research output. A total of two PhD and 44 MSc research degrees were awarded. The proportion of academic staff with PhDs remained at about 20% compared to the university’s target of about 75% by 2022.</td>
<td>Workload reviewed for staff planning to submit PhD theses for examination by end of 2019. Staff encouraged to continue publishing, especially with their postgraduate students. RINC pool funding availed for staff to present subsidy-earning papers at conferences.</td>
</tr>
<tr>
<td>02 Improve teaching and learning effectiveness</td>
<td>😊😊😊</td>
<td>In 2018, the METF sponsored equipment purchases to improve on the teaching and learning environment in the School. One final year undergraduate student was selected in 2018 to start on the prestigious Anglo American Building Leaders and Shaping Talent (BLAST) programme in 2019. Re-designed curriculum – which is ‘Mining 4.0’ aligned – was approved by the university for implementation from 2019.</td>
<td>Measures developed to manage the transition period for gradually phasing out the existing curriculum and introducing the re-designed curriculum.</td>
</tr>
<tr>
<td>03 Enhance the academic project support system</td>
<td>😞</td>
<td>The student mentoring system was continued.</td>
<td>Continue workshops on how the School functions, especially to benefit new staff members.</td>
</tr>
<tr>
<td>04 Increase the visibility of the School and its staff</td>
<td>😊</td>
<td>School ranking improved to 13th out of all mining engineering schools worldwide, according to the Quacquarelli Symonds (QS) Ltd World University Rankings by subject area. This was up from 15th in 2017. It maintained its position as the No.1 mining engineering school in Africa. Three of the School’s four NRF-rated academics maintained their ratings in 2018; one did not re-apply due to retirement.</td>
<td>Eligible staff members encouraged to apply for rating by the National Research Foundation (NRF) of South Africa.</td>
</tr>
<tr>
<td>05 Review and establish internal and external collaborations</td>
<td>😊😊😊</td>
<td>The School maintained its existing partnerships, including the successful on-going execution of the research partnership between Wits and Gold Fields.</td>
<td>Maintain and continue seeking “win-win” partnerships.</td>
</tr>
</tbody>
</table>
One of the key criteria considered in top global university rankings is research output, including its attendant quality. Therefore, the university’s Vision 2022 is for Wits to be a “leading research-intensive university firmly embedded in the Top 100 world universities by 2022”. The School’s Strategic Initiative No. 1 is aligned to this overarching vision. The School contributes to this vision by actively working on improving its research output and proxies for quality, such as research output units, number of National Research Foundation (NRF) rated academic staff, and academic staff with PhDs.

The key research outputs are MSc and PhD research degrees awarded by the university and peer-reviewed, subsidy-earning publications accredited by the Department of Higher Education and Training (DoHET). An acceptable standard of measure for parity across years and schools in the university is the total publication units per senior lecturer research equivalent (SLRE) to account for different levels of appointment. As senior academics are expected to be more research-active, the SLRE is estimated from relative factors applicable to each staff category as follows:
- Full Professor = 1.3
- Associate Professor (or Adjunct Professor) = 1.1
- Senior Lecturer = 1.0
- Lecturer (or Senior Tutor) = 0.8
- Associate Lecturer (or Tutor) = 0.6

In 2018, the School had in post two Full Professors, three Associate Professors, six Senior Lecturers, eight Lecturers and five Associate Lecturers for a total SLRE of 21.30. Table 1 illustrates the School’s steady progress in achieving the university’s target of 2.0 publication units per SLRE. The reported MSc and PhD graduate numbers comprise students graduating in the July and December graduations for each calendar year and the April graduation of the consecutive calendar year, while the credited publications are for papers published between January and December of a calendar year.

