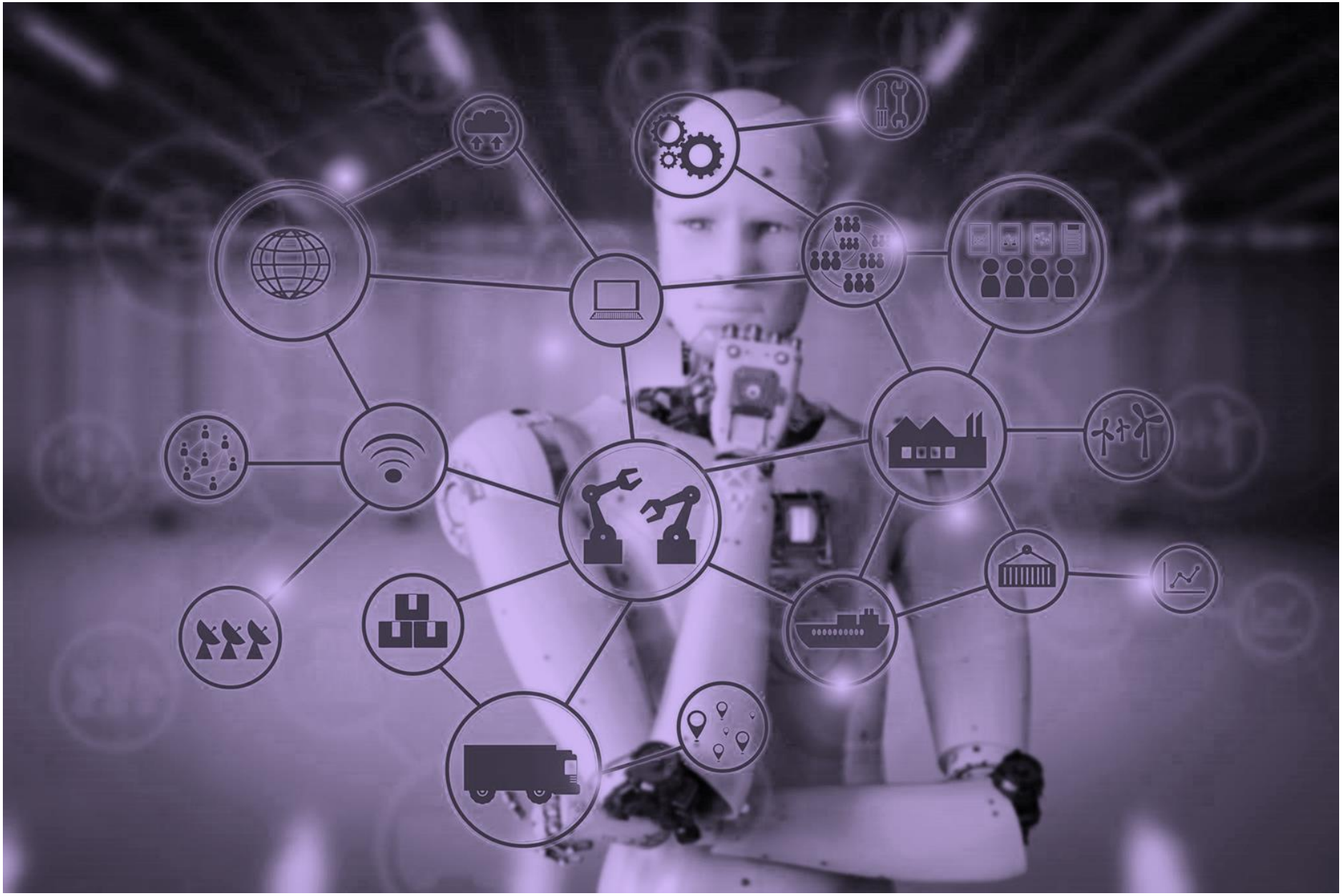
FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT



ANNUAL REPORT 2017

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Acting Executive Dean – Prof Charles Mbohwa

1. FEBE IN FOCUS (2013 – 2017)

Over the last decade, the Faculty of Engineering and the Built Environment (FEBE) has strategically metamorphosed from a faculty of sixteen Heads of Departments (HoDs) and academic departments, into twelve individual academic departments, one postgraduate school of engineering management, ten research centres, two technology stations and one institute.

Moving from four broad clusters of programme offerings in the fields of Electrical, Civil, Mechanical, Chemical, Metallurgy, Construction, Surveying, Operations, Management and Mining, the faculty's academic offerings are presently housed within over-arching School structures, which has made room for greater academic collaboration and resource sharing between Departments that may be located across campuses, but reside within the same School. The twelve departments are: electrical and electronic engineering science; electrical and electronic engineering technology; civil engineering science; civil engineering technology; town and regional planning; construction management and quantity surveying; mining engineering and mine surveying; metallurgy; chemical engineering technology; mechanical engineering science; mechanical engineering technology; and quality and operations management The existing schools are: the Postgraduate School of Engineering Management, School of Civil Engineering and the Built Environment, School of Mining Metallurgy and Chemical Engineering, School or Electrical Engineering and the School of Mechanical and Industrial Engineering.

These academic structures are operationally supported by undergraduate Faculty Offices based on both the Auckland Park and Doornfontein Campuses. A postgraduate faculty office is located on the Auckland Park campus, offering postgraduate administrative support.

The main achievements of the Faculty over the last five years are as follows:

- 2012: 50 Master's: 2012: 8 Doctorate to 2016: 142 Master's; 2016: 21 Doctorate
- 2013: 67 staff with doctoral qualification; 7 NRF rated to 2016: 84 (53 % of academic staff) with doctoral qualifications and 27 NRF rated (incl., in 2016, 2 A-rated, 2 B-rated)
- Accredited research publication output units: 2012: 126.95 units to 2016: 364.31 units
- Annual citations in SCOPUS: 2011: 446 citations to 2015: 880 citations
- Enrolment profile: 2013:- 7740 undergraduates; 594 postgraduates; 8 postdoctoral research fellows (PDRFs) to 2017 8328 undergraduates; 963 postgraduates (Affected by enrolment closure in 2017; 38 PDRFs
- Undergraduate output: 2013: 1785 graduates to 2017: 2064
- Percentage students completing 3-yr UG qualifications in minimum time: 2011: 19.6 % to 2014: 24.8 %
- Selected programmes approved for online learning: None in the past to 2016: 1 online postgraduate qualification – submitted to CHE and 2017: 3 online continuing education programmes (aligned to HEQSF) implemented
- Percentage UG programmes incorporating foundations of decolonisation from none in the past to current state where decolonisation has been contextualised within sustainable development and contextualisation of engineering for the benefit of humanity. The integration has been done through final year project modules, research programmes and for the upcoming new programmes (BEng Tech and others).
- Number of international students: 2013: 585 to 2017: 906
- Percentage international permanent & fixed-term academic staff: 2013: 43/140 = 31 % to 2017: 61/177 = 34 %
- Number of study abroad students (inbound & outbound) 2013: about 40 to 2016: about 70: Need to measure per department.
- Number of awards (national & international) & prestigious recognition: 2013: about 5 to 2016: about 10
- Third stream income (Externally generated research funding): 2013: ZAR 70.8 m: 2013 – NRF: ZAR 2.5 m to 2016: 132.3 m and 2016 – NRF: ZAR 12.4 m
- Percentage black permanent and fixed term academic staff: 2013: 35/140 = 25 % to 2017: 69/177 = 38.9 %
- Permanent and fixed term academic staff by rank (Profs & Assoc. Profs): 2013: 18/140 = 13% to 2017: 28/177 = 16 %
- Number of associate professors and professors by race and gender: 2013: 9 Non-white; 2013: 0 Female to 2017: 13 Non-white and 2017: 3 Female

The graduation figures in 2017 are as follows:

TABLE 1: FEBE GRADUATION FIGURES IN 2017

Faculty Custom Qualification Type Level	Academic Year
	2017
	Number Of Qual Awarded
ENGINEERING BUILT ENVIRONMENT	2 404
Doctoral	22
Masters	141
Undergraduate	2 241
Total	2 404

The graduation figures went up in 2017. This reflects the increase in number of postgraduate students completing studies and more throughput at undergraduate level as the P1, P2 and Work-integrated learning students complete studies before some of the national diplomas are phased out.

TABLE 2: FEBE POSTDOCTORAL FELLOWS IN 2017

PDRF Type	Number
URC PDRFs	37
GES PDRFs	26
TOTAL	63
Terminations	11

The number of postdoctoral fellows increased tremendously during 2017. There will be a need to manage future increases in a sustainable manner that ensures higher productivity.

