



UNIVERSITY
OF
JOHANNESBURG

FACULTY OF
ENGINEERING
AND THE BUILT
ENVIRONMENT

ANNUAL
REPORT
2023





FACULTY OF ENGINEERING AND THE
BUILT ENVIRONMENT

ANNUAL REPORT

2023

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1

EXECUTIVE SUMMARY

The Faculty of Engineering and the Built Environment (FEBE) has continued to significantly contribute towards the strategic objectives of the university and the United Nations Sustainable Development Goals, (UN SDGs). From obtaining the highest faculty research input units at the University of Johannesburg, to bold innovative teaching and learning methods, FEBE has pushed itself to re-imagine and engineer the higher education landscape of tomorrow. FEBE lives the 4IR strategy of the university, evident in the use of innovation, technology and the faculty's agility and adaptability to ensure business continuity, amid a myriad of socio-economic pressures.

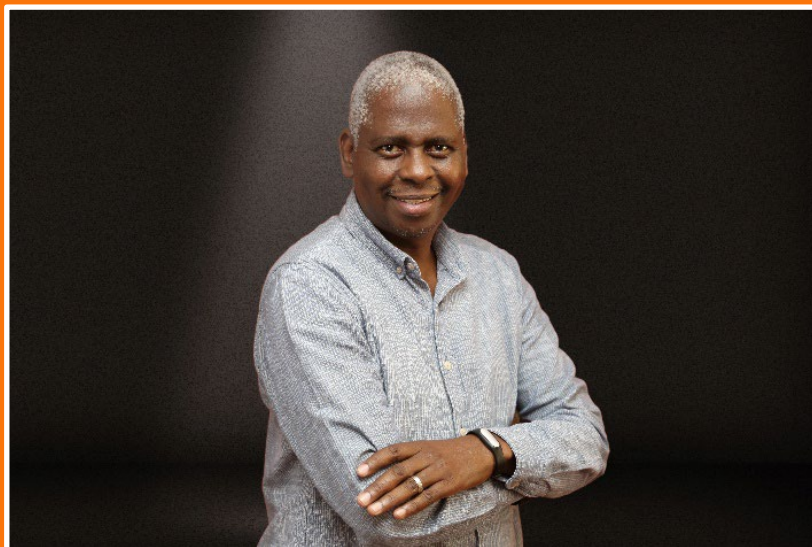


Image 1: Executive Dean – Prof Daniel Mashao

FEBE is the second largest faculty at the University of Johannesburg and the largest in the Science, Engineering and Technology (SET) category. FEBE's total student headcount for 2023 totalled 9 765, a marked increase from the total 2022 headcount of 9 254, (HEDA, Dean's Infographics

2022). The increase in headcount in 2023 is significant in that it affirms the faculty's current contribution towards the strategic SET growth of the institution and is also in line with addressing the national scarce skills of the country. The faculty's societal impact is however significant, in that FEBE's philosophy towards teaching, impact-driven research and special projects, does indeed reach and uplift communities.

FEBE has maintained stability and planned strategic growth in key areas. The faculty has also cemented and affirmed its commitment towards the quality of teaching and learning through the successful accreditation of its programmes. Stability, sustainability, and impact will remain the key focus areas of FEBE's current and future trajectory.

2 FEBE AT A GLANCE

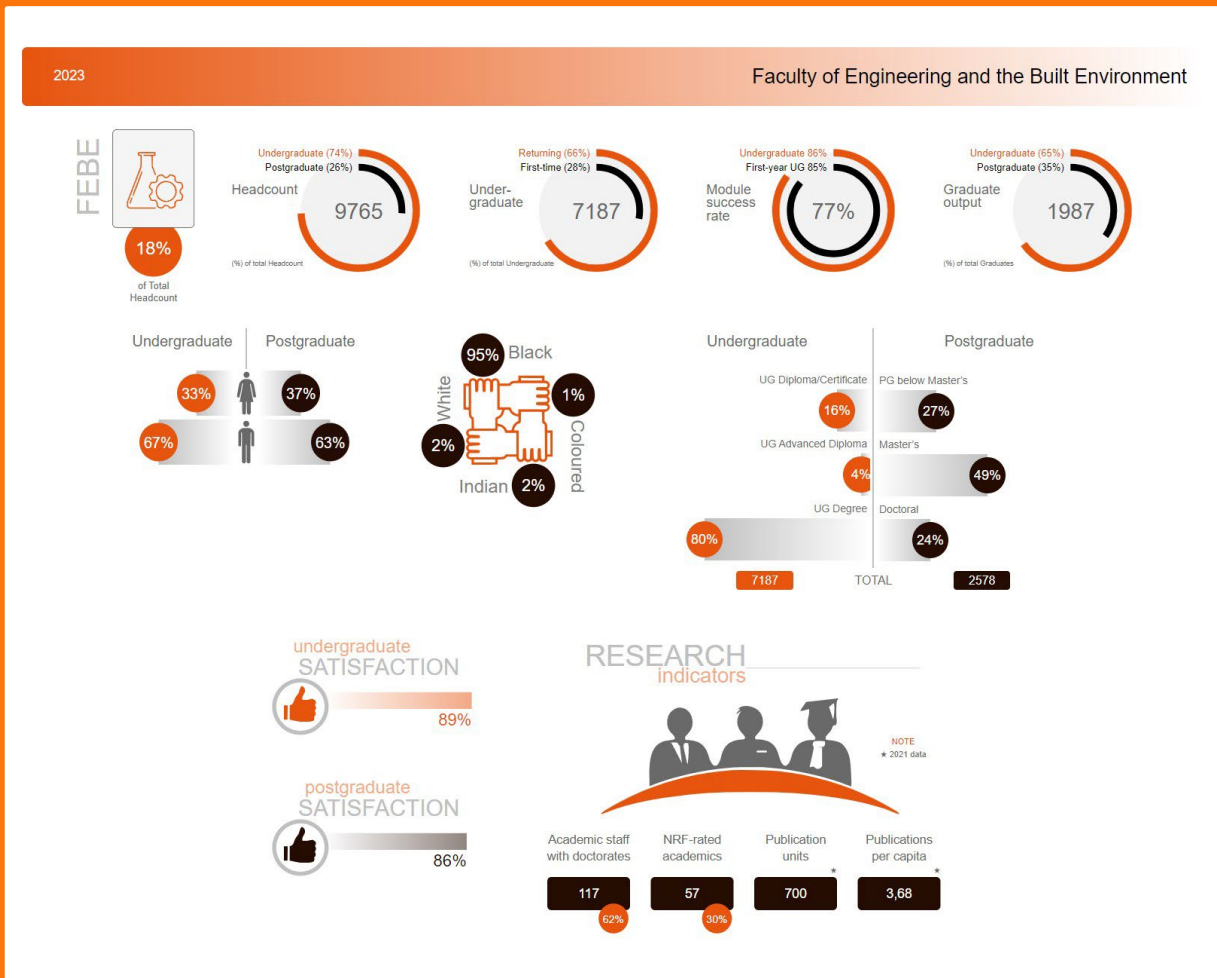


Image 2: Dean’s Infographic (HEDA, 27 Feb 2024)

At a glance, for the 2023 academic year, it is significant to note that the faculty enrolled 200 additional first-time entering students than in the previous year. In so doing, FEBE's increased

first-time entering student enrolment has shifted the faculty towards an 74 % undergraduate and 26 % postgraduate split.

FEBE has maintained stability and its planned growth in strategic areas and has proved to be agile, adaptable and innovative in response to external sources of disruption and change. The faculty's student satisfaction rates remain fairly high, at 89% for undergraduate respondents and 86% for postgraduate.

In the area of research excellence, FEBE is proud, not only of its departmental contributions towards its research output targets and sectoral innovation, but also of the significant contribution made by its research centres and technology stations.

As FEBE's efforts grows its own timber, by increasing the number of staff with doctoral degrees, the faculty has performed outstandingly well in the area of research and innovation.

3

FACULTY GOVERNANCE

FEBE governance structures have continued in ensuring academic oversight and programme quality as the year progressed. These committees comprise firstly, the Technology Programme Committee (TPC) that governs the operational and academic quality of undergraduate engineering technology, built environment and management programmes. Secondly, the Engineering Science Programme Committee (ESPC) governs undergraduate engineering science related programmes.