### Table 1: Research Output

<table>
<thead>
<tr>
<th>Year</th>
<th>SLRE</th>
<th>MSc</th>
<th>PhD</th>
<th>Total Publication Units Credited</th>
<th>Total Publication Units per SLRE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>18.71</td>
<td>16</td>
<td>2</td>
<td>1.71</td>
<td>0.09</td>
</tr>
<tr>
<td>2011</td>
<td>20.49</td>
<td>6</td>
<td>3</td>
<td>12.25</td>
<td>0.60</td>
</tr>
<tr>
<td>2012</td>
<td>22.72</td>
<td>16</td>
<td>3</td>
<td>5.50</td>
<td>0.24</td>
</tr>
<tr>
<td>2013</td>
<td>22.46</td>
<td>11</td>
<td>2</td>
<td>14.29</td>
<td>0.64</td>
</tr>
<tr>
<td>2014</td>
<td>25.94</td>
<td>14</td>
<td>2</td>
<td>12.39</td>
<td>0.48</td>
</tr>
<tr>
<td>2015</td>
<td>26.99</td>
<td>13</td>
<td>7</td>
<td>22.89</td>
<td>0.85</td>
</tr>
<tr>
<td>2016</td>
<td>26.99</td>
<td>10</td>
<td>5</td>
<td>40.15</td>
<td>1.49</td>
</tr>
<tr>
<td>2017</td>
<td>22.00</td>
<td>35</td>
<td>3</td>
<td>36.50</td>
<td>1.66</td>
</tr>
<tr>
<td>2018*</td>
<td>21.30</td>
<td>44</td>
<td>2</td>
<td>24.69</td>
<td>1.16</td>
</tr>
</tbody>
</table>

*The total publication units for 2018 are provisional estimates
There is a generally increasing trend in normalised publications units between 2010 and 2018. This trend is indicative of the School’s academic staff becoming more research-active. As more academic staff are pursuing their PhDs — with some of them planning to submit their PhD theses for examination towards the end of 2019 — this trend is expected to continue. In 2018, the School retained its recently acquired position of being among the top three schools for research output, out of the Faculty’s seven schools. Here are the 2018 research highlights, which show that the School is on an upward research output trajectory:

1. The School was awarded the high-impact Resources Policy journal June 2018, Vol. 56, as a Special Edition in honour of Professor Emeritus Richard (Dick) Minnitt.

2. A total of two PhDs were awarded in 2018, thus maintaining the historical trend of the School awarding about two PhDs each year.

3. Three of School’s four NRF-rated academics maintained their ratings: Professor Emeritus Dick Stacey, Professor Fred Cawood and Professor Cuthbert Musingwini. Professor Emeritus Dick Minnitt did not renew his rating on his retirement. Despite this change, the School remains the mining engineering school with the highest number of NRF-rated academic staff in South Africa.

4. The proportion of academic staff with PhDs remained at about 20% - compared to the university’s target of 75% of staff with PhDs by 2022.
Strategic Initiative 2 guides the School in ensuring that the teaching and learning system is as effective as possible within existing constraints. Several proxies are used to measure the effectiveness of the School’s teaching and learning system. These include regular, independent evaluations such as the Quinquennial Review (QQR) and accreditation by the Engineering Council of South Africa (ECSA). Both independent evaluations have to date positively endorsed the School’s teaching and learning system.

The School also continually reviews its enrolment numbers to ensure that the student population remains fairly stable and matches the teaching and learning resources. The student:staff ratio is a proxy measure to ensure that the teaching and learning process can be effective. Students are also encouraged to learn competitively and contribute positively in the proper functioning of the School by rewarding outstanding achievement. Table 2 shows the 13 prizes that were awarded to our students in 2018 for outstanding achievement and positive contribution to the proper functioning of the teaching and learning system. The School invites mining companies and organisations not listed in Table 2 to consider contributing prizes which will help ensure that our teaching and learning system continues to produce competitive graduates.