1.1. Governance Structures

Four Faculty committees presently govern the twelve departments and one postgraduate school. The Technology Programme Committee (TPC) caters for undergraduate technology, built environment and management programmes, whilst the Engineering Science Programme Committee (ESPC) caters for the undergraduate engineering science related programmes. The Faculty Higher Degrees committee caters to postgraduate programmes and the Faculty Research Committee caters to all research related matters. School research committees were also constituted in 2017, allowing for a ground-level focus on research related matters and strategic research initiatives in a manner that promotes interdisciplinary and interdepartmental collaboration.

Critical issues, decisions and interventions are debated at these fora, and feed into the Faculty Board. In addition, there is a top-down filtering of higher university decisions and actions to individual departments via these very committees, through departmental representatives. This bottom-up and top-down approach allows for the continuous flow of communication and feedback.

At the helm of Faculty governance, is the Executive Dean of the Faculty, supported by a Vice-Dean of Teaching and Learning, Prof E. Akinlabi and Vice-Dean of Postgraduate Studies, Research and Innovation, Prof C. Aigbavboa. Prof C. Mbohwa currently serves as Acting Executive Dean in light of the previous Executive Dean, Prof Saurabh Sinha, having taken up the post of Deputy Vice Chancellor of Research and Innovation. The Vice-Deans provide oversight within their respective domains as is delegated by the Dean. They assist towards directing the strategic imperatives of the Faculty as a whole. FEBE is most fortunate that the 2017 year has marked the smooth transition of two staff members into these pivotal Vice-Dean roles.

The FEBE Management team, as well as key support individuals are listed in the tables that follow.

TABLE 3: FEBE DEANERY AND SUPPORT TEAM

Designation	Name
Acting Dean	Prof C. Mbohwa
Vice Dean: Teaching and Learning	Prof E.T. Akinlabi
Vice Dean: Postgraduate Studies, Research and Innovation	Prof C. Aigbavboa
Head of Faculty Administration	Mrs. E. Maas
Programme Advisor	Ms. D. Govender

TABLE 4: FEBE HEADS OF SCHOOLS

Name of School	Head of School
School of Civil Engineering and the Built Environment	Prof S. Ekolu
School or Electrical Engineering	Prof J. Meyer
School of Mechanical and Industrial Engineering	Prof. A. Noor
School of Mining Metallurgy and Chemical Engineering	Prof. P. Olubambi
Postgraduate School of Engineering Management	Prof J.H. Pretorius

TABLE 5: FEBE HEADS OF DEPARTMENT

Name of School	Name of Department	Name of Head of Department
SCHOOL OF CIVIL ENGINEERING AND THE BUILT ENVIRONMENT	Civil Engineering Science	Dr M Ferentinou
	Civil Engineering Technology	Ms Ntebo Ngcobo
	Construction Management and Quantity Surveying	Mr Nazeem Ansary
	Town and Regional Planning	Dr Trynos Gumbo
SCHOOL OF ELECTRICAL ENGINEERING	Department of Electrical and Electronic Engineering Science	Prof Yanxia Sun
	Department of Electrical Engineering Technology	Prof Babu Paul
SCHOOL OF MECHANICAL AND INDUSTRIAL ENGINEERING	Department of Mechanical Engineering Science	Prof Tien Chien Jen
	Department of Mechanical and Industrial Engineering Technology	Dr. Madindwa Mashinini
	Department of Quality and Operations Management	Dr Pule Kholopane
SCHOOL OF MINES, METALLURGY AND CHEMICAL ENGINEERING	Department of Chemical Engineering Technology	Prof Kalala Jalama
	Department of Metallurgy	Dr Elizabeth Makhatha
	Department of Mining and Mine Surveying	Dr Hennie Grobler

The faculty maintains good relations with many professional bodies and this has facilitated successful accreditation of programmes over the last five years. These bodies consist of the Engineering Council of South Africa (ECSA); the South African Council for Planners (SACPLAN); the South African Geomatics Council (SAGC); the South African Council for Project and Construction Management Professions (SACPCMP) and the South African Council for the Quantity Surveying Profession (SACQSP). These affiliations have enhanced the national and international reputation, quality, integrity and standard of the Faculty's professional programme offerings throughout the years.

In May 2017, the Department of Construction Management and Quantity Surveying underwent an accreditation visit by the South African Council for Project and Construction Management Professions (SACPCMP). Full accreditation was received for the National Diploma in Building and Bachelor of Technology programmes until 2022.

During October 2017, FEBE also underwent a re-accreditation visit by ECSA. The suite of undergraduate Engineering Technology programmes reviewed by ECSA included: the Bachelor of Technology in Engineering; Civil (Construction Management), the Bachelor of Technology in Engineering; Civil (Transportation Engineering) the Bachelor of Technology

in Engineering; Civil (Structural Engineering) the Bachelor of Technology in Engineering; Civil (Water Engineering), the Bachelor of Technology in Engineering (Electrical), Bachelor of Technology in Engineering (Industrial) and the National Diploma Engineering (Mechanical).

Internal Mock Accreditation exercises, chaired by the relevant Heads of Schools had taken place in August 2017 and these helped to ensure that all deficiencies and concerns were aptly addressed prior to the actual visit. All programmes were thereby fully accredited by the ECSA panel until 2020. In addition, the Faculty made preparations for the South African Council of Planners (SACPLAN) accreditation re-visit in 2018.

1.2. Risk Management

Faculty risks are controlled and monitored by placing the faculty's Risk Register as a standing item on the Faculty Executive Committee agenda. Significant risks are then raised to the Risk Management Committee.

Each year, high priority risks are identified. The loss of professional accreditation has featured significantly over the years and has therefore been actively controlled and monitored. The Faculty has moved from a silo departmental approach towards accreditation, towards a more cohesive, centrally co-ordinated approach. Increased interventions and support during this process have included training programmes for academic staff conducted by professional bodies, evidence audit support systems and increasingly more robust internal mock accreditation exercises.

Leveraging off inter-departmental and inter-school accreditation knowledge has proven beneficial to the Faculty at large. Best practices are shared and the robust processes adopted have been proven to enhance the quality and the success of the accreditation review visits.

1.3. Times Higher Education World Rankings

An analysis of the Times Higher Education World Universities Ranking in 2017 places UJ marginally in first position with an overall score of 29.603 against 29.595 for the University of Cape Town, with UJ's Engineering and Technology also in top 401 to 500 as in Table 1.

TABLE 6: 2018 TIME HIGHER EDUCATION WORLD UNIVERSITY RANKINGS BY SUBJECT

	2018 Times Higher Education (THE) World University Rankings by Subject: Engineering & Technology							
	Global Rank Band	National Rank	Overall	Citations	Industry Income	International Outlook	Research	Teaching
University of Johannesburg	401-500	1	29.603	45.7	34.4	81.0	12.4	18.4
University of Cape Town	401-500	2	29.595	35.0	61.9	75.4	15.0	22.4
University of KwaZulu-Natal	401-500	3	27.453	35.6	35.7	72.5	18.3	16.5
Stellenbosch University	401-500	4	26.658	40.1	1.2	43.2	22.8	18.3
University of the Witwatersrand	401-500	5	26.438	23.0	100	64.7	16.6	17.6

While these scores are too close to call and must be interpreted with care, it is clear that the Faculty has done well over the last five years.

- Overall Score: 29.603 for UJ against 29.595 for Cape Town: This is very narrow and disputable. If UJ FEBE is to distinguish itself the scores gap needs to grow.
- Under this system scores on citations were: 45.7 for UJ vs 35.0 UCT- these use the Scopus database: For this citation score, UKZN and Stellenbosch are better that UCT.
- The Industry income score: UJ 34.4 vs 61.9 UCT- WITS has 100; UKZN 35.7. UJ needs to improve on attracting industrial chairs, industrial contract research and external funding for research, teaching and learning and other activities.
- Scores for International Outlook: UJ- 81.0; UCT 75.4. UJ must maintain lead.
- Scores for Research: UJ 12.4; UCT 15.0; UKZN 18.3; Stellenbosch 22.8; WITS 16.6
- Scores for Teaching: 18.4 (second beating Stellenbosch 18.3 by a small margin.) UCT: 22.4

2. Mission and Strategy

FEBE has seamlessly imbedded itself into UJ Mission and strategies.

2.1. Living the UJ Mission

FEBE has, through a number of its initiatives, brought the UJ mission to life "Inspiring its community to transform and serve humanity through innovation and the collaborative pursuit of knowledge." By bringing together industry, faculty and communities, FEBE continues to strive towards the innovative transformation and improvement of communities.

The Gwakani Project is an on-going project that is just one such example, that bears testament to the tangible results achieved through strategic collaboration. Gwakwani Village in Limpopo now has a drip irrigation system and solar panels installed thus far. In addition, FEBE's Gwakani project is set to grow and expand even further, with plans to take on additional projects. This project practically attends to Sustainable Development Goals by providing solar power and stimulating microeconomic activities in rural areas.