Further to this, the Faculty Higher Degrees Committee (FDHC) governs postgraduate programmes whilst the Faculty Research Committee (FRC) governs all research related items. Supporting these Faculty-level structures, School research committees provide guidance and support related to strategic postgraduate initiatives. The Faculty Executive (FExCo), who meet regularly, also continue to ensure strategic oversight, good governance and direction in relation to high-level operational, financial and resource related matters.

FEBE's robust and well-functioning governance structures ensured the academic integrity of the key decision-making processes undertaken in 2023. FEBE's robust and well-functioning governance structures ensured the academic integrity of the key decision-making processes undertaken in recent years, despite the disruptiveness of recent years and its impact on academic endeavours.

The decisiveness and oversight offered by such committees proved to be an invaluable resource that steered the Faculty in the right direction: towards successful completion of the academic year.

The Faculty also has an active Industry Advisory Board (IAB) composed of high-profile members from the local industry, including ESKOM, CSIR, Rand Water, the Government, local banks and ECSA. The Board has proved to be an essential mechanism for the Faculty to keep abreast of critical national engineering challenges, which are fed back into the programmes in order to keep them relevant. In addition, the IAB facilitates fundraising and student placement in the industry for experiential learning and vacation work.

The IAB advises the Faculty on important higher education issues such as transformation, equity and strategic recruitment, amongst other matters. Also pivotal, is their feedback regarding industry direction, trends, needs and challenges.



Image 3: FEBE Industry Advisory Board

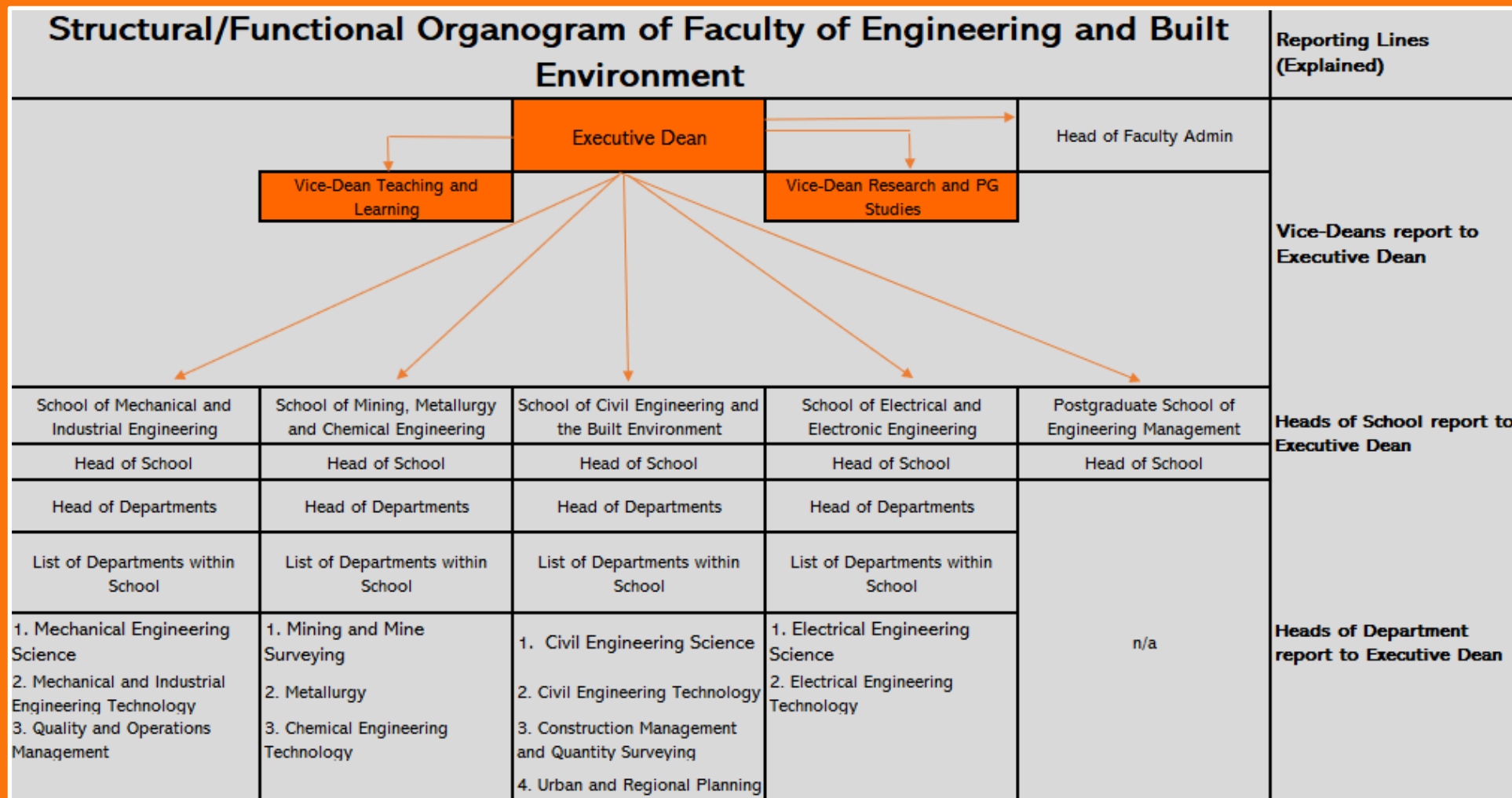


Image 4: FEBE Academic Schools and Departments - 2023

4 FACULTY RISK MANAGEMENT

FEBE actively monitors various risks, included in the Faculty's Risk Register, which appears as a standing item on the Faculty Executive Committee (FExCo) agenda. Risks are identified for closer monitoring, and action items and progress are discussed in-depth during these meetings. In this way, the FExCo is aware and tasked with specific actions to ensure risks are timeously mitigated.

- **Programme Accreditation:**

The major risk identified in 2023 related largely to the potential loss of professional accreditation for the Bachelor of Civil Engineering Technology programme. The Faculty however, did receive full accreditation for this programme, until the next accreditation cycle. Monitoring, preparation and faculty expertise of ECSA processes and policies, ensured that this programme be accredited, along with the other ten (10) ECSA affiliated undergraduate engineering programmes.

Professional Body accreditation of FEBE undergraduate programmes has and continues to feature as a major risk for faculty and is therefore constantly monitored and supported by the executive management committee of the Faculty. The FExCo ensures that accreditation preparation plans are closely and actively monitored and actioned. FEBE also consults with external accreditation experts to ensure its preparations are full, complete and deal effectively with blind spots not apparent to the faculty.

In addition to the risk to the accreditation of programmes, FEBE also successfully managed the risk associated with the transition to a hybrid approach to teaching and learning.

Close monitoring of student progress, departmental engagement and feedback aided the process effectively, ensuring a relatively smooth and informed transition.

- **Recruitment and vacancies:**

In the scarce skills sector of engineering, filling vacancies has proved challenging for the faculty. It is for this reason that close monitoring and vacancy statuses are reported at FExCo meetings. FEBE has continued to try to attract and retain skilled staff. The recruitment process has proved challenging, given the competition with industry-related salaries. Improved recruitment and headhunting strategies are required to maintain a competitive edge and maintain adequate staff numbers. The FExCo, together with its Human Capital Partner meet regularly to monitor this risk, and ensure processes are expedited to minimise delayed recruitment processes.

Table 1: FEBE Staff to Student Headcount and FTE Ratios (HEDA, Faculty Profile Report)

Calendar Year	ACAD (PE) STAFF (A)	STUDENT HEADCOUNT (B)	RATIO (B/A)	ACAD (PE) STAFF FTE'S (C)	STUDENT FTE ENROLLED (D)	RATIO (D/C)
2022	182	9,142	1:50	86.72	5,226.90	1:60
2021	188	9,059	1:48	173.43	5,076.33	1:29
2020	186	8,931	1:48	172.08	4,540.22	1:26
2019	189	10,179	1:54	174.32	5,447.57	1:31
2018	187	9,835	1:53	178.46	4,960.90	1:28
2017	188	9,398	1:50	178.36	4,383.96	1:25
2016	181	9,604	1:53	165.18	4,446.51	1:27
<i>FTE: Full-Time Equivalent</i>						

- **Professional Registration and the Identification of Engineering Work (IDoEW):**

A newly identified risk, given the new legislation on the Identification of Engineering Work (IDoEW), makes ECSA professional registration compulsory for those academics with departmental leadership responsibilities or those involved with the assessments of graduate attributes (GAs). As such, the faculty executive commenced workshops to encourage and assist academics with their professional registration pathway. This includes registration mentorship and registration workshops. The faculty also pays for one professional registration per staff member.