Table 2: Mining Engineering Prizes

<table>
<thead>
<tr>
<th>Prize</th>
<th>Criteria</th>
<th>2018 Recipient</th>
</tr>
</thead>
<tbody>
<tr>
<td>AEL Mining Services Prize</td>
<td>The student with the highest mark in the second year Excavation Engineering course</td>
<td>Keba Moalusi</td>
</tr>
<tr>
<td>Danie Krige Prize in Mine Evaluation</td>
<td>The student with the highest average mark in the Technical Valuation and Financial Valuation courses</td>
<td>Segogogoele Mapheto</td>
</tr>
<tr>
<td>Herbert Simon Memorial Prize</td>
<td>The student with the highest aggregate mark in final year examinations</td>
<td>Segogogoele Mapheto</td>
</tr>
<tr>
<td>Institute of Mine Surveyors of South Africa Prize</td>
<td>The best student in Mine Surveying</td>
<td>Mabilanyana Mandlazi</td>
</tr>
<tr>
<td>Mine Managers Prize</td>
<td>The Mining Engineering student with the best second year results</td>
<td>Sifiso Bina</td>
</tr>
<tr>
<td>Mine Ventilation Prize</td>
<td>The best final year student in Mine Ventilation</td>
<td>Loeto Sekwati</td>
</tr>
<tr>
<td>Professor S Budavari Memorial Prize</td>
<td>The student in the third or fourth year of study, whose academic achievement, contributions to the student affairs, and interactions with the School are of a high order</td>
<td>Khanyisile Kunene</td>
</tr>
<tr>
<td>SA Institute of Mining and Metallurgy Prestige Prize (Mining)</td>
<td>The student with the highest aggregate mark in the subject Rock Mechanics</td>
<td>Trinity Sokane</td>
</tr>
<tr>
<td>South African Colliery Managers’ Association</td>
<td>The student with the best aggregate mark for third and fourth year Rock Mechanics courses</td>
<td>Nosipho Mageza</td>
</tr>
<tr>
<td>South African National Institute of Rock Engineering</td>
<td>The final year student obtaining the highest marks in mining engineering subjects</td>
<td>Nosipho Mageza</td>
</tr>
<tr>
<td>Witwatersrand University Mining Engineers’ Association Prize</td>
<td>For the fourth year student with the highest aggregate mark for all the Mining Method subjects (Mining A,B,C,D,E) and Mine Design Project</td>
<td>Nosipho Mageza</td>
</tr>
<tr>
<td>Worley Parsons Prize for Mining Engineering</td>
<td>For the third year student with the highest mark in the subject Health, Safety and the Mining Environment</td>
<td>Ida Motshegoa</td>
</tr>
</tbody>
</table>
Tables 3 and 4 show the staff and student populations for the period 2010-2019. The table indicates fairly stable staff and staff populations, with a student:staff ratio of about 35:1 for 2018.