Figure 1: Gwakani Project

Another example of FEBE exploring tangible changes that would benefit communities was demonstrated in the discussion between The UJ Human Settlement and Construction Research Centre and Gautrain regarding the "Gautrain as a catalyst for transport

integration and development in Gauteng." This will assist in solving commuter problems and develop the first steps towards the creation of smart cities within the region.

2.2. Decolonisation

FEBE has also embraced the Decolonisation agenda. In 2017, a series of seminars were held to discuss how decolonisation could feature and add value to the discipline and the Sustainable Development Goals. In addition, the Faculty has formed a Decolonisation Task Team, tasked to create awareness, promote dialogue and explore decolonisation of the engineering and built environment disciplines.

Figure 2: Executive Dean Prof Sinha at Big Data and Decolonisation Seminar

2.3. Sustainable Growth Strategy

FEBE's early trajectory could be attributed towards the goal of maintaining stability. FEBE's renewed strategy over the last five years particularly, has been one of growth. As trends indicate, FEBE's growth strategy has extended to number of key areas in line with the strategic plan of the University. These include, but are not limited to, growth with regards to strategically aligned Science Engineering and Technology (SET) programme offerings, postgraduate student enrolment and international reach.

Upon analysis, it is noted that FEBE has, in line with UJ strategy, grown these key areas in recent years.

TABLE 7: FEBE POSTGRADUATE HEADCOUNT ENROLMENTS (HEDA, 5 APRIL 2018)

Postgraduate Headcounts	Year				
	2013	2014	2015	2016	2017
DEP OF CHEM ENG TECHNOLOGY	26	32	29	32	33
DEP OF CIVIL ENGINEER SCIENCE	20	22	32	61	77
DEP OF CIVIL ENGINEER TECH	9	9	7	7	8
DEP OF CONSTRU MGT & QUANT SUR	11	31	45	45	44
DEP OF ELEC & ELEC ENG SCIENCE	101	113	121	123	120
DEP OF ELECTRIC ENG TECHNOLOGY	14	24	23	31	24
DEP OF MECH ENG SCIENCE	56	67	70	84	92
DEP OF MECH&IND ENG TECHNOLOGY	13	13	14	21	19
DEP OF METALLURGY	28	29	42	40	53
DEP OF QUALITY & OPERATION MGT	40	61	80	70	53
DEP OF TOWN & REGIONAL PLAN	0	0	0	0	0
POST GRAD SCHOOL OF ENG MAN	276	312	405	419	456
Grand Total	594	713	868	933	979

It is noted that the Departments of Town and Regional Planning will enrol new Master's students in 2018. The Department of Mining Engineering and Mine Surveying has no approved postgraduate programmes at the moment.

TABLE 8: FEBE INTERNATIONAL PROFILE (2013 – 2017) (HEDA, FEBE International profile, 5 April 2018)

Academic Year	STUDENT HEADCOUNT	FTE ENROLLED	FTE PASSED	FTE % PASS	TIU	GRADUATES
2017	919	446.796	334.630	74.9	1 865.517	135
2016	927	434.087	331.698	76.4	1 784.404	174
2015	793	362.128	261.817	72.3	1 479.325	139
2014	628	289.011	214.935	74.4	1 216.077	139
2013	589	266.346	199.967	75.1	1 017.015	132

The number of international students has grown steadily. However the numbers are reducing/ stagnating and new initiatives are necessary to increase them.

2.4. Collaborations and Research that matters

FEBE has strategically aligned its collaborative pursuits (both local and international) towards the fulfilment of the National Development Plan and the UN's Sustainable Developmental Goals. In this way, the faculty intends to ensure that the collaborations pursued can contribute tangible changes towards the attainment of the sustainable development goals.

Figure 3: Centre for Intelligent Transport Discussion

There have been discussion for the development of the Centre for Intelligent Transport. This work will develop the current Global Excellence and Stature activities towards the building the blocks of the fourth industrial revolution.

Synergies have been developed to bring together the Gauteng Provincial Government, the City of Johannesburg and the University of Johannesburg together to develop research programmes that will benefit the three entities.

Figure 4: GPG-CoJ-UJ Partnership Discussion

Figure 5: FEBE Industry Advisory Board Meeting – May 2017

2.5. Transformation

Transformation has and remains a key goal of the Faculty. Strides have been made to ensure increased transformation in staff particularly and can be evidenced in the employment details captured under employee profile.

All goals, strategies and thereby initiatives and key projects of the Faculty are linked in some way to the broad strategic goals of the UJ. In this way, alignment and strategic support ensures the higher-level strategies are achieved from the ground up. It also ensures that all staff in the Faculty is acutely aware and participants towards the attainment of the University's strategy. One of the strategies to improve transformation and diversity is to strategically plan replacement of staff going on pension. The Table 4 below presents the plan.

TABLE 9: THE FEBE STAFF RETIREMENT/ REPLACEMENT PLAN

Retirement in 2021: Start the head hunt for designated candidate and motivate for special appointment by the end of 2020.
Retirements in 2018: Urgently advertise and arrange to fill post with a designated candidate during 2018.
Resignation: Urgently advertise and arrange to fill post .with designated candidate
Resignation: Move post to another department.- Target designated candidate
Retirement in 2020: Special appointment by end of 2019 aim for designated candidate
Retirement in 2021: Professor/ Associate Professor if possible. Maintain professorial level
Retirement in 2018- Target designated candidate - advertise and fill post in 2018
Retirement in 2022: Plan to advertise and fill post in 2022- target designated candidate
Retirement in 2023. Target designated candidate- special appointment by end of 2022
Retirement in 2019 for Possibility to replace with designated candidate or extend contract
Retirement in 2021: Target designated candidate - special appointment by end of 2020
Retirement in 2018: Target designated candidate- advertise and fill post in 2018
Retirement in 2022: Professor/ Associate Professor Level in 2022 maintain professorship
Retirement in 2022: Target designated candidate special appointment by end of 2021
Retirement in 2020: Target designated candidate - advert and filling in 2020
Retirement in 2019: Target designated candidate - special appointment by end of 2018
Retirement in 2023: Target designated candidate special appointment in year 2022
Retirement in 2019: Associate Professor in 2019 – maintain professorial level
Retirement in 2017: Fill by end of June 2018. Handover- takeover planned for at most 9 months. This is urgent.
Retirement in 2020: Plan designated candidate special appointment by end of 2019
Retirement in 2022: Plan designated candidate - special appointment by end of 2021
Retirement in 2023: Plan designated candidate - special appointment by end of 2022
Retirement in 2022: Plan for designated candidate - special appointment by end of 2021
Retirement 2022 May extend or replace at professorial level in 2022.
Contract ends June 2021. – Replace at Professorial level in 2021

It is noted that if posts are academic and at professorial levels by the time of the vacancy, efforts will be made to appoint at that level. The yearly summaries are as follows:

2018: 1 or 2 extra-ordinary posts needed- If promotion occurs it might be 1 post needed.

2019: 2 extra-ordinary posts- one is a continuation of the 2018 post budget and 1 could be extra moved to relevant department

2020: 2 posts; 2021: 3 posts; 2022: 3 posts

These extra posts articulate into a permanent post meaning the maximum level of extra post supports does not in total exceed 3 posts per year. The main benefit is that this can assist to increase the number of designated appointments for at least 6 posts and at most 10 posts by end of 2022.

3. STRATEGIC OBJECTIVES AND MAJOR DRIVES

Strategic Objective 1: Excellence in Research and Innovation

The faculty has grown in leaps and bounds during the past five years, enhancing its research profile. With the goal of developing the stature of research and innovation, active strategies to support PDRFs and emerging researchers were implemented in 2012. In 2014, for the first time, the Faculty exceeded over 200 research output units. A renewed focus was on publications in journals and in addition to this, the Faculty's presence on UJ Digispace (online repository) tripled to over 400 outputs, in order to further enhance research visibility. Over the recent years, FEBE has demonstrated a steady increase in research output, has employed strategies to promote journal and high quality book publications and has continued to increase its presence in the UJ Institutional Repository.

TABLE 10: FEBE POSTDOC FELLOWS (HEDA, 20 April 2018)

Faculty	Year				
	2013	2014	2015	2016	2017
FEBE	15	17	38	43	63

The number of postdoctoral fellows has quadrupled in the last five years. This expansive growth is testament to FEBE's focus on the Strategic objective of research and internationalisation. FEBE's drive towards research excellence is evident by the faculty's actively robust research profile. During 2017, FEBE's research portfolio included 24 authored books, 65 book chapters, 1234 Conference contributions and 432 journal articles, (unaudited RIMS data, as at 9 Feb 2018). These account for about 460 units, projecting the Faculty as the leading faculty/entity, in terms of research publication output units.