Over recent years, FEBE has mitigated risks with not only inclusive leadership but also as a result of the depth of academic, operational and administrative expertise within its staff compliment, such as Heads of Department. The faculty has therefore proven, especially in recent years, that it is confident of mitigating risks within its power to do so.

5 STRATEGIC OBJECTIVES

In addition to the six strategic objectives of the University, FEBE also contributes to, and is guided by its growing contributions towards the UN SDGs. Departments annually report on decolonisation strategies, 4IR initiatives, SDG projects and curriculum content changes that furthers the UJ strategic objectives and inculcates it into society, communities, and classrooms.

5.1 Strategic Objective 1: Research and Innovation

Historically, FEBE has consistently promoted a culture of excellence in research and innovation. The faculty has, over the years, consistently met research output targets, often exceeding them. The past reporting year was no different, with FEBE reaching 700 units (OROSS - Online Research Output Submission System, as yet un-audited).

New research centres are also a source of enhancing the research profile of the university. An innovative Hybrid Teaching and Learning and Research centre, the Automotive Centre, was developed in the past year.

Given the growth of postgraduate student enrolments in recent years, there is a renewed focus on supervisor training and development, initiated by the Executive Dean. To enhance its suite of postgraduate offerings, FEBE has focused on introducing a number of new specialised postgraduate

programmes, aimed to address critical industry needs and national skills deficits. Programmes approved in 2023 for implementation in 2024 include the Master of Sustainable Advanced Materials and the Master of Engineering in Electrical and Electronic Engineering. Coursework Master's programmes such as these aim to cater for the working professional.

Table 2: UJ FEBE Research Structures List (as at 25 August 2023)

FEBE RESEARCH CENTRES/INSTITUTES
1. Mineral Processing and Technology Research Centre
2. Sustainable Materials and Manufacturing Research Centre (jointly with Nanjing Tech University in China)
3. Sustainable Human Settlement and Construction Research Centre
4. Centre for Nanoengineering and Advanced Materials (CNAM)
5. Centre for Applied Research and Innovation in the Built Environment
6. Centre for Collaborative Digital Networks
7. Centre for Sustainable Material and Construction Technologies (SMaCT)
8. Atomic Layer Deposition Research Centre (ALDRC)
9. Centre for Cyber Physical Food Energy and Water Systems (CCP-FEWS)
10. Centre for Ecological Intelligence (CEI)
11. Centre for Smart Information and Communication Systems (CSICS)
12. Construction Industry Development Board Centre of Excellence
13. The Nuclear Research Centre

Table 3: Postgraduate Headcounts and Graduates (2021 – 2023)

POSTGRADUATE HEADCOUNTS AND GRADUATES	Headcounts	Graduates	Headcounts	Graduates	Headcounts	Graduates
	2021		2022		2023	
FEBE						
DEANS OFFICE: ENGINEERING	2	0	4	0	6	0
DEP OF CHEM ENG TECHNOLOGY	76	18	79	24	92	41
DEP OF CIVIL ENGINEER SCIENCE	154	13	147	22	139	22
DEP OF CIVIL ENGINEER TECH	45	18	55	42	58	49
DEP OF CONSTRU MGT & QUANT SUR	261	121	329	106	440	154
DEP OF ELEC & ELEC ENG SCIENCE	228	33	247	46	267	48
DEP OF ELECTRIC ENG TECHNOLOGY	46	18	57	36	51	32
DEP OF MECH ENG SCIENCE	205	35	233	41	252	34
DEP OF MECH&IND ENG TECHNOLOGY	151	97	153	69	188	100
DEP OF METALLURGY	107	30	124	48	124	53
DEP OF MINING ENG&MINE SURVEY	29	19	49	22	55	24
DEP OF QUALITY & OPERATION MGT	252	93	238	95	273	118
DEP OF URBAN & REGIONAL PLAN	156	33	190	59	191	60
POST GRAD SCHOOL OF ENG MAN	472	91	458	110	442	108

To support and maintain these enrolment numbers, FEBE has renewed its commitment to develop and support its staff in the supervision process, such that the workload of supervision is shared fairly and effectively managed. It is hoped that these developmental initiatives will increase the throughput in the faculty's postgraduate programmes.



Image 5: FEBE 2023 Postgraduate Awards Ceremony

FEBE was able to attract both internal and external research funding totalling R135 million in the past academic year. FEBE has continued to successfully contribute towards the research objectives of the University. The faculty has also remained committed to the strategy that research-led teaching proves more beneficial towards both research and innovation and teaching and learning.

5.2 Strategic Objective 2: Excellence in Teaching and Learning

Student enrolment profiles shifted in 2023. The undergraduate complement of students grew significantly from 2 363 in 2022 to 2 578 in 2023 (HEMIS HEDA Data, 26 Feb 2024). Simultaneously, postgraduate enrolment has also increased steadily over the years, in line with the strategic postgraduate growth of the institution, from 2 037 in 2020 to 2 578 in 2023.

With the lack of growth in the academic staff complement in recent years, vacancies and recruitment processes are monitored closely at the level of the Faculty Executive, remaining a standing item on the faculty's risk register. Increased teaching loads and research commitments are mitigated at both a departmental and faculty level.

The dedication, commitment, and adaptability of FEBE staff is evident in the excellence of teaching and learning and continuous exemplary research productivity, despite these growing concerns.

Table 4: Undergraduate and Postgraduate Enrolment Trends (2020 – 2023)

Headcounts	2020	2021	2022	2023
Undergraduate	6 894	6 875	6 900	7 187
Postgraduate	2 037	2 184	2 363	2 578
Grand Total	8 931	9 059	9 263	9 765

Following the decreased enrolment during the phase-in and phase-out processes of recent years,

student numbers have quickly recovered. FEBE implemented the Higher Education Qualification Sub-Framework (HEQSF) - aligned suite of programmes from 2017 onwards.

As a result, graduates of these programmes have steadily increased in recent years, commencing from 2020. FEBE produced 1 987 graduates in the 2023 academic year, an increase from the 1 930 in 2022.

Table 5: Undergraduate Headcounts and Graduates

UNDERGRADUATE	Headcounts	Graduates	Headcounts	Graduates
YEAR	2022		2023	
DEP OF CHEM ENG TECHNOLOGY	350	54	380	61
DEP OF CIVIL ENGINEER SCIENCE	518	33	537	51
DEP OF CIVIL ENGINEER TECH	646	86	719	100
DEP OF CONSTRU MGT & QUANT SUR	290	51	298	89
DEP OF ELEC & ELEC ENG SCIENCE	465	59	463	62
DEP OF ELECTRIC ENG TECHNOLOGY	457	89	456	77
DEP OF MECH ENG SCIENCE	471	49	491	64
DEP OF MECH&IND ENG TECHNOLOGY	1 121	162	1 192	217
DEP OF METALLURGY	636	142	601	127
DEP OF MINING ENG&MINE SURVEY	487	93	516	83
DEP OF QUALITY & OPERATION MGT	1 347	361	1 430	370
DEP OF URBAN & REGIONAL PLAN	112	31	105	26

5.2.1 Student Success Initiatives

Student success and support remains a key focus of teaching and learning. A number of student success and curriculum review sessions have taken place in the faculty, identifying areas for improvement and further interrogation. Measures related to student success in the FEBE including

throughput in minimum time, dropout rates and graduation rates have indicated performance that is below expected norms in the University and nationally.

However, maintaining student success rates in engineering and built environment faculties around South Africa remains a challenge, and it is widely acknowledged that student success needs to be tackled. National conversations around engineering curricula as part of the Integrated Engineering Curricula (IEC) project, which involves most engineering institutions in South Africa, have identified student success as a key driver for change.

The faculty has approached the development of the student success plan by engaging with FEBE's departments as important stakeholders in the process. A workshop was held in November 2023 where each department in the faculty was asked to reflect on their current student success data, highlight current issues affecting student success, report on current initiatives underway to positively influence student success and identify possible future interventions.