### Table 3: Wits Mining student head count

<table>
<thead>
<tr>
<th>Year</th>
<th>1st</th>
<th>2nd</th>
<th>3rd</th>
<th>4th</th>
<th>Graduates</th>
<th>Total Undergrads</th>
<th>GDE</th>
<th>MEng</th>
<th>MSc</th>
<th>PhD</th>
<th>Total Postgrads</th>
<th>Total UG &amp; PG</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>228</td>
<td>85</td>
<td>79</td>
<td>79</td>
<td>468</td>
<td>196</td>
<td>68</td>
<td>62</td>
<td>16</td>
<td></td>
<td>340</td>
<td>808</td>
</tr>
<tr>
<td>2011</td>
<td>233</td>
<td>96</td>
<td>62</td>
<td>62</td>
<td>473</td>
<td>137</td>
<td>32</td>
<td>34</td>
<td>19</td>
<td></td>
<td>222</td>
<td>695</td>
</tr>
<tr>
<td>2012</td>
<td>234</td>
<td>143</td>
<td>60</td>
<td>70</td>
<td>631</td>
<td>102</td>
<td>15</td>
<td>42</td>
<td>14</td>
<td></td>
<td>173</td>
<td>704</td>
</tr>
<tr>
<td>2013</td>
<td>302</td>
<td>124</td>
<td>66</td>
<td>53</td>
<td>634</td>
<td>90</td>
<td>15</td>
<td>70</td>
<td>16</td>
<td></td>
<td>191</td>
<td>825</td>
</tr>
<tr>
<td>2014</td>
<td>212</td>
<td>139</td>
<td>86</td>
<td>72</td>
<td>587</td>
<td>38</td>
<td>3</td>
<td>112</td>
<td>22</td>
<td></td>
<td>175</td>
<td>762</td>
</tr>
<tr>
<td>2015</td>
<td>231</td>
<td>144</td>
<td>106</td>
<td>83</td>
<td>643</td>
<td>3</td>
<td>2</td>
<td>176</td>
<td>20</td>
<td></td>
<td>201</td>
<td>844</td>
</tr>
<tr>
<td>2016</td>
<td>260</td>
<td>116</td>
<td>118</td>
<td>99</td>
<td>663</td>
<td>3</td>
<td>1</td>
<td>138</td>
<td>20</td>
<td></td>
<td>162</td>
<td>825</td>
</tr>
<tr>
<td>2017</td>
<td>260</td>
<td>126</td>
<td>112</td>
<td>93</td>
<td>632</td>
<td>0</td>
<td>0</td>
<td>198</td>
<td>20</td>
<td></td>
<td>219</td>
<td>851</td>
</tr>
<tr>
<td>2018</td>
<td>213</td>
<td>156</td>
<td>142</td>
<td>108</td>
<td>621</td>
<td>0</td>
<td>0</td>
<td>194</td>
<td>19</td>
<td></td>
<td>213</td>
<td>834</td>
</tr>
</tbody>
</table>

*As at the start of 2019, excluding part-time, honorary and visiting academic staff.

### Table 4: Student to academic staff ratios

<table>
<thead>
<tr>
<th>Year</th>
<th>Full-time academic staff</th>
<th>Total students</th>
<th>Student-to-staff ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>19</td>
<td>806</td>
<td>42</td>
</tr>
<tr>
<td>2011</td>
<td>21</td>
<td>656</td>
<td>33</td>
</tr>
<tr>
<td>2012</td>
<td>20</td>
<td>704</td>
<td>35</td>
</tr>
<tr>
<td>2013</td>
<td>22</td>
<td>825</td>
<td>37</td>
</tr>
<tr>
<td>2014</td>
<td>24</td>
<td>762</td>
<td>32</td>
</tr>
<tr>
<td>2015</td>
<td>25</td>
<td>844</td>
<td>33</td>
</tr>
<tr>
<td>2016</td>
<td>24</td>
<td>825</td>
<td>34</td>
</tr>
<tr>
<td>2017</td>
<td>24</td>
<td>851</td>
<td>35</td>
</tr>
<tr>
<td>2018</td>
<td>24</td>
<td>834</td>
<td>35</td>
</tr>
<tr>
<td>2019*</td>
<td>23</td>
<td>738</td>
<td>32</td>
</tr>
</tbody>
</table>

Some of the highlights in Teaching and Learning activities for 2018 were:

1. A re-designed undergraduate curriculum, which is ‘Mining 4.0’-aligned, was approved by the university, for gradual roll-out from 2019. The curriculum was well-received at two international Society of Mining Professors (SOMP) conferences held in South Africa and China, in March and July 2018 respectively. The University of British Columbia (UBC) in Canada has now invited the School for a possible collaboration on their introduction of a re-designed, modern undergraduate curriculum.

2. One of our final year students, Kamogelo Moteme, was selected in 2018 to start in 2019 on the prestigious Anglo American Building Leaders and Shaping Talent (BLAST) programme, which selects high flyers in their respective fields to spend their first three years after graduating on training on more than one continent.

3. The School maintained a stable student population and staff complement to maintain a student:staff ratio of about 35:1.

4. The METF sponsored the purchase of equipment to the tune of R1,58 million. This included digital notice boards for students, survey equipment and 3D printers. These are being procured in 2019.