The faculty underwent two major programme development projects in 2017. The first focused on the development and approval of 16 Honours programmes, creating an articulation pathway for the graduates of the new Bachelor programmes introduced in 2017. The second project dealt with the development of 19 new master's programmes, designed to accommodate for the Master of Technology phase-out scheduled for December 2019. The faculty hopes to offer these programmes in 2020, allowing for the faculty's full alignment to the Higher Education Qualification Sub-Framework (HEQSF). In addition, these new programmes will ensure full vertical articulation, from an undergraduate level, all the way through to the doctoral level, within each discipline, thereby enhancing and growing the postgraduate and research profile of the Faculty.

FEBE academics have also actively participated in various conference panels, as reviewers, session chairs and organising committees of local and international conferences. FEBE Schools have successfully hosted international peer-reviewed conferences, extending the faculty's research footprint and impact globally. The number of NRF-Rated researchers has continued to grow to 29 in 2017.

TABLE 11: FEBE RATED RESEARCHERS (AS AT 5 APRIL 2018)

Surname	Initials	Title	Department	Rating	Duration
Ahmed	NA	Prof	Mechanical Engineering Science	C3	01 Jan 2018 - 31 Dec 2023
Aigbavboa	CO	Prof	Department of Construction Management & Quantity Surveying	Y2	01 Jan 2016 - 31 Dec 2021
Akinlabi	ET	Prof	Mechanical Engineering Science	Y2	01 Jan 2014 - 31 Dec 2019
Connell	S	Prof	Electrical & Electronic Engineering Science	B2	01 Jan 2016 - 31 Dec 2021
Dundu	M	Prof	Department of Civil Engineering Science	C2	01 Jan 2016 - 31 Dec 2021
Ekolu	SOE	Prof	Department of Civil Engineering Science	C2	01 Jan 2015 - 31 Dec 2020
Ferentinou	MF	Dr	Department of Civil Engineering	C2	01 Jan 2017 - 31 Dec 2022
Ferreira	HC	Prof	Department of Electrical and Electronic Engineering Science	A2	01 Jan 2013 - 31 Dec 2018
Gupta	K	Dr	Mechanical Engineering	Y2	01 Jan 2018 - 31 Dec 2023
Jalama	K	Prof	Department of Chemical Engineering	Y2	01 Jan 2014 - 31 Dec 2019
Jen	TCJ	Prof	Department of Mechanical Engineering Science	B3	01 Jan 2017 - 31 Dec 2022
Lo Giudice	A	Prof	Department of Quality and Operations Management	C3	01 Jan 2017 - 31 Dec 2022
Marwala	T	Prof	Research, Innovation, Post Graduate Studies and the Library	B3	01 Jan 2014 - 31 Dec 2019

Mbohwa	C	Prof	Department of Quality and Operations Management	C1	01 Jan 2018 - 31 Dec 2023
Moothi	K	Dr	Department of Chemical Engineering	Y1	01 Jan 2017 - 31 Dec 2022
Mulaba-Bafubiandi	AF	Prof	Department of Mining, Metallurgy and Chemical Engineering	C3	01 Jan 2018 - 31 Dec 2023
Nicolae	DV	Prof	Department of Electrical and Electronic Technologies	C2	01 Jan 2017 - 31 Dec 2022
Ntuli	F	Prof	Chemical Engineering Technology	Y2	01 Jan 2014 - 31 Dec 2019
Olubambi	PA	Prof	Chemical Engineering Technology	C3	01 Jan 2014 - 31 Dec 2019
Ouahada	K	Prof	School of Electrical Engineering	C3	01 Jan 2014 - 31 Dec 2019
Pradhan	A	Dr	Quality and Operations Management	Y2	01 Jan 2017 - 31 Dec 2022
Pretorius	JHC	Prof	Department of Electrical Engineering	C3	01 Jan 2016 - 31 Dec 2021
Sun	Y	Dr	Electrical & Electronic Engineering Science	Y2	01 Jan 2015 - 31 Dec 2020
Swart	TG	Prof	Department of Electrical and Electronic Engineering	C3	01 Jan 2017 - 31 Dec 2022
Thwala	WD	Prof	Postgraduate Centre	C3	01 Jan 2017 - 31 Dec 2022
Twala	B	Prof	Department of Electrical and Electronic Engineering Science	C3	01 Jan 2015 - 31 Dec 2020
Von Solms	S	Dr	Department of Electrical and Electronic Engineering Science	Y2	01 Jan 2017 - 31 Dec 2022
Wang	QG	Prof	Institute for Intelligent Systems	A2	01 Jan 2017 - 31 Dec 2022
Xing	BX	Prof	Institute of Intelligent Systems	Y2	01 Jan 2016 - 31 Dec 2021

The Faculty actively supports the Research and Innovation endeavour. The Writer's Journey, an Academic Writing workshop, is just one example of supportive strategic initiatives.

Figure 6: The Writers Journey – Academic Writing (May 2017)

It is also key to note that postgraduate students from Africa help to build diversity and the common areas of challenge in Africa create opportunities for collaboration and partnerships. Collaboration and strategic partnerships are therefore a key factors in the growth of the Faculty. A number of multi-disciplinary research projects, using equipment in other departments and faculties, are being explored. Research in FEBE is aligned with the priorities of South Africa's National Development Plan.

In order to increase and improve the quality and quantity of research publications outputs, FEBE will increase the number of visiting academics, which will include new collaborators, former students and postdoctoral fellows, former academic staff outside South Africa and personnel from research institutions like CSIR. In many cases research work produced by former students and postdocs is not published. This move will remedy this.

Strategic Objective 2: Excellence in Teaching and Learning

The teaching and learning journey for FEBE has been an innovative and progressive one. FEBE academics have been able to consistently reflect on all aspects of the teaching and learning cycle. Professional Bodies and UJ programme accreditation cycles have played an integral role in ensuring that qualifications are reviewed, updated and continuously improved, thereby improving the quality of graduate leaving the Faculty.

In support of the Teaching and Learning Strategy of the Faculty, funding was secured to enhance various teaching resources. Specifically, the Vice-Dean of Teaching and Learning was able to obtain R2.5 million for the upgrading of audio visual equipment, this is with a resolution in place to receive an additional R2.5 million over the next two years. In an effort to improve computer facilities, R5 million was obtained, with a further R5 million secured for the next two years. Further to this, the three departments of Engineering Science (located on the Auckland Park Campus) received R1 million each for the upgrading of equipment. Securing such funding has positioned the Faculty to embrace and lead the UJ strategy towards Industry 4.0 teaching and research initiatives.

- Strategy

A strategic shift for the Faculty in the last five years, has been the phasing out of Diploma qualifications and the phasing in of the new Bachelor of Technology and Bachelor degrees on the Doornfontein Campus. This process has inevitably made room for blended-learning initiatives and out-of-the-box teaching strategies to ensure students complete their qualifications timeously. In tandem, 2017 saw the first rollout and implementation of the new Bachelor and Bachelor of Engineering Technology programmes. Being the first in the country to roll out the Bachelor of Engineering Technology programmes, enrolment intake proved lower than initially anticipated. Medium to long-term marketing interventions were planned to ensure greater public awareness of the new programmes, and the career pathways associated with them, especially when endorsed by a professional body. This process is ongoing, with different levels of strategic marketing campaigns to be implemented on an annual basis.

Although the faculty does not offer non-subsidised academic programmes, in 2017, 23 SLPs were developed and approved at Senate. This growth has been significant over the last five years as the Faculty intends to focus on this area in 2018, as part of its third stream income strategy.

- Student Success and Support

Teaching and Learning Support Initiatives in the Faculty have not only grown in the last five years, but have also intensified towards specific outcomes. 2017 saw the FEBE continue

to run its own First Year Seminar (FYS) with new first year students registered within the Faculty. The FYS not only allowed for interaction between staff and students within the Faculty, but also fostered close linkages between the FYS and the formal engineering curricula. During the FYS, students were engaged in various activities, broadly grouped into three categories (literacy, mathematics and computer skills), and these activities were directly related to aspects that would be covered in subsequent modules. The FYS served to introduce students to their chosen engineering programme while simultaneously assisting with the development of the academic practices necessary for success in Higher Education. Students were also engaged in engineering related activities to further motivate them.

In an effort to extend support to students, over 250 tutors were appointed across the Faculty to assist in teaching and learning. The majority of these were appointed to work with students in specific integral modules. Further to this, on both the Auckland Park Kingsway campus and Doornfontein campus, all first year students within the Faculty were able to receive additional tutoring assistance on any of their first year modules. This was offered through the FEBE First Year Tutor Centre on each campus. These Centres are run by a team of postgraduate and senior undergraduate student-mentors, drawn from various sub-fields of engineering. All first year students are able to visit these Centres to obtain individual or small-group tutoring on any of their generic first year modules.