All departments in the faculty were involved in this process – 12 undergraduate departments and one postgraduate school. Although the focus of the workshop and these reports is undergraduate success, valuable insights can be provided by also involving the postgraduate school in these discussions.

Additional presentations were also included from the Undergraduate Dropout survey report, the UJ and FEBE Mentorship programme and the UJ Institutional Quality Review on undergraduate assessment. The findings from this initial workshop have been analysed and integrated into a proposed plan to tackle student success issues in the short term and the long term. An action plan has been prepared identifying action items, deadlines and required resources.

The faculty acknowledges that improving student success in the FEBE is a long-term project that requires shifts in the teaching and learning culture of academic staff and students. Although it is possible to put remedial interventions in place to boost student success in isolated pockets, the

faculty believes that more work is required to tackle the underlying root causes and produce sustainable impact on student success, lifelong learning, and preparedness for the world of work.

FEBE therefore anticipates that it will take time for student success measures to show improvement but that if interventions are successful, the improvement should continue for years to come. This will however also require sustained focus on the initiatives, and it is recommended that these interventions are ultimately not seen as once-off activities but a change in the way that teaching and learning in the FEBE operates.

5.2.2 FEBE Programme Quality Assurance

In addition to FEBE's sound teaching and learning governance structures, there are five professional bodies associated with undergraduate programme accreditation, which enhance and maintain programme quality management in FEBE.

A large part of the teaching and learning portfolio includes accreditation for professional engineering and built environment programmes. These bodies include 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). Professional body visits and accreditation have proven to elevate the quality of FEBE's undergraduate programme offerings, confirming the academic integrity and global competitiveness of FEBE programmes.

Professional accreditation of FEBE programmes validates the quality of its programme offerings whilst simultaneously enhancing the reputation and integrity of the institution. In 2023 and early 2024, FEBE concluded the current accreditation cycle, receiving official confirmation of previous

accreditation visits. The faculty now prepares for the next cycle, having successfully accredited all programmes affiliated with professional bodies.

- SACPCMP: The faculty received feedback on the 2023 South African Council of Construction Management Professionals (SACPCMP) accreditation visit. Full accreditation was granted until the next accreditation cycle.
- SACPLAN: The full accreditation report from SACPLAN was received in early 2024, confirming accreditation until the next cycle.
- ECSA: Official feedback regarding the Bachelor of Engineering Technology in Civil Engineering was received from ECSA, receiving full accreditation until the next cycle.

FEBE boasts a high success rate of programme accreditation, a testament to the rigorous preparation plans, mock accreditation visits and key relationship management skills that went into preparing for these visits.

The majority of undergraduate programmes, together with some Honours programmes, are affiliated with a professional body in order to facilitate professional registration of the FEBE graduates. This ensures higher employability prospects for the FEBE graduate. These programmes are continuously improving with each successful accreditation cycle. As such, the focus is to maintain the sustainability and integrity of the existing undergraduate programmes.

5.3 Objective 3: International Profile for GES

FEBE contributes significantly to the University's vision to be an international university of choice. Comparatively, FEBE attracts a large contingent of international students, steadily growing each academic year. This offers the Faculty the academic rigour associated with a diverse student and staff population. Although this has proved more challenging in recent years, following the pandemic and increasing challenges with student visas, FEBE has continued to attract both international staff and students.

Table 6: FEBE International Enrolments (HEDA, Dean's KPI Report 2023)

Enrolments: International			2023	2022	2021	2020	2019
	Total UG	No. of Headcounts	633	616	629	645	789
		No. of Registrations	639	619	628	656	793
		No. of Admissions	1023	816	695	914	1088
		Registration Yield on Admissions	62.5%	75.9%	90.4%	71.8%	72.9%
	Total PG	No. of Headcounts	564	543	509	522	467
		No. of Registrations	578	563	564	564	506
		No. of Admissions	820	807	774	754	694
		Registration Yield on Admissions	70.5%	69.8%	72.9%	74.8%	72.9%
Total (UG AND PG)	No. of Headcounts	1197	1159	1138	1167	1256	
	No. of Registrations	1217	1182	1192	1220	1299	
	No. of Admissions	1843	1623	1469	1668	1782	
	Registration Yield on Admissions	66.0%	72.8%	81.1%	73.1%	72.9%	

Examples of international engagements include a visit from students from The Northwestern University in the USA visited the FEBE Department of Mining Engineering and Mine Surveying and had the opportunity to meet with Prof Hennie Grobler (HOD of Mining and Mine Surveying), to discuss various aspects of the mining industry.



Image 6: Northwestern University (USA)visiting Mining (DFC)

5.4 Objective 4: Student Friendly spaces

FEBE consistently evaluates the learning environment of its students in order to enhance programme delivery, especially given the technical skills taught in a majority of its programmes. FEBE pushes the envelope when it comes to out-of-the-box teaching and learning methods. Some of these learning environments include gamification in the classroom, 4IR and digital laboratories and Virtual Mine Simulators.



Image 7: Innovative Teaching at FEBE' s 4IR Experience Lab

Practical training and equipment forms an integral part of the teaching and learning process at FEBE. In 2023, a team of lecturers, from the Thermofluids cluster from the FEBE Department of Mechanical and Industrial Engineering Technology, visited the Nissan Simulation plant. This followed the successful handover of two NISSAN NAVARA's to be used for practical learning.



Image 8: FEBE Visit to Nissan Simulation plant

FEBE laboratories are now shared throughout the Faculty as required, administered using the centralised timetable, with the benefit that upgrades of these venues are undertaken at institutional level.

As part of its annual preparation, the Faculty undertook an audit of its laboratory and computer facilities each year. Sizeable investments were made to ensure the safety, maintenance and proper storage of FEBE materials and equipment. In this way, the Faculty has made significant plans towards compliance, improvement and safety of students' learning environments, in light of growing number of student enrolments in the faculty.

5.5 Objective 5: National and Global Reputation Management

FEBE staff accomplishments especially, have also served to enhance the national and global reputation of the faculty. At its core, it is FEBE staff, their expertise, impactful and innovative research in the engineering and built environment sectors, that build and grow the faculty's reputation and stature, both locally and abroad.