5. Sibanye-Stillwater sponsored the re-equipping of the 24/7 walk-in Computer Laboratory for final year undergraduate students.

*As at the start of 2019, excluding part-time, honorary and visiting academic staff.
Strategic Initiative 3 is aimed at ensuring that the School’s academic project enables students to succeed in their studies. This is achieved through a number of activities such as running Policies and Procedures Workshops every second year to assist new staff and refresh existing staff on university expectations in the proper functioning of the School. For students, activities include the Student Mentoring System for second year students and remedial Weekend Tutorials for first year students. In addition, the School ensures that academic and technical/administrative staff who leave the School are timeously replaced.

The highlights in 2018 related to Strategic Initiative 3 were:

1. Our alumni body, the Witwatersrand University Mining Engineers Association (WUMEA), the Southern African Institute of Mining and Metallurgy (SAIMM) Scholarship Trust Fund and Sibanye-Stillwater continued their financial support for needy but academically deserving students in the School.

2. Three groups of final year students were hosted by various mines for the mandatory fourth year mine technical visits held during the first semester break.

3. Sibanye-Stillwater hosted three groups of the School’s second year students for the week-long Workshop Practice, which is required as part of the academic curriculum.
The success of the School also depends on the active contributions of staff beyond the university borders as this assists the School in growing much-needed networks in the mining industry that are critical for its success. The School’s staff are encouraged to visibly participate in the activities of relevant professional bodies, including some of the key committees for these bodies.

The highlights in 2018 under Strategic Initiative 4 were:

1. Five staff members maintained their professional engineer (Pr.Eng.) registration with ECSA: Professor Emeritus Dick Stacey, Professor Cuthbert Musingwini, Professor Bekir Genc, Mr Kelello Chabedi and Mr Paseka Leeuw.

2. Four other staff members maintained their registrations with their respective professional bodies: Mr Clinton Birch and Mrs Duduzile Modiba as professional natural scientists (Pr.Sci.Nat) with the South African Council for Natural Scientific Professions (SACNASP); Professor Frederick Cawood and Mr Huw Thomas as professional surveyors with the South African Geomatics Council (SAGC) – previously known as the South African Council for Professional and Technical Surveyors (PLATO).

3. Professor Cuthbert Musingwini served ex-officio as a past-president on the council of the Southern African Institute of Mining and Metallurgy (SAIMM) for the 2018/2019 financial year.

4. Professor Musingwini was invited to deliver a keynote address at the Society of Mining Professors (SOMP) 6th Regional Conference 2018, hosted by the SAIMM from 12-13 March 2018 in Johannesburg, South Africa.

5. Professor Musingwini was also invited to deliver a keynote address at the 27th International Symposium on Mine Planning and Equipment Selection (MPES 2018) held from 20-22 November 2018 in Santiago, Chile.

6. The School hosted a meeting of the council of the Association of Mine Managers of South Africa (AMMSA) on 16 November 2018.
The School is always exploring mutually beneficial, collaborative partnerships with other schools within Wits University and in South Africa, as well as with the South African mining industry and other institutions internationally. These partnerships enhance the School’s position as a leading school in mining engineering education and research, both locally and globally. Locally, the School participates in the Mining Engineering Education South Africa (MEESA) initiative – where the four Heads of mining schools in South Africa meet quarterly to share common challenges and establish common solutions to addressing these challenges. Internationally, the School maintains a presence in the Society of Mining Professors (SOMP), which meets annually to keep abreast of international developments in mining engineering education and research. The School’s partners are listed later in this report.

The highlights of the collaborative activities for 2018 were the successful implementation of the Memorandum of Understanding (MoA) between Wits and Gold Fields (for its first year), and the approval of four MSc research projects by the Steering Committee.
How your organisation can partner with the School

In order to ensure that the School can continue to deliver quality mining engineering education and research, we invite your organisation or company to consider:

- Partnering with the School to provide much-needed Vacation Work especially, to our third and fourth year students to ensure that they can meet all the requirements for graduation;
- Awarding bursaries and/or prizes to the best-performing students;
- Availing financial support for needy but deserving students;
- Engaging our staff and postgraduate MSc/PhD students to help solve some of your research problems to improve the operation of your mines.