Much of the formal engineering curricula is quantitative in nature. However, engineering students do write a significant amount, across a wide array of genres, including laboratory reports, project reports, research reports and so on. Writing is accepted as being intricately tied to the content of disciplines and students' ability to write well is not only a reflection of their thinking within the discipline but also a marketable skill that can set graduates apart in the workplace. As such, the FEBE, in 2017, continued to operate the FEBE Writing Centre. This Centre therefore offers individualised support and instruction regarding all aspects of academic writing in engineering.

The FEBE Writing Centre offered two writing workshops within the first year module, Introduction to Engineering Design, which is a module common to all the programmes offered at APK campus. In addition, it ran a series of 10 workshops for fourth year students undertaking their final year research and/or design projects. These workshops were formally integrated into the final year capstone module undertaken by the electrical and mechanical engineering students. The FEBE Writing Centre also continued to pilot a writing support initiative where the writing consultants partnered with several undergraduate research project supervisors and offered intensive, and continuous writing support to final year students during their research project. This included offering regular individual supervision of the entire research report writing process. The Tutor intervention programme over a five year period is presented in Table 6.

TABLE 12: TUTOR INTERVENTION (2013 – 2017)

YEAR	2013	2014	2015	2016	2017
Number of Tutors	No central tutor co-ordination	+/- 50 strategic tutor appointments (allocated only to first year modules) deployed in addition to departmental tutor funds	20 GES senior tutor appointments; +/- 100 strategic tutor appointments (allocated to priority modules) deployed in addition to departmental tutor funds.	13 GES senior tutor appointments; 114 strategic tutor appointments (allocated to priority modules) deployed in addition to departmental tutor funds.	288 tutor appointments; 7 GES senior tutor appointments; 2017 was the first year that ALL tutor appointments within the FEBE were centralised (in the office of Dr Z Simpson, with administrative assistance of Ms P Meso)

- Student profile

FEBE's total student enrolment for 2017 was 9383, with 34% female and 66% male students. 2017 marked the first year of implementation for the new Bachelor degrees on the Doornfontein Campus. This suite of programmes included Bachelor of Engineering Technology programmes and Bachelor programmes in Construction, Town and Regional Planning. The implementation of these programmes marked a strategic shift in the student profile of the Faculty, catering to degree students in a larger capacity, with only the Department of Quality and Operations Management catering to Diploma students from 2017 onwards. The overview of student data is presented in Table 7.

TABLE 13: STUDENT OVERVIEW (HEDA, 05 April 2018)

YEAR	STUDENT HEADCOUNT	FTE ENROLLED	FTE PASSED
2017	9,382	4,454.0	3,671.7
2016	9,604	4,468.9	3,693.7
2015	9,109	4,178.6	3,397.2
2014	8,663	3,774.6	3,016.7
2013	7,595	3,298.3	2,652.7

FEBE's student compliment has grown from just over 7500 in 2013 to over 9000 in 2017. This trend is in keeping with both the national and UJ strategy of growing Science,

Engineering and Technology (SET) programmes. The journey of this growth however, has been complex, mingled with a number of phase-outs and phase-ins. It is intended that this approach will shift the focus of FEBE's academic offerings, catering to the professional needs of industry, professional bodies and the country. Student enrolment data over a five year period is presented in Table 8.

TABLE 14: STUDENT ENROLMENT (HEDA, 05 April 2018)

	STUDENT	ATTENDANCE MODE		ENTRY STATUS				NSFAS
YEAR	HEADCOUNT	CONTACT	DISTANCE	F	T	E	N	RECEIVED
2017	9,382	9,382	0	1,594	431	964	6,393	2,404
2016	9,604	9,604	0	1,820	515	991	6,278	1,125
2015	9,109	9,109	0	1,895	459	889	5,866	969
2014	8,663	8,663	0	1,829	317	819	5,698	952
2013	7,595	7,595	0	1,260	304	714	5,317	919

Although FEBE is committed towards the growth of the SET sector, the decline in the First-time Engineering students in 2017 could be attributed to the introduction of new programmes across a number of disciplines. It is surmised that the diverse engineering and built environment programmes housed in the Faculty may not be fully understood at the point of application. Efforts to educate support divisions such as Marketing and the Student Enrolment Centre have been ongoing. In 2017, it was identified that this reach should extend even further, reaching students at secondary and primary schools, in order to ensure the various bachelor programmes, spanning across 11 undergraduate departments, are correctly explained and differentiated. Mapping clearer career paths in promotional material, engagements with professional bodies, industry advisory boards, parents and educators and strategic online marketing initiatives have also assisted with this process.

TABLE 15: STUDENT SUCCESS (HEDA, 05 APRIL 2018)

YEAR	STUDENT HEADCOUNT	FTE ENROLLED	FTE PASSED	FTE % PASS	GRADUATES
2017	9,382	4,454.0	3,671.7	82.43%	2,405
2016	9,604	4,468.9	3,693.7	82.65%	2,229
2015	9,109	4,178.6	3,397.2	81.30%	1,900
2014	8,663	3,774.6	3,016.7	79.92%	1,888
2013	7,595	3,298.3	2,652.7	80.43%	1,639

At present, the FEBE graduation count for 2017 sits at 2405 (HEDA, as at 05 April 2018). Comparatively, with 1 639 graduates in 2013, FEBE has steadily improved on the number of students graduating. For two consecutive years, FEBE has performed above its graduation target and thereby assisted UJ to meet the institutional score. It is envisioned and planned that the number of graduates will significantly increase in the next one to two years, especially with regards to the remaining pipeline students in programmes that have and will be phasing-out.

Student success has become a key aspect of the Faculty's focus. Particularly in 2017, Priority modules were identified and initiatives were put into place to ensure throughput and quality are enhanced for the student's benefit. To enhance student success, an intense evaluation of pre-requisites took place in 2017. This assisted the Faculty in clearing unnecessary hurdles impeding student completion, without comprising the integrity of the programmes.

Graduation ceremonies are deservedly celebrated by both staff and students. Executive Dean Prof Sinha and Mr Stafford Masie, the CEO and Founder of Thumbzup (Former Managing Director of Google South Africa) and 2016 SRC President are depicted below.

Figure 7: 2017 Graduation

In addition, the student experience was enhanced by the efforts of a dedicated Faculty Student Liaison Officer, who deals with challenges with student accommodation and subsistence. Student success stories have been numerous in 2017. One example of which is Mr Sibusiso Reuben Bakana, a Master of Technology: Electrical Engineering graduate, who acquired a presidential scholarship in China, for having excelled academically. Mr Bakana was awarded the Jiangsu University Presidential Scholarship and was admitted to the School of Computer Science and Telecommunications Engineering in Jiangsu University, China. Staff to student ratio data of the Faculty is presented in Table 10.

TABLE 16: STAFF – STUDENT RATIOS (Faculty Profile - HEDA, 25 April 2018)

YEAR	PER ACAD STAFF (A)	STUDENT HEADCOUNT (B)	RATIO (B/A)	ACAD STAFF FTE'S (C)	FTE ENROLLED (D)	RATIO (D/C)
2017	180	9,383	1:52	238.90	4,447.60	1:19
2016	175	9,604	1:55	197.96	4,468.95	1:23
2015	159	9,109	1:57	176.39	4,178.58	1:24
2014	155	8,663	1:56	181.16	3,774.60	1:21
2013	137	7,595	1:55	143.68	3,298.27	1:23

Staff-student ratios have improved over the last five years. The Faculty mitigates this risk with the appointment of Assistant Lecturers and Tutors. This level of support assists to ensure that the balance between Teaching and Learning and Research is supported such that Research-led teaching can take place, to the benefit of FEBE's students. Student academic recognition, in the form of the Dean's Honour's Roll, proved a successful and much deserved event.

Figure 8: Dean's Honour Roll Function – Oct 2017

Strategic Objective 3: International Profile for GES

The faculty's strong international profile is enhanced by the number of international students and members of staff that call FEBE home. Academic staff are constantly encouraged to form critical networks with the international communities in their disciplines.

The Faculty's International profile was enhanced in 2017 with a total of 919 international students in the Faculty, and a total of 135 international students graduating, (HEDA: Faculty International Profile, 4 Feb 2018). In addition to this, the Faculty has made a number of international collaborations to further cement its international profile. Among such collaborations are the Department of Electrical Engineering Technology who hosted delegates from Romania; the Executive Dean's visit to Ravensburg-Weingarten University of Applied Sciences; and Professor Wan, Director of the Institute of Nuclear Energy Science and Engineering Management of the Department of Engineering Physics, Tsinghua University, Beijing, China, who led a delegation of academics on a visit to the University of Johannesburg.

FEBE has throughout the recent years, increasingly played host to a number of international guests and visitors. In 2017 a public lecture was presented by Prof John Kao, Vice-President & Pro-Vice-Chancellor of Hong Kong University. This event was jointly hosted by FEBE, the Faculty of Health Sciences and the UJ Division of Internationalisation. In support of this strategic objective, the Faculty and the Internationalisation Office, successfully completed its first Africa by Bus excursion, which took place in November 2017. Thirty-nine postgraduate students took part in an all-expenses paid academic and cultural excursion to Lusaka, Zambia. The students visited the University of Zambia to contextualise and benchmark their research areas against those of their hosts.