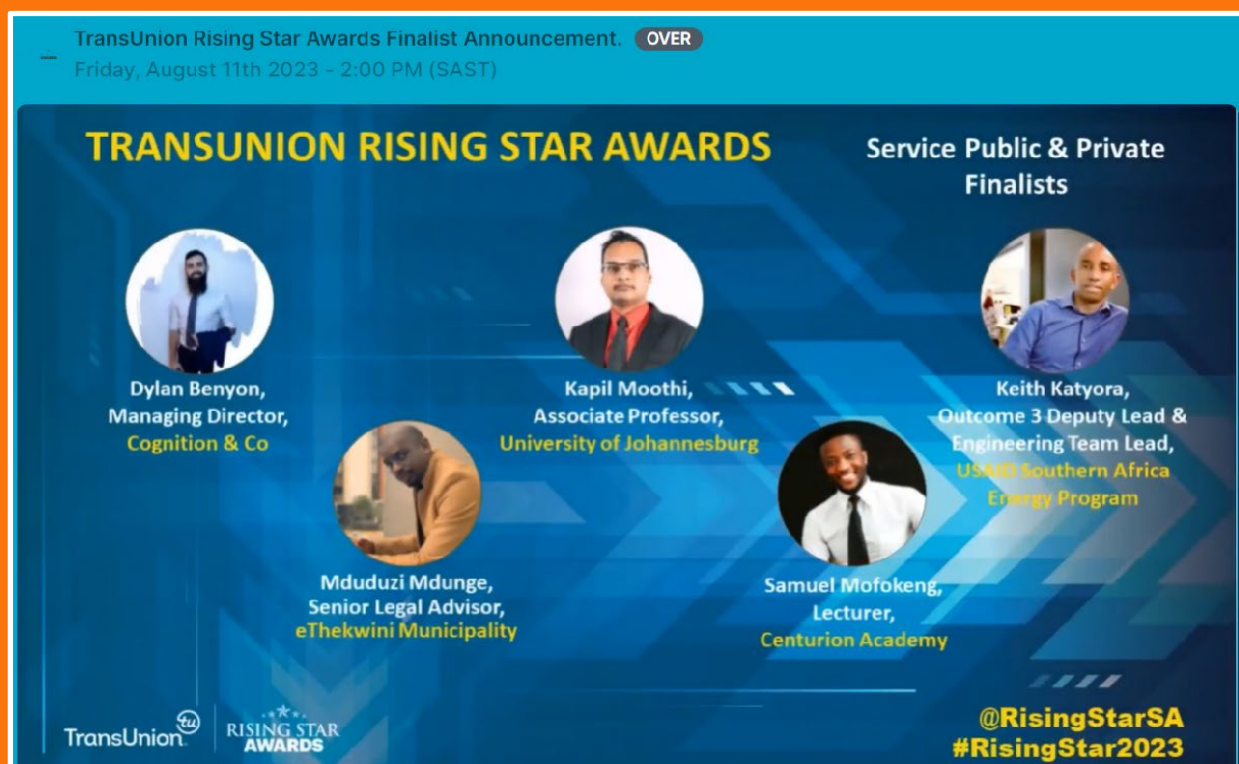


Image 9: TransUnion Rising Star Awards 2023 – FEBE’s Prof Kapil Moothi

In addition, FEBE's active stakeholder engagement has enhanced the Faculty's reach and brand not only in the local and global academic community, but to the heart of communities within South Africa as well. In this way, FEBE continues to prove that its research and academic activities are current, relevant, innovative, solution-driven and impactful to both local and global partners.



Image 10: U-Tech Eswatini school campus visit

FEBE also has a number of local outreaches to schools, Career Expos and Science Fairs. FEBE is also quite active in the media, with academics offering expert opinions and career advice via various media channels. These engagements are co-ordinated by the FEBE Marketing Office.

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

As a testament of FEBE's fitness for Global Excellence and Stature, the majority of FEBE programmes are accredited by the following five (5) Professional Accreditation Bodies:

1. Professional Engineering and Engineering Technology Programmes: The Engineering Council of South Africa (ECSA)
2. Town and Regional Planning Programmes: South African Council for Planners (SACPLAN)
3. Mine Surveying Programme: South African Geomatics Council (SAGC)
4. Construction Management Programme: South African Council for Project and Construction Management Professions (SACPCMP)
5. Quantity Surveying Programme: South African Council for the Quantity Surveying Profession (SACQSP)

Quality and Operations Management Programmes are quality assured internally through UJ institutional processes.

Accreditation agencies generally align to international accords and in this way most programmes listed by FEBE receive recognition internationally. ECSA is a signatory of the Dublin, Sydney and Washington Accord, which provides international recognition for the Faculty's BEng and BEngTech. Curricula are specifically designed, taking into consideration the National Skills Development Plan,

industry needs, surrounding communities, government, economy and international bodies. Programmes are subject to accreditation visits and quality assurance processes. The updated curricula standards will in future ensure, that all engineering curricula also contribute significantly towards the UN SDGs. FEBE looks forward to the implementation of these standards.

- **Washington Accord**

The Washington Accord, signed in 1989, is an international agreement among bodies responsible for accrediting engineering degree programmes. It recognizes the substantial equivalency of programmes accredited by those bodies and recommends that graduates of programmes accredited by any of the signatory bodies be recognized by the other bodies as having met the academic requirements for entry to the practice of engineering.

- **Sydney Accord**

Similarly, an Agreement was developed for Engineering Technologists or Incorporated Engineers, called the Sydney Accord (SA), which was signed in June 2001.

- **Dublin Accord**

The Dublin Accord is an agreement for the international recognition of Engineering Technician qualifications. In May 2002 the national engineering organisations of the United Kingdom, Republic of Ireland, South Africa and Canada signed an agreement mutually recognising the qualifications which underpin the granting of Engineering Technician titles in the four countries.

South Africa, through ECSA, is an active member of all three (3) accords. FEBE's continued success with the ECSA Accreditation of its programmes, ensures that graduates leave the university with a qualification that is globally recognised, through ECSA's global alliances.

In this manner, the quality of FEBE's undergraduate offerings themselves, are a key exemplar of its fitness for the global arena. Currently, all FEBE engineering programmes (8 engineering technology and 3 engineering science) programmes have been fully accredited by ECSA, until the next accreditation cycle, which commences from 2026.

6

FEBE STAFF

6.1 FEBE Staff Profile

Engineering remains a scarce skill in the labour sector. FEBE has continued to try to attract and retain skilled staff. The recruitment process has proved challenging, given the competition with industry-related salaries. Despite recruitment challenges, the Faculty has maintained a certain level of consistency, in that the academic staff complement, which remains steady at 184 permanent academic staff members. To support faculty staff and students, the faculty also has 44 support staff and 56 technical staff members. In spite of resignations, the faculty cohort of staff remains constant over recent years, amounting to a total of 284 staff members.

Table 7: Academic staff equity profile by race (HRIS as at 31 Dec 31 Dec 2023)

Academic Year	Category	Black	White	Total	Foreign Nat - Africa	Foreign Nat - Other	Total	Grand Total
2023	Academic staff	93	34	127	47	10	57	184
2022	Academic staff	91	37	128	45	10	55	183
2021	Academic staff	89	38	127	44	10	54	181

Through its efforts to strongly encourage and develop staff, FEBE now has 117 academic staff members who hold a doctoral qualification. FEBE staff are also encouraged to participate in the Accelerated Academic Mentorship Programme (AAMP).

Of the total staff, 57 staff members are NRF-rated. Efforts to increase this figure are on-going, with a year-on-year increase noted.

Table 8: FEBE NRF Rated Researchers (2019 - 2023)

Year	2023	2022	2021	2020	2019
NRF Rated	57	53	49	47	41

Employee profile details, per category and department are listed below.

Table 9: Academic Employee Profile by Category and Rank (HRIS, 31 Dec 2023)

Academic	Research Professor	Associate Professor	Professor	Senior Lecturer	Lecturer	Assistant lecturer	Senior Research	TOTAL
DEP OF CHEMICAL ENGINEERING TECHNOLOGY	0	4	1	4	4	2	0	15
DEP OF CIVIL ENGINEERING SCIENCE	0	0	3	3	5	0	0	11
DEP OF CIVIL ENGINEERING TECHNOLOGY	0	2	0	3	8	0	0	13
DEP OF CONSTRUCTION MNGT & QUANTITY SURVEYING	0	0	2	4	2	0	0	8
DEP OF ELEC & ELEC ENG SCIENCE	0	3	6	4	3	2	0	18
DEP OF ELECTRIC ENG TECHNOLOGY	0	3	0	9	8	0	0	20
DEP OF MECHANICAL ENGINEERING SCIENCE	0	2	4	3	2	0	0	11
DEP OF MECH&IND ENG TECHNOLOGY	0	2	3	11	9	0	0	25
DEP OF METALLURGY	0	2	3	4	7	1	0	17
DEP OF MINING ENG&MINE SURVEY	0	3	0	2	7	0	0	12
DEP OF QUALITY & OPERATION MGT	0	2	0	5	4	3	0	14
DEP OF TOWN & REGIONAL PLAN	0	1	1	2	4	2	0	10
POST GRAD SCHOOL OF ENG MANAGEMENT	0	0	2	1	0	0	0	3
INSTITUTE OF INTELLIGNECE SYSTEMS	0	1	1	2	0	0	1	5
DEAN'S OFFICE	0	2	0	0	0	0	0	2
TOTAL	0	27	26	57	63	10	1	184

Table 10: Technical Support Employee Profile by Category and Rank (HRIS, 31 Dec 2023)

Non-Academic (Technical Support Services)	Technical Assistant	Technician	Senior Technician	Technical Manager	Head Technician	Station Engineer	Total
DEP OF CHEMICAL ENGINEERING TECHNOLOGY	0	1	0	1	1	1	4
DEP OF CIVIL ENGINEERING SCIENCE	2	0	0	1	1	0	4
DEP OF CIVIL ENGINEERING TECHNOLOGY	3	1	0	1	0	0	5
DEP OF CONSTRUCTION MNGT & QUANTITY SURV.	0	1	0	0	0	0	1
DEP OF ELEC & ELEC ENG SCIENCE	2	0	0	1	0	0	3
DEP OF ELECTRIC ENG TECHNOLOGY	0	3	0	0	2	0	5
DEP OF MECHANICAL ENGINEERING SCIENCE	2	0	1	1	3	0	7
DEP OF MECH&IND ENG TECHNOLOGY	0	1	2	0	0	0	3
DEP OF METALLURGY	3	6	3	1	0	2	15
DEP OF MINING ENG&MINE SURVEY	0	1	1	0	0	0	2
DEP OF QUALITY & OPERATION MGT	0	0	0	0	0	0	0
DEP OF TOWN & REGIONAL PLAN	0	1	0	0	0	0	1
DEAN'S OFFICE	0	3	1	0	0	2	6
TOTAL	12	18	8	6	7	5	56