You can contact any of the following for further information:

Head of School
Professor Cuthbert Musingwini
Tel: +27 11 717 7412
Email: Cuthbert.Musingwini@wits.ac.za

School Administration Manager
Mrs Zeenath Adam
Tel: +27 11 717 7409
Email: Zeenath.Adam@wits.ac.za

Chairman of Public Relations Committee
Mr Kelello Chabedi
Tel: +27 11 717 7406
Email: Kelello.Chabedi@wits.ac.za
From left to right:

First Row:  Mamokete Madonsela, Bekir Genc, Bryan Watson, Cuthbert Musingwini, Antonio Nieto, Rudra Mitra, Matsobane Nong
Second Row: Tinashe Tholana, Jacob Mabeba, Sihe Nhleko, Lindy Dabrowski, Daisy Matlou, Phila Gamedza, Paskalia Neingo, Zeenath Adam
Third Row:  Isaac Mabala, Badisheng Morena, Andrew Morgan, Siyabonga Mabatha, Andrew Carpede, Joseph Negondeni
Fourth Row: Kelello Chabedi, Huw Thomas, Clinton Birch, Motsho Mochubele.
Absent: Carl Beaumant, Pontsho Ledwaba, Paseka Leeuw, Dudu Modiba, Zweli Thebebe, Erhan Uludag, Sonja Douman, Paulos Sibeko
From left to right:

First Row: Cuthbert Musingwini, John Cruise, Anne Fitchett, Ranganai Chinamatira

Second Row: Thibedi Ramontja, Gys Landman, Kelello Chabedi

Absent: Gordon Smith, Tim Rowland, Fred Cawood, Mzila Mthenjane,Themba Masondo, Chris Sheppard, Billy Mawasha, Vusi Maseko, Pierre Olivier, Hawk Rakale, Jim Porter, Corne Strydom
First Row: B I Morena, M I Marala, D G Magazi, P F Ledwaba, C R Beaumont, H G Thomas, Prof R Mitra, Prof C Musingwini (Head of School), Prof B Genc, M J Nong, P J K Leeuw, M N M Cudjoe, E Uludag, C C Birch, T Zwarivadza, Z Thebethe, A S Nhleko


Fourth Row: K E Malope, R R Malla, L Tsoaake, N L Hosana, T A Mashau, A A Mqoqi, K M Phamotsu, D Makhoba, N M M Mamabolo, K X Shiviti, A Randima, P L Ubisi, M N Ngiba, R Makondelela, T M Mokhine


Seventh Row: M K Mtthimunye, B S Vaughan, L S Mdala, O M Luvhengo, A T Khoza, I N M Nday, R Mashua, T B Chivra, E Ravhutsi, M Rachidi, K N Nkadimang, M C Mmako
External Examiners

A
Afeni, B  Agiouiantis, Z  Andersen, D

B
Baartjes, N  Bals, A  Barakos, G  Bartlett, H  Bennett, C  Biffi, M  Bisnath, A

C
Campbell, GA  Canbulat, I  Chamberlain, V  Chirimumimba, HP  Cohen, A  Cruise, J

D
De Jager, K  Deutsch, C  Docrat, Y

E
Esterhuizen, G

F
Fleming, DR  Foster, P

G
Gardner, L  Goode, R  Grobler, H

H
Hebblewhite, BK  Herselman, S  Hull, D

J
Jarosz, A  Johnson, RA  Jooste, R  Jooste, M  Joughin, W

K
Karmis, M  Kasatuka, C  Katakwa, PT  Khumalo, B

L
Lilford, EV  Lydall, M

M
Mahase, MJ  Mahomed, F  Mandava, SM  Maponga, O  MacDiarmid, J  Mohanalal, K  Morgan, CJ  Moyes, AB  Mpunzi, P