Strategic international collaborations are strengthening FEBE's position globally. The faculty encourages the building of key academic relationships and network that will ultimately grow and enhance the international profile of the Faculty. These are evidenced by increase in international visitors and interactions of the Faculty.

Figure 9: Africa by Bus 2017

Delegates from China were received by the Head of Departments of Mechanical Engineering Science and Electrical Engineering Science. The other participants included UJ's A Rated Distinguished Professor of Intelligent Systems, UJ's Co Director of the Confucius Institute and academic staff members. It was established that there exists opportunities for mutual co-operation and joint sharing of knowledge and experience. The visit therefore concluded with the intent to formalise a working agreement between Universities. The forging of such global collaborations and agreements remains critical in the Faculty's attempt to enhance its international profile for global excellence.

Figure 10: University for Applied Sciences Ravensburg-Weingarten, Germany

Figure 11: Tsinghua University visits UJ

Strategic Objective 4: Student friendly living and learning environment

Over the years, the Faculty has endeavoured to upgrade its undergraduate teaching laboratories and audio-visual equipment. Particularly, the upgrading of Civil Engineering Technology venues at the Doornfontein Campus, successfully concluded in September 2017, in time for the ECSA accreditation visit. The Perskor Building on the Doornfontein Campus was re-named the Qoboza/Klaaste (QK) Building.

Figure 12: Qoboza/Klaaste (QK) Building: Unveiling and Re-naming - Mr Khulu Sibiya

Creative engineering, technology, science, and craft students at the University of Johannesburg (UJ) received a massive boost in skills development when the University launched its first Makerspace at the Doornfontein Campus's Library and Information Centre on Wednesday, 8 November 2017. The new laboratory, filled with 3D printing and scanning facilities, robots (created from scratch by UJ engineering students), and smart computer technologies, was opened to staff and students for the first time. Pioneering initiatives such as these have successfully enhanced the student learning environment, paving the way for innovative enterprises to follow.

FEBE is proud that The Makerspace project:

- Supports the development of a user's critical thinking and problem solving skills through deliberate experimentation (providing an educational environment often not met in the classroom alone)
- Promotes innovation by encouraging students/faculty to explore fields/equipment outside their traditional university departmental 'silos'
- Encourages true innovation

- Encourages users to explore and get familiar with technologies they may never have been exposed to before providing new knowledge and the opportunity for the user to develop new marketable skills
- Facilitates interdisciplinary collaboration between the highest profile programs at UJ to develop innovative research, products and services.
- Provides an experimental learning space for UJ faculty to explore new teaching methodologies including new pedagogical models that support active learning.
- Is a catalyst that promotes community educational outreach
- Contains an area that allows for 3 dimensional thinking and creativity, equipped with 3D scanners, printers and cameras so that users can bring their creativity to life.

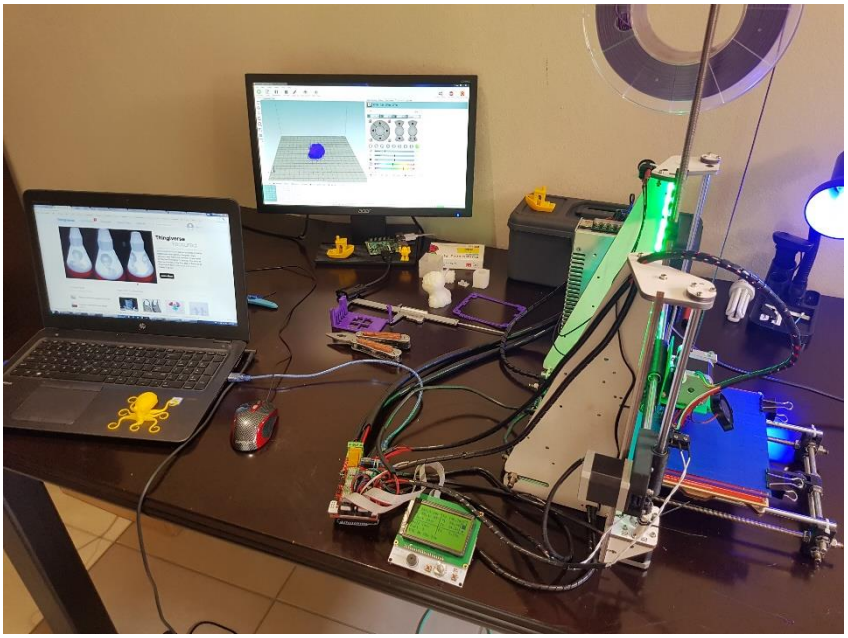

Figure 13: Makerspace 3D area

Strategic Objective 5: National and Global Reputation Management

FEBE remains firmly committed to various levels of engagement and its many stakeholders. Through a number of varied initiatives, projects and networks, the Faculty has enhanced its local and global reputation and reach.

FEBE strives to be a pan-African centre of critical intellectual inquiry through extensive scholarship and balanced participation in the knowledge networks both within and external to the continent. Enhancing the Faculty's national and global reputation management, Executive Dean: Prof Sinha, received the Joint Distinguished Award from the (The Institute of Electrical and Electronics Engineers) IEEE and The *South African Institute of Electrical Engineers (*SAIEE), in October 2017. Prof. Saurabh Sinha was recognised for having continued to serve IEEE in various ways, including as a past Vice President: Educational Activities (member of the IEEE Educational Activities Board (EAB)). In the history of IEEE, over 130 years, this is noted to be the first time for a South African to be elected and to serve the IEEE Board in this significant manner.

During the 4th Annual Africa Engineering Week 2017, Prof Saurabh Sinha presented a Seminar on the Decolonisation of Knowledge in Engineering and Built Environment. FEBE exhibited alongside industry. This event was hosted by the United Nations Educational, Scientific and Cultural Organisation (UNESCO), the Department of Science and Technology (DST), the Engineering Council of South Africa (ECSA) and Central University of Technology (CUT).

Prof Yanxia Sun, Head of Department of Electrical and Electronic Engineering Science was inaugurated into South African Young Academy of Science (SAYAS) in October 2017. The South African Institution of Civil Engineering (SAICE) awarded its prestigious President's Award to the Faculty's compassionate and committed Researcher to Senior Lecturer, Mr Deon Kruger. This accolade ushered in worldwide congratulatory messages from colleagues and professionals in the engineering field, further enhancing the global reputation of the Faculty.

The Faculty has continued to enthusiastically adopt and utilised social media platforms as these allow for targeted and insight-driven promotional strategies. In an effort to increase FEBE's online presence, a Youtube channel has been created with 15 video uploads to date. Followers on Facebook have grown from 3819 (in 2017) to 5008 to date. All social media activity undertaken complies with the institution's social media guidelines. Insights indicate increased engagement levels with a niche user profile ranging from varying engineering disciples, industry practitioners, sponsors, partners, students and staff.

The University of Johannesburg's Faculty of Engineering and the Built Environment in partnership with the Engineering Council of South Africa (ECSA) presented an Engenius

workshop at the Lepono Primary School in Mathibestad, North West Province. The workshop attracted 250 learners from ten poorly resourced and underserviced Primary schools in and around the village. The learners were presented with an enriching program of activities, which commenced with a visual and engaging presentation on the engineering profession. Further engagement involved an official from the Johannesburg Roads Agency on Road Safety.

A presentation on Robotics made learners aware of the roles played by technology and innovation in the country's economy earn. Learners were encouraged to explore robots through basic training on how to build and program robots. The learners further participated in the bloodhound car challenge as well as the civil engineering competitions with commitment, vigour and enthusiasm. The materials provided for the competitions included toothpicks, balloons, jelly tots as well as car model instructional paperboards provided by ECSA. A diverse and dynamic team of 44 delegates from the University of Johannesburg as galvanized by the FEBE: Vice-Dean in Teaching and Learning, Prof Esther Akinlabi, guided and motivated the learners throughout the activities.

In October 2017, Shell South Africa in conjunction with the University of Johannesburg, School of Electrical and Electronic Engineering led by Professor Johan Meyer, hosted the fourth Shell Eco-marathon in Africa. The event was held at Zwartkops Raceway, Pretoria West. The Shell Eco-marathon is a global competition that challenges high school and university students to design, build, test and drive the most energy-efficient vehicle.

FEBE Marketing also participated at the Eskom Expo for Young Scientists exhibitions for grade 4 - 12 learners in the Kenneth Kaunda District. The Eskom Expo is South Africa's primary and only biggest existing science fair for school students and is endorsed by the Department of Science and Technology. It has established itself as a perfect vehicle for South African youth to demonstrate their inventiveness and innovation in science and technology.