Table 11: Administrative Support Employee Profile by Category and Rank (31 Dec 2023)

Non Academic (Support Services)	Exec. Dean	Faculty Officer	Project Manager	Prog. Advisor	Head of Faculty	Co-ordinator	General Assistant	Secretary	Admin Assistant	Admin Officer	Total
DEP OF CHEMICAL ENGINEERING TECHNOLOGY	0	0	0	0	0	0	0	0	1	0	1
DEP OF CIVIL ENGINEERING SCIENCE	0	0	0	0	0	0	0	1	0	0	1
DEP OF CIVIL ENGINEERING TECHNOLOGY	0	0	0	0	0	0	0	1	2	0	3
DEP OF CONSTRUCTION MNGT & QUANTITY SURVEYING	0	0	0	0	0	0	0	1	0	0	1
DEP OF ELEC & ELEC ENG SCIENCE	0	0	0	0	0	0	0	1	1	0	2
DEP OF ELECTRIC ENG TECHNOLOGY	0	0	0	0	0	0	0	1	0	0	1
DEP OF MECHANICAL ENGINEERING SCIENCE	0	0	0	0	0	0	0	1	0	0	1
DEP OF MECH&IND ENG TECHNOLOGY	0	0	0	0	0	0	2	1	0	0	3
DEP OF METALLURGY	0	0	0	0	0	0	0	1	1	0	2
DEP OF MINING ENG&MINE SURVEY	0	0	0	0	0	0	0	1	0	0	1
DEP OF QUALITY & OPERATION MGT	0	0	0	0	0	0	0	2	0	0	2
DEP OF TOWN & REGIONAL PLAN	0	0	0	0	0	0	0	1	0	0	1
POST GRAD SCHOOL OF ENG MANAGEMENT	0	0	0	0	0	0	0	0	1	1	2
DEAN'S OFFICE	1	11	0	1	0	2	0	3	3	1	22
INSTITUTE OF INTELLIGENCE SYSTEMS	0	0	1	0	0	0	0	0	0	1	1
Total	1	11	1	1	0	2	2	15	9	2	44

6.2 Staff Achievements and Awards

FEBE's accolades were substantial in volume in the past year, totalling over fifty (50) in 2023 alone. FEBE academics have excelled in all areas. In addition to receiving a number of internal awards, such as featuring in the VC Awards of 2023, FEBE academics and support staff have gained recognition beyond the scope of institution, evidencing their commitment and professional excellence in their disciplines globally.

Highlights of exemplary achievement include:

- The Transunion Rising Star Award received by Prof Kapil Moothi of the Department of Chemical Engineering Technology. Having progressed from semi-finalist to finalist, he was chosen as the winner for the "Service: Public and Private" category.
- The Best Paper Award sponsored by Engineered Science Society, USA, is a testament to the exceptional quality, originality, and relevance exhibited by research in advancing the understanding of environmental science and engineering. Head of Department of Mechanical Engineering Science, Prof T.C. Jen was recognized by this accolade, as having significantly enriched the scientific community's knowledge base.
- FEBE's Prof Tebogo Mashifana, Head of Department Chemical Engineering Technology, was selected as one of the Top 10 HERS-SA Higher Education Women Leaders Awards in three categories: Trailblazer, Women in STEM and Emerging Young Women Leader.
- FEBE's Precious Maputle Faculty Marketing Co-Ordinator was announced as the winner of the 2023 Mail and Guardian top 50 "Power of Women" in the category "governing women".

- The South African Institution of Civil Engineering (SAICE) awarded its prestigious President's Award to the University of Johannesburg's (UJ) compassionate and committed Researcher and Senior Lecturer, Mr Deon Kruger. This accolade ushered in worldwide congratulatory messages from colleagues and professionals in the engineering field to Mr Kruger.



Image 11: SAICE President's Award to FEBE's Senior Lecturer, Mr Deon Kruger

The summary of awards received by FEBE staff members, is listed below.

Table 12: FEBE Summary of Staff Awards and Achievements (2023)

1.	Dr Samuel Adekunle: received an award and coordinated the research process on behalf of the South African Research Chair in Sustainable Construction Management and leadership in the Built Environment (Prof Clinton Aigbavboa) in collaboration with the University of Manchester research group ,future Sustainable Built Environment, 10 February 2023
2.	Samuel Adeniyi Adekunle: won the Seethrough Carbon Competition , which launched on the 1st of January
3.	Akintunde Alonge: Department of Electrical and Electronic Engineering Technology elevated to the grade of Senior Member of IEEE this year, 28 Feb 2023
4.	Prof Qingguo Wang: Department of Electrical and Electronic Science has ranked #489 in the world ranking and #1 in South Africa. he has also been recognized with the Research.com Electronics and Electrical Engineering in South Africa Leader Award for 2023.
5.	Dr Takalani Tshabalala: Department of Quality and Operations Management has been appointed as a member of the task team on the CET skills summit
6.	Mika Sillanpää: Department of Chemical Engineering Technology received his NRF B1 rating.
7.	Dr Nita Sukdeo: Department of Quality and Operations Management received a Global Supply Chain and Logistics award at the 2023 IEOM Zambia Awards
8.	Dr Nita Sukdeo: Department of Quality and Operations Management received a IEOM Society Conference Service Award at the 2023 IEOM Zambia Awards
9.	Dr Nita Sukdeo: Department of Quality and Operation Management was awarded the Best Track Paper Lean, Quality and Six Sigma at the 2023 IEOM Zambia Awards
10.	Dr Takalani Madzivhandila: Senior Lecturer from the Department of Metallurgy has been appointed as the member of the Board of Directors of Council for Mineral Technology. The full announcement by the Government Communication and Information System is available from: Statement on the Cabinet Meeting of 24 May 2023 South African Government (www.gov.za) .
11.	Prof Kapil Moothi: Associate Professor: Chemical Engineering Technology selected as a semi-finalist in the "Service Public & Private" category for the 2023 TransUnion Rising Star Awards , 02 June 2023
12.	Prof Hannelie Nel: Associate Professor, Postgraduate School of Engineering Management has been invited to serve on the Industry Advisory Board of the ASEM, American Society for Engineering Management.
13.	Dr Naadhira Seedat: nGAPLecturer Department of Chemical Engineering , featured on the National Research Foundation Youth Month edition , https://www.nrf.ac.za/youth-month-2023-dr-naadhira-seedat/ , 12 June 2023
14.	Dr Rishen Roopchand; Lecturer from the Department of Chemical Engineering Technology recognized as one of the winners of the prestigious Mail & Guardian 200 Young South Africans Awards Programme , https://mg.co.za/200youngsouthafricans/ , 23 June 2023
15.	Dr Thandiwe Sithole: Senior Lecturer from the Department of Chemical Engineering Technology recognized as one of the winners of the prestigious Mail & Guardian 200 Young South Africans Awards Programme, https://mg.co.za/200youngsouthafricans/ , 23 June 2023
16.	Dr Takalani Tshabalala: Senior Lecturer from the Department of Quality and Operations Management recognized as one of the winners of the prestigious Mail & Guardian 200 Young South Africans Awards Programme, https://mg.co.za/200youngsouthafricans/ , 23 June 2023
17.	Zandile Moruthanyane: Research Coordinator from the Centre for Ecological Intelligence recognized as one of the winners of the prestigious Mail & Guardian 200 Young South Africans Awards Programme, https://mg.co.za/200youngsouthafricans/ , 23 June 2023