N
Napier, J  Ndlovu, X  Nel, W  Nilsen, B  Njowa, G  Nong, S

O
Otto, J  Ozbay, M

P
Photo, Z  Potvin, Y  Prins, C

R
Rangasamy, T  Rawlins, A  Roberts, D  Rupprecht, S  Ruther, H

S
Saungweme, WZ  Saydam, S  Schouwstra, R  Scott, B  Sears, M  Sellers, E  Shires, SD  Skivington, P  Smit, J  Steffen, O  Steyn, M  Stiefenhofer, J

T
Terbrugge, P  Topal, E  Tudor, D

V
Vafaï, F  Van De Steen, B  Van Zyl, J  Visser, J  Von Deutsch, C

W
Wagner, N  Walraven, V  Wilkinson, A  Woodhall, M

Z
Zindi, L

Acronyms

AMMSA  Association of Mine Managers of South Africa
CUMT  China University of Mining and Technology
DMR  Department of Mineral Resources
ECSA  Engineering Council of South Africa
DHET  Department of Higher Education and Training
FEBE  Faculty of Engineering and the Built Environment, Wits University
GASA  Geostatistical Association of South Africa
IMSSA  Institute of Mine Surveyors of South Africa
ISPT  Instituto Superior Politécnico de Tete, Mozambique
METF  Minerals Education Trust Fund
MHSC  Mine Health and Safety Council
MQA  Mining Qualifications Authority
MVSSA  Mine Ventilation Society of South Africa
NRF  National Research Foundation
NSFAS  National Student Financial Aid Scheme
NUST  National University of Sciences and Technology, Pakistan
SACMA  South African Colliery Managers’ Association
SAIMM  Southern African Institute of Mining and Metallurgy
SANIRE  South African National Institute of Rock Engineering
SLRE  Senior Lecturer Research Equivalent
SMES  Students Mining Engineering Society
SOMP  Society of Mining Professors
WASM  Western Australian School of Mines
WMI  Wits Mining Institute
WUMEA  Witwatersrand University Mining Engineers Association
A
Aveng Mining (Grinaker LTA)
Anglo American Chairman’s Fund
AEL Mining Services
African Exploration and Mining Finance
African Rainbow Minerals
Afrisam
Akita University, Japan
Andalusite Resources
Anglo American Coal Head Office
Anglo American - New Vaal Colliery
Anglo American plc
Anglo American Thermal Coal
AngloGold Ashanti – Tau Tona Gold Mine
Anglo Platinum
Anglo Platinum – Bathopele and Thembelani mines
Anglo Platinum (Zimbabwe) – Unki Mine
Anglo Operations
Anton du Kom University, Suriname
Association of Mine Managers of South Africa
Atlas Copco (Zimbabwe)
AusAid

B
Barbrook Gold Mine
Barloworld Equipment
Basil Reed
BBE Consulting
BECSA
BHP Billiton
BME (Omnia Group)
Burnstone Development Trust

C
CAT
Career Wise
Centre for Mechanised Mining Systems
Centre for Sustainability in Mining and Industry
Chamber of Mines
Coaltech 2020
Cons-MurchGravelotte Mine
COSMO Scholarship Fund
Curtin University (Western Australia School of Mines)
China University of Mining and Technology
Colorado School of Mines (US)

D
De Beers Consolidated Mines
Department of Mineral Resources
Dessault Systemes
Dean: Faculty of Engineering and the Built Environment (Wits University)

E
Eskom
Exxaro Grootegeluk Mine
Exxaro – Matla Coal Mine
Eyesiswe
ECSA
ESRI-SA

F
Fossil Fuel Foundation
Foskor

G
Gemcom GEMS
Gemcom Whittle
Geostatistical Association of Southern Africa
Goedehoop Colliery
Gold Fields
Greenside Colliery
Great Basin Gold