Furthermore, FEBE Marketing participated in the 4th Annual Green Youth Indaba from the 28th - 29th June 2017 at the SciBono centre. The engagement was with young eco-preneurs (600) and the objective of the Green Youth Indaba (GYI) is to go beyond exploring opportunities for youth within the green economy but to effectively explore and unpack necessary strategies that can create an easy access to support, green innovations and skills development programmes needed to eradicate youth unemployment and poverty. Participation at more events (focused on STEM) organised by external and internal parties and affiliates included Go for Gold, National Science Week as well as Rural2Rural project.

Strategic Objective 6: Fitness for Global Excellence and Stature (GES)

Enhancing the Faculty's fitness for the Global Excellence and Stature, the Makerspace initiative takes an international concept that allows students the space to think and create 3D objects, sharing thoughts, ideas, and questioning specific topics of interest in using technology.

The evolution of 3D printing has inspired the University to use technology not just in engineering projects, but also in other academic disciplines such as health sciences, art and design. The UJ Makerspace at the Doornfontein Campus is part of the steps taken, bringing students closer to the University's drive and vision towards the Fourth Industrial Revolution.

The Faculty has made strides with its online presence, especially with regard to the online delivery of Short Learning Programmes. In addition, during 2017, online modules were explored to assist with the teaching load of modules to be phased out. These interventions have allowed FEBE to benchmark module delivery with global online initiatives, raising its fitness for GES.

4. EMPLOYEE PROFILE

As at 31 Dec 2017, the Faculty employed approximately 291 staff members in total, 190 of which were academic employees. FEBE's staff compliment has steadily grown to accommodate and mitigate a steady increase in enrolment. Further to this, the Faculty has also embraced the transformation strategy of the UJ, as is evident in the increasing number of designate academic employees in recent years.

TABLE 17: STAFF HEADCOUNT (2013 – 2017) (FACULTY PROFILE, HEDA, 28 APRIL 2018)

	2013		2014		2015		2016		2017	
FEBE HC	Staff Headcount	Academic Staff HC	Staff Headcount	Academic Staff HC	Staff Headcount	Academic Staff HC	Staff Headcount	Academic Staff HC	Staff Headcount	Academic Staff HC
Race										
African	115	65	131	74	148	83	158	90	180	106
Coloured	11	4	13	6	14	7	16	10	12	7
Indian	17	12	14	9	19	13	28	22	25	21
White	96	71	94	70	85	61	80	60	74	56
Grand Total	239	152	252	159	266	164	282	182	291	190

In 2017, the Faculty also appointed 29 new staff members and experienced 27 resignations. 14 promotions took place, (HRIS, Dec 2017). FEBE is proud to note that 17 members of staff received long-term service awards in 2017, bearing testament to the Faculty's pool of dedicated staff members.

FEBE has made steady strides towards the growth of designate professors and associate professors, as is evident in the Table below. However, this goal remains a key drive of the Faculty, along with increasing the number of females in these key positions.

In addition, FEBE staff achievements have continued to make integral contributions towards the strategic growth and profile of the Faculty.

TABLE 18: ACADEMIC STAFF HEADCOUNT BY POSITION (2014 – 2017)

Academic Staff Headcount																									
Year	2014					2014 Total	2015					2015 Total	2016						2016 Total	2017						2017 Total
Position	Associate professor	Junior lecturer	Lecturer	Professor	Senior lecturer		Associate professor	Junior lecturer	Lecturer	Professor	Senior lecturer		Associate professor	Junior lecturer	Lecturer	Other instruc./research	Professor	Senior lecturer		Associate professor	Junior lecturer	Lecturer	Other instruc./research	Professor	Senior lecturer	
FEBE	12	8	65	10	64	159	14	9	71	10	60	164	16	12	65	2	14	73	182	25	13	72	2	14	64	190
African	7	7	31	5	24	74	7	7	38	5	26	83	6	10	39	1	6	28	90	8	12	48	1	6	31	106
Coloured		1	3		2	6	1	1	1	1	3	7	2	1	1		2	4	10	2		1		2	2	7
Indian			3		6	9		1	6		6	13	2	1	7		2	10	22	6	1	6		2	6	21
White	5		28	5	32	70	6		26	4	25	61	6		18	1	4	31	60	9		17	1	4	25	56
Grand Total	12	8	65	10	64	159	14	9	71	10	60	164	16	12	65	2	14	73	182	25	13	72	2	14	64	190

Figure 14: FEBE Nov 2017 – Faculty Breakaway Session

5. PERFORMANCE OF THE FACULTY

FEBE has made substantial progress in elevating the profile and performance of FEBE, specifically over the last five years. A snapshot of these increased key recognitions in recent years, covered in detail elsewhere in this report, includes:

- The growth of staff with doctoral qualifications has significantly grown.
- The enrolment plan of the faculty with a shift to increase postgraduate and stabilise undergraduate numbers has taken place.
- Accredited research publication output units has significantly grown from 126.95 units (2012) to 460 units (2017).
- Graduate outputs have also significantly grown from 1785 graduates (2013) 2405 in 2017.
- Selected programmes approved for online learning. FEBE has moved from none in the past to 2 online postgraduate qualification submitted to the CHE by 2017.
- FEBE programmes incorporating foundations of decolonisation has moved from from none in the past to current state where decolonisation has been contextualised within sustainable development and contextualisation of engineering for the benefit of humanity. The integration has been done via final year project modules, research programmes and within the new bachelor programmes.
- Number of international students has significantly increased, with FEBE contributing significantly towards the institutional target.
- Third stream income has significantly grown.
- Number of designate associate professors and professors has grown, and now include female representation as well.

6. RESOURCE MANAGEMENT AND SUSTAINABILITY

Within the wider UJ financial landscape, activities of the faculty contributed towards an approximate revenue of ZAR 189 million excluding government subsidy, (unaudited as at 6 March 2018). Through the annual budgeting process, the Faculty receives part of this funding towards managing its expenditure.

Tuition fees for 2017 represented ZAR 177 million, with the revenue generated from research productivity which significantly grew to approximately ZAR 10.2 million (1% of the total revenue). Income from research productivity is primarily ploughed back into the research and innovation enterprise. It is also noted that SLPs presented by the faculty steadily grew and, in this way, serve the South African public and private sector landscape. Once again, in terms of expenditure, salaries featured as the largest expense: ZAR 220 million, which indicates a 6 % increase from 2016's total of 149 million. This represents 90 % of the total expenditure of the faculty and approximately a third of the total revenue. Full-time permanent or fixed-term contracted staff accounted for 88 % of the salaries expenditure (ZAR 135 million) whilst temporary staff accounted for 12 % (ZAR 18 million).

The Faculty once again scrutinised monthly budget expenditure reviews, specifically managing line items not supporting the core business functions such as functions and entertainment and telephone costs. Operating expenses amounted to ZAR 15.6 million (5 % of revenue) in line with the budget allocation of ZAR 17.6 million. In light of the current economic landscape, both internal and external to UJ, the Faculty has therefore also continued to pursue external funding and strategic partnerships.

7. LEADERSHIP

The 2017 academic year saw the appointment of two new Vice-Deans to the posts of Vice-Dean Postgraduate Studies, Research and Innovation (Professor Clinton Aigbavboa) and Vice-Dean Teaching and Learning (Professor Esther Akinlabi). The smooth transition has helped the Faculty maintain stability and momentum. The year also ended with the exit of the Executive Dean of the Faculty, Prof Saurabh Sinha, who took up the position of Deputy Vice-Chancellor: Research & Internationalisation of the University. Whilst his direct absence will be missed, the leadership skills he helped develop within the faculty has helped the Faculty maintain its strategic trajectory and stability. Prof Charles Mbohwa, former Vice Dean Postgraduate Studies, Research and Innovation, serves as Acting Executive Dean until a permanent appointment is made in 2018.

In addition, the year also saw staff members take up the mantle of Head of Department. Dr Mashinini, Madindwa now serves as HoD of the Department of Mechanical and Industrial Engineering on the Doornfontein Campus. Prof Jalama Kalala heads up the Department of Chemical Engineering Technology, also on Doornfontein. Constant coaching and monitoring has ensured relevantly smooth transitions, with support from the FEBE Executive.

In addition to this, individual staff accomplishments have built leadership capacity within the Faculty. The introduction of departmental marketing ambassadors, accreditation specialists, programme and year co-ordinators adds to the layers of the leadership capacity within a department, and inherently the faculty at large. Just one such accomplishment includes Prof Prof Fulufhelo Nelwamondo, who was the recipient of the Order of Mapungubwe.

Prof Sinha with Recipient of the Order of Mapungubwe, Prof Fulufhelo Nelwamondo

8. REFLECTIONS, CONCLUSION AND WAY FORWARD

The Faculty has made significant progress over the last five years in all spheres. It is poised to maintain this trajectory into the future. It is necessary that reflections of the main successes be done so that growth in performance in the future is more assured.