18. Dr Johan Venter: Lecturer, Department of Electrical Engineering Technology has been elected to serve as an academic EXCO member by the South African Council of Automation and Control (SACAC) , https://sacac.org.za/pages/structure/ , 12 June 2023
19. Omowunmi Mary Longe: Department of Electrical and Electronic Engineering Science received recognition of her paper Hybrid speed bump-pv-battery grid power generation in a smart grid environment select for the EEPES 2023 Conference Best Paper Award, 21-23 June 2023
20. Dr Sithole: Senior Lecturer from the Department of Chemical Engineering has been selected to receive the NRF award for Early Career/Emerging Researcher. This exciting news will be made public at the award ceremony on the 31st of August.
21. Dr Khangale Phathutshedzo: senior lecturer within the department of chemical engineering technology published an opinion piece titled "Poor record-keeping exposes Joburg to gas disasters" on the sowetan newspaper, PHATHUTSHEDZO KHANGALE Poor record-keeping exposes Joburg to gas disasters (sowetanlive.co.za) , 17 August 2023
22. Prof Kapil Moothi: Associate Professor: Chemical Engineering Technology has been selected as a top 5 finalist for the "Service: Public & Private" category for this year's TransUnion Rising Star Awards! , 17 August 2023
23. Prof Tebogo Mashifana : Head of Department Chemical Engineering Technology selected as one of the Top 10 HERS-SA Higher Education Women Leaders Awards in three categories: Trailblazer, Women in STEM and Emerging Young Women Leader , Home - HERS-SA , 21 August 2023
24. Prof Pat Naidoo: Research Professor Department of Mechanical Engineering Science received the NED letter of appointment; effective for 3 years at the National Nuclear Regulator , 17 August 2023
25. Dr Philip Reeve Baron: Department of Electronic and Electrical Engineering Technology was awarded a Silver Play Button from YouTube for his educational teaching videos on YouTube, which got more than 100k subscribers.
26. Precious Maputle : Faculty Marketing Co-Ordinator was announced as the winner of the 2023 Mail and Guardian top 50 "Power of Women" in the category "governing women" Precious Nthabiseng Maputle – The Mail & Guardian (mg.co.za) .
27. Dr Thandiwe Sithole: Senior Lecturer Department of Chemical Engineering Technology appointed to serve on the DHET research output sub panel for the evaluation of scholarly publications
28. Prof Tebogo Mashifana: Head of Department Chemical Engineering Technology appointed to serve as a member of the Advisory Board of Xpero Trading (Pty) Ltd t/a Paradigm Shift Holdings (PSH).
29. Dr Mathaba Machodi: Lecturer Department of Chemical Engineering Technology featured in the Science Magazine
30. Ms Vizelle Naidoo: Assistant Lecturer Department of Chemical Engineering Technology selected for the Department of Science and Innovation (DSI) THENSA for PhD candidates
31. Dr Major Mabuza selected for the Future Professor programme: https://futureprofessorsprogramme.co.za/the-fellows/#1683123847851-34ab716f-dd17
32. Dr. Thandiwe Sithole: Senior Lecturer Department of Chemical Engineering Technology has been honoured with the prestigious NRF award for Early Career/Emerging Researchers in the female Engineering category. Read more: https://brnw.ch/21wCfR7
33. Prof. Mahachi's paper – won the best laboratory research in the Sustainable Ecological Engineering Desing for society conference 2023
34. Prof. Mahachi's paper – won the best sustainable development research in the Sustainable Ecological Engineering Desing for society conference 2023
35. The research centre (SMaCT) won BIM award on construction innovation
36. Publication of a Book from PhD Thesis on Mixed Income Housing Development for the Global South at final review stage by Emeralds. [Dr Onatu]
37. Appointed and performing as Editorial Advisory Board (EAB) Member of Dialogue 8, representing the 53 Planning Schools in Africa (AAPS) among the Global Planning Education Network (GPEAN). [Dr Onatu]

38. Completed successfully the African Sustainable Infrastructure Mobility (ASIM) Staff exchange Programme with 3 Months Teaching and Research activities in Dar -es Salaam from February- May, 2023. [Dr Onatu]
39. Recipient of Industry 4.0 Funding by the GES [Dr Onatu]
40. Secured R100 000 from the Housing Development Agency (HAD) for research [Dr Makoni]
41. Appointed as Mentor for Mr Brightness Risimati, nGAP Lecturer, University of Venda. [Dr Makoni]
42. Appointed as book chapter reviewer for Dr. Mdlalose, Methembe's book: RSA Regions and Cities Book Series. Routledge [Dr Makoni]
43. Selected for the British Academy: Writing workshop: Governing for urban inclusion 2023/2024. [Dr Makoni]
44. Two staff members chaired a room during the 2nd Inclusive Cities Conference, held online 16-18 Aug 2023. Staff member was a panellist during a discussion session at this conference
45. The Department has partnered with the Non Aligned Movement Centre for Science and Technology, India, and we are co-editing a book titled "Industrial Connects Among Developing Nations: Prospects, Opportunities and Challenges". This is headed by the Professor of Practice Prof Simelane and Prof Mphambukeli.
46. The Department of Urban and Regional Planning Head of Department Prof Mphambukeli was appointed as Editorial Board Member of the Frontiers in Sustainable Cities Journal and co-authored an editorial titled "Urban (In)Security and Social Justice in Post-Colonies". DOI 10.3389/frsc.2023.1175632.
47. Common Purpose Kick-Start Programme Mentor [Prof Mphambukeli]
48. The Department of Urban and Regional Planning Head of Department Prof Mphambukeli was appointed as Editorial Board Member of the Journal of BRICS Studies [Prof Mphambukeli]
49. Published five conference papers from the supervision track, ROUs of 1.07 achieved submitted on OROSS. The research focused in areas of: Residential Satisfaction; Rural Development; Spatial Transformation; Integrated Development Plan; and Housing Assessment. [Mr Ogra]
50. Completed workshop training on 'Modeling and Simulation of Urban Systems [Mr Ogra]
51. Appointed Editorial Board Member of journals (1) Smart Tourism (ISSN 2810-9821); (2) Journal of Smart Cities and Society (2772-3577; 2772-3585) [Mr Ogra]

It is anticipated that the faculty continues to inspire each other, on to greater levels of achievement and recognition.

6.3 FEBE Professorial Inaugurations

FEBE is proud that a number of professorial inaugurations took place in the past year. Of them, a significant number of female staff were inaugurated.



Image 12: FEBE Professorial Inaugurations

6.4 Staff Development

In addition to annual staff development initiatives and participation, such as the UJ Accelerated Academic Mentorship Programme (AAMP) programme, FEBE has also internally geared up for the implementation of the Identification of Engineering Work regulation, as gazetted in March 2021.

With engineering education being regarded as engineering work and to further professionalise teaching and lecturing of engineering, these regulations call for all academics teaching modules that assess graduate attributes to be professionally registered with ECSA.

Faculty workshops and training sessions that facilitate the pathway towards professional registration, have commenced, to guide academics with this process.

6.5 Transformation

FEBE's transformation strategy plays a key role in the recruitment of new staff, prioritising designated and female candidates. Although FEBE has endeavoured to pursue transformation guidelines, it has proven challenging in the recruitment of designated engineering candidates, when competing with industry.

Table 13: FEBE Staff Demographics (Gender, Race)

Staff Demographics (Gender, Race)			
Female	Male	Black	White
103	179	63.83 %	14.89 %

FEBE has significantly increased its female academic staff complement occupying head of department and head of school roles. Among these include Prof Annlize Marnewick as Head of the Postgraduate School of Engineering Management, Prof Tebogo Mashifana as Head of Department for the Department of Chemical Engineering Technology, Prof Sune von Solms as Head of Department for the Electrical and Electronic Engineering and more recently, Prof Thuli Mphambukeli as Head of Department for Urban and Regional Planning and Dr Ntebo Ngcobo as Head of Department for Civil Engineering Technology.

FEBE has also focussed strongly on its Women in Engineering and the Built Environment (WIEBE) initiatives, in an effort to encourage, grow and support the female student and staff population, in line with the faculty's transformation agenda.



Image 13: Women in Engineering and the Built Environment (WIEBE) Banquet Dinner 2023

7

Student Profile

7.1 FEBE Student Profile

The FEBE student headcount profile grows each year, with its demographic profile remaining fairly stable. The Faculty has worked on encouraging female student applications. Events such as FEBE Girl Winter Camps, TechnoLab's Robotics workshops presented at schools, have no doubt assisted in the steady increase of the FEBE female student population.

Table 14: FEBE Student Demographic Trends [2019-2023], (HEDA, Faculty Profile 2024)

YR	STUDENT		FEMALE				GROUP			AGE GROUP			HOME LANGUAGE			
	HEADCOUNT	%	AFRICAN	COLOURED	INDIAN	WHITE	< 21	21-24	24 >	ENGLISH	ISIXHOSA	AFR.	OTHER			
2023	9,766	34	9,320	86	189	157	2,844	3,668	3,254	1,312	830	62	7,562			
2022	9,263	32	8,762	96	201	180	2,547	3,578	3,138	1,239	746	66	7,212			
2021	9,059	32	8,552	96	196	204	2,390	3,611	3,058	1,209	697	71	7,082			
2020	8,931	31	8,410	96	184	233	2,238	3,448	3,245	1,277	662	94	6,898			
2019	10,179	31	9,598	106	191	284	2,130	4,034	4,015	1,394	662	111	8,012			

Table 15: Proportion of F-students with APS >= 35

Proportion of F-students with APS >= 35		2023		2022		2021		2020		2019	
Proportion of students with APS >= 35 (Score without Life)	DEP OF CIVIL ENGINEER SCIENCE	110	97.3%	97	86.6%	54	46.6%	77	81.9%	61	71.8%
	DEP OF CIVIL ENGINEER TECH	61	37.4%	47	34.1%	21	14.0%	34	29.8%	21	14.8%
	DEP OF CONSTRU MGT & QUANT SUR	16	19.0%	17	27.0%	15	26.3%	14	15.2%	16	18.0%
	DEP OF URBAN & REGIONAL PLAN	5	14.7%	4	13.8%	2	8.0%	2	4.3%	3	7.9%
	DEP OF ELEC & ELEC ENG SCIENCE	101	84.2%	65	61.3%	51	48.6%	49	55.1%	35	47.3%
	DEP OF ELECTRIC ENG TECHNOLOGY	98	79.7%	46	46.0%	36	31.9%	40	42.1%	42	38.9%
	DEP OF QUALITY & OPERATION MGT	13	3.7%	4	1.4%	2	0.8%	7	2.5%	2	0.7%
	DEP OF MECH ENG SCIENCE	93	76.2%	94	79.7%	62	55.9%	63	70.8%	65	70.7%
	DEP OF MECH&IND ENG TECHNOLOGY	180	55.9%	126	43.8%	94	32.5%	114	44.0%	79	32.5%
	DEP OF CHEM ENG TECHNOLOGY	108	99.1%	76	85.4%	63	68.5%	46	68.7%	53	74.6%
	DEP OF METALLURGY	30	21.4%	15	13.2%	20	19.8%	29	20.0%	28	19.7%
	DEP OF MINING ENG&MINE SURVEY	116	77.9%	70	52.6%	28	21.4%	45	44.6%	42	38.5%
	Total	931	50.8%	661	41.8%	448	29.1%	520	35.2%	447	30.0%

FEBE also attracts a high number of Orange Carpet high achieving students each year, with more than half of FEBE first-time entering students achieving an APS score of greater than 35.



Image 14: 2023 FEBE Orange Carpet Welcome Function

7.2 Student Success

FEBE's undergraduate module success rate averages 77 %, with undergraduate module success rate of 86 % and a first-time entering module success rate of 85 %, (Dean's Infographic, HEDA).

FEBE endeavours to tailor student success initiatives, such that it applies and benefits the FEBE student more directly. It is hoped that through these customised interventions, FEBE throughput statistics, especially for engineering, will improve.

Table 16: Student Success by Group and Gender (HEDA, Faculty Profile Report 2024)

FTE PASS															
GENDER	MALE					FEMALE					TOTAL				
YEAR	A %	C %	I %	W %	T %	A %	C %	I %	W %	T %	A %	C %	I %	W %	T %
2023	79%	74%	81%	70%	78%	83%	92%	71%	100%	83%	80%	80%	78%	75%	80%
2022	75%	61%	78%	75%	75%	80%	63%	97%	83%	80%	77%	62%	83%	77%	77%
2021	78%	65%	80%	85%	78%	82%	55%	70%	67%	81%	79%	62%	78%	83%	79%
2020	78%	80%	78%	70%	77%	82%	82%	67%	107%	82%	79%	80%	75%	75%	79%

A - African C - Coloured I - Indian W - White T - Total

7.3 Student Achievements

Much like FEBE staff, FEBE students thrive to excel and achieve. The number of students achieving excellence rises each year. The faculty honours such students in both undergraduate and postgraduate awards days.



Image 15: 2023 FEBE Dean's Honours Roll



Image 16: 2023 Award Ceremony Chemical Engineering Technology

It is no doubt, that the exemplary example of FEBE staff, is being emulated by their student population. Below, a summary of student awards and achievements from the 2023 academic year. FEBE is certain that this trend will only grow and increase in coming years.

Table 17: 2023 Summary of Student Awards and achievements

1.	Zekhethelo Thwala: Department of Electrical and Electronic Science completed a solar powered weather station project for her final year , 16 Nov 2022
2.	Mechanical and Civil Engineering students won Engineers Without Borders' Engineering for People Design Challenge Grand Final, 6 December 2022
3.	Ms Mavis Gezimati : Department of Electrical and Electronics Engineering Science article entitled "Circular Synthetic Aperture Radar for Near-Field Terahertz Imaging" adjudged the Best Paper Award in 5th International Conference on Multimedia, Signal Processing, and Communication Technologies (IMPACT 2022), (https://amu.ac.in/miscellaneous/impact-2022)
4.	Ms. Chauke and Dr. Singh: Department of Metallurgy, publication of their book chapter, 04 January 2023, Mining Law and Governance in Africa: Transformation and Innovation for (routledge.com)
5.	Xola Mapekula: Department of Mechanical Science, working in ATLAS at CERN has won a SA-CERN Excellence Bursary for his PhD, 28 Feb 2023
6.	Michelle Moganedi: Department of Metallurgy was recently crowned the 2023 Disabled Sportswoman of the year at the Gauteng Sports Awards. Coincidentally, Michelle was also crowned the 2022 UJ Sportswoman of the Year, 03 March 2023
7.	Terry-Anne Fredericks: Department of Electrical and Electronic Engineering Technology was awarded 1st place prize on the ICT Competition 2022-2023 which was held in Shenzhen, China
8.	Oluwafeni Oni: Department of Electrical and Electronic Engineering Science received recognition of her paper Hybrid speed bump-pv-battery grid power generation in a smart grid environment select for the EEPES 2023 Conference Best Paper Award, 21-23 June 2023
9.	Robert Thokozani Skhosana: Department of Electrical and Electronic Engineering Science received recognition of THE paper Hybrid speed bump-pv-battery grid power generation in a smart grid environment select for the EEPES 2023 Conference Best Paper Award, 21-23 June 2023
10.	Lawrence Seseni: Department of Quality and Operations Management was awarded second place for the Doctoral Thesis Competition at the Sixth European International Conference on Industrial Engineering and Operations Management , 18-20 July 2023
11.	Sebonkile Thaba: Department of Quality and Operations Management was awarded First Place for the Doctoral Thesis Competition at the Sixth European International Conference on Industrial Engineering and Operations Management, 18-20 July 2023
12.	Kgothatso Tjebane (and Team) : Department of Construction and Quantity Surveying came in first place at the digital twin Hackathon (prize was to go to the Netherlands and learn the digital twinning done in the Europe , 25 July 2023
13.	The UJ Civil Tech Forum: Department of Civil Engineering Technology was awarded the prestigious title of "2023 SAICE National Awards Student Chapter of the Year"
14.	Mr Jojo Kayembe : UJ Civil Tech Forum Chairperson 2023 received the Prospective Young Engineer Professional Award during the Africa Engineering Week hosted by the Engineering Council of South Africa
15.	URP: Coordinated and appointed 4 students to participate in the Provincial Members Assembly convened by the South African Local Government Association (SALGA). [Dr Makoni]
16.	URP: Postgraduate student received the award for the 2nd best presentation during the 2nd Inclusive Cities Conference, held online 16-18 Aug 2023. [Mr Pretorius]

8

Partnerships, Stakeholder and Community Engagement

FEBE strives to be a Pan-African centre of