H
Harmony

I
IBM
Impala Platinum
International Mining for Development Centre
Institute of Mine Surveyors of South Africa
Instituto Superior Politécnico de Tete (Mozambique)
iProp
Isibonelo Colliery

J
Japan International Cooperation Agency
Joburg Mining Indaba
Joy Mining Global

K
Kearney Education Trust
Kriel Colliery
Kumba Iron Ore - Thabazimbi Mine
Kuyasa Mining

L
Latona Consulting
Lesotho Government
Lily Gold Mine
London Metal Exchange
Lonmin Platinum
M
Maastricht University (Netherlands)
Mandela Institute
Matla Colliery
McGill University
Mining Health and Safety Council
Mining Lekgotla
MinRED – Anglo American
Minerals and Education Trust Fund
MineRP Solutions
Mine Ventilation Society of South Africa
Mining Qualifications Authority
Modikwa Mine (student day arranged by AMSSA)
Murdoch University

N
Namdeb
National Mining University (Ukraine)
National Student Financial Aid Scheme
National University of Sciences and Technology (Pakistan)
New Concept Mining
New Denmark Colliery
New Vaal Colliery
Northam Platinum
Nottingham University (UK)
NSFAS

P
Palabora Copper Ltd

R
R.E.D. Graniti SA
Resources4Africa
Royal Bafokeng Holdings

S
Samancor
Sanlam
Sandvik
Sasol
Sehwai Drilling
Shaft Sinkers
Shauenburg
Sibanye Gold
Silica Quartz
Simang Mining
Society of Mining Professors
Sound Mining Solutions
Southgold Exploration
South African Colliery Managers’ Association
Southern African Institute of Mining and Metallurgy
South African National Institute for Rock Engineering
SRK Consulting Canada
SRK Consulting South Africa
Student Mining Engineers Society
Swaziland Government

T
Tendele Coal Mining – Somkhele Mine
Terramin – CIO Chasm Consulting
To The Point Growth Specialists
Two Rivers Platinum

U
United Nations Economic Commission for Africa
University of Dundee (Centre for Energy, Petroleum and Mineral Law and Policy)
University of Johannesburg
University of Namibia
University of Newcastle (Australia)
University of Western Australia

V
Vantage Goldfields
Ventsim
Vibra-Tech
Village Main Reef
VUMA Software ADCO

W
Wesizwe Platinum – Bakubung Mine
Western Chrome Mines
Wits Enterprise
Wits Mining Institute
Wits University Mining Engineers Association
World Bank
WorleyParsons Resources and Energy/TWP – now Worley
WSE Stone Consulting

X
Xstrata Coal
Xstrata South Africa

Z
Zambian School of Mines
Zibulo Colliery
Zimasco
Zimbabwe Scholarship Fund
Zimplats
The School of Mining Engineering is one of the seven schools in the Faculty of Engineering and Built Environment in the University of the Witwatersrand.

It has 25 academic staff positions, including two vacant positions.

The School has approximately 850 students with 600 at undergraduate level and 250 at postgraduate level (MSc/PhD).

Note: Only the highest qualifications are indicated for academic staff.
Postgraduate Studies: Essential skills for mining engineering specialisations

The School of Mining Engineering at Wits University is committed to improving research output in mining, and has accredited, world-class programmes for South Africa, the African continent and the rest of the world. For the past century, we have provided essential skills for mining engineering specialisations – and have been consistently recognised and supported by industry.

Our multi-disciplinary postgraduate research programmes have seen the volume of MSc research students that graduate, rising dramatically in recent years. The School has also been graduating between two and seven PhD students a year.

The Postgraduate Programme attracts a multi-cultural student body and offers good facilities for postgraduate students.

From left to right:

Back: Poloko Monaheng, Pathy Muke, Peter Rungani, Oluwatobi Daya-Olupona
Front: Mosima Mathwana, Veriyadi Veriyadi, Peter Kolapo, Atang Maqelepo, Mpoyi Kanda, Nosipho Mageza, Tatenda Maphosa
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