8.1. Times Higher Education World Universities Ranking

The Times Higher Education World Universities Ranking system has put FEBE under pressure.

The weightings for the engineering and technology ranking used are:

· Teaching: the learning environment 30.0 per cent (Reputation Survey of employers 15% , Staff to student ratio 4.5%; Doctorate to bachelors ratio 2.25%; Doctorates awarded to academic staff ratio 6% and institutional income 2.25%): Strategy: FEBE needs to add people that know its systems well to the employers database. There is also a need to move towards having 100% of staff with doctoral qualifications. There is also a need for higher postgraduate to undergraduate ratio.

· Research: volume, income and reputation 30.0 per cent (Reputation survey of peers: 18%; Research income: 6%; Research productivity: 6%). Strategy: FEBE academics need to collaborate with many peers so that they know the Faculty well. The Faculty needs to add academic peers that know the faculty well to the databases of ranking agencies to get a fairer assessment. FEBE academics must aim to have high impact research and outputs. The Faculty needs to support more inbound and outbound programmes. It has to raise more external research income. FEBE must maintain the growth of its research productivity- publication output quantities as well.

· Citations: research influence (Normally 30%) 27.5 per cent. This is completely dependent on Scopus data hence the need to focus on Scopus indexed journals and conferences. FEBE has many high quality journal papers, books, book chapters and conference papers that are published in unknown and non-accessible/ non-indexed media. FEBE academics must be advised to choose publication outlets very carefully.

· International outlook: staff, students and research 7.5 per cent (International-to-domestic-student ratio: 2.5%; International-to-domestic-staff ratio: 2.5%; International collaboration: 2.5%). FEBE will need to accept international students as early as June of every year so that they can get VISAs on time. It may be necessary to mobilise partial funding to clear registration fees and other preliminary costs for international students. Furthermore, the Faculty needs to attract academic staff from all over the world. A good

strategy can be to extend every conference visit into substantive and useful international collaboration opportunity.

· Industry income: innovation (Normally 2.5%) 5.0 per cent- (Based on value of research income from industry per staff member). Our numbers as academic staff increased from 140 in 2013 to 180 in 2017. Strategy: Industrial income should increase as a percentage at a greater pace than the percentage increase of academic staff. Any amount of industrial income large or small can have an impact. The Faculty can increase funding by collaborating with CSIR and other research institutions; by carrying out a census and engaging all Alumni so that they can assist; Developing very large databases of industries/organisations/ governments institutions that the different departments and units can engage with a view to get/attract funding.

The threshold to be ranked is 500 Scopus listed articles over a 5-year period. It is important to have many documents on Scopus in order to qualify. The more the better. Strategies: The conference organised by FEBE must apply for Scopus-indexing. The FEBE researchers must be advised to target potentially Scopus-listed conferences. FEBE staff must be capacitated with skills to write excellent research monographs. This way each chapter can be individually Scopus-listed.

8.2. QS World University Ranking:

UJ has stayed in the 601 - 650 group in the QS WUR since 2013. However given that there are now approximately 26 000 universities globally (as indicated and ranked by QS), UJ has moved from being in the top 4% to being in the top 2.3% of universities in the world.

Mining Engineering was placed second in SA. Strategies: While the performance of mining Engineering can be due to the strength in science, there is an opportunity for FEBE researchers to scale this performance up by becoming active researchers and by collaborating with relevant units in the Faculty of Science to improve quality and quantity of research outputs. The student staff ratio may require a Germany approach of having doctoral and masters students as employees (research scientists and research engineers). In USA teaching assistants and research assistants are used. The current employments of assistant lecturers; tutors and senior tutors can also be leveraged.

8.3. Shanghai Ranking's Academic Ranking of World Universities (ARWU)

UJ made its debut in the Shanghai Rankings in 2017 by being ranked in the 401 - 500 group. It was placed joint fourth in South Africa together with SU and UKZN. The strategies for improving ranking include: FEBE aiming to publish in Nature and Science and other

high impact factor journals; Web of Science Core Collection: Science Citation Index-Expanded (sci-expanded) and Social Science Citation index (ssci). Some of the FEBE publications are in these indexed databases. The quantities can be improved; Highly cited researchers (Challenging- constraints imposed by Clarivate Analytics in each subject area- Need many highly cited researchers. This is a long-term objective unless such individuals are recruited.

8.4. General Ideas and Comments on How FEBE can Improve Status

Surveys- 2% of the targeted respondents are from Africa. This is one of the biggest hindrance. This and other risk identified in this document can be reduced by:

- High level internationalisation- collaboration, mobility both inbound and outbound and attending conferences.
- More co-authorship with Internationals
- Maximising OROSS and Institutional Repository presence to attract citations
- Engaging in interdisciplinary work
- Joint-research with international partners
- Adding links to email signatures;
- Use of social media- Research gate; Google Scholar, Facebook; Twitter; LinkedIn etc:
- Engaging employers- including in Advisory Boards/ Committees/ Councils- Consultative assemblies; guest lectures, mentorship programmes and faculty-focused career fairs;
- Maximising the role of Alumni to improve on many fronts- income from industry; surveys.

8.5. Reflections on Improving Performance in "Global Excellence in Research and Innovation"

- All Departments and Schools in FEBE must drive this Objective
- Improving role of the Departmental Boards and School Committees in Postgraduate Studies Research and Innovation
- The need for bridging SLPs at NQF Level 8 and for credit bearing substitute courses NQF Level 9. These must be activated FEBE-wide and can potentially bring more income than research publication outputs subsidies.
- If a programme has say 210 doctoral students- Is it possible to increase in number of graduates- ideally 70 graduates per year by focused supervision and management.
- If we have 1200 Masters students, can we ideally graduate 300 per year. Allowing each to study for 4 years.
- Regularising SLPs FEBE-wide. Start with a zero budget and volunteerism when participant numbers are small to salary subvention as programmes grow.

- Build Alumni database FEBE-wide- This can be done by the Continuous Professional Development Committee ad by departments.
- The development of professional doctoral programmes- These will be potential Professors of Practice.
- Investigating the possibility to run select SLPs and postgraduate programmes in select African countries- especially the SLP format. Supervision and co-supervision can be outsourced to these countries. Some of the content can be delivered through online programmes/ blended learning.
- Strategic partners in the rest of Africa can be identified for collaborative opportunities
- Ensuring that MOAs have tangible benefits and outputs
- Outbound and inbound programmes/ (Planned future collaborations) Outbound plans by bus to neighbouring countries for postgraduate students
- Having a committee under the Vice-Deans to activate all approved Short Learning Programmes
- School and Departmental should develop and finalise guidelines for masters/ doctoral proposals, theses and dissertations by the end of March 2018. These will be guided by our FEBE guidelines.
- All Departments- HODs must ensure that enrolment targets and graduation targets for postgraduates are met.

8.6. Global Excellence in Teaching and Learning

- Accreditation Visits: Concerned Departments to ensure good preparedness and success. All academic staff members to be available during the visit. Performance contracts to include ECSA requirements per academic staff.
- Marketing B. Eng Tech to overcome challenging take-off.
- Ensuring that MOAs have tangible benefits and outputs
- Enhancing and expanding participation in Scholarship or Teaching and Learning
- Addressing all accreditations and related issues up to 2023?
- Outbound and inbound programmes by bus to neighbouring countries for undergraduate students
- Investing in laboratories and computers. There is new money to equip all laboratories and to replace 1325 computers in FEBE over the next three years.
- All Departments- HODs to ensure that enrolment targets for new undergraduate students are met every year.
- A conversation is needed about replacement of supplementary and special examinations to allow for two assessment opportunities per module per semester.
- Implements Departmental Board/ Committee of Examiners to meet one week after the last examination of every session or during the last week of November each

year, to look at progression of every student between levels- say from year 1 to year 2 etc. and to graduation.

- The number of national diploma students in need of P1 and P2 / work integrated learning is large due to existing backlog. A plan to clear backlog P1 and P2/ work-integrated learning students' clearance plan for FEBE has been developed with a view to planning to ensure that all students in need of P1 and P2/ work-integrated learning are assisted.

Mapping the way forward, the Faculty is committed to strategic renewal, the decolonisation of knowledge, new innovative research centres, as well as joint international research centres, book incentives, focussed mentorship, strategic leadership rejuvenation and a focus on a higher quality of publications.

A key focus area for the future of FEBE remains the faculty's growth and sustainability, given the new pool of undergraduate programmes. In addition, the Faculty has made strides to implement the University's postgraduate growth strategy and it is intended that the undergraduate pool of offerings will follow suite.

The Faculty is committed to the strategic objectives of the UJ, and looks forward to the incorporation of Industry 4.0 initiatives, dialogue and projects in order to achieve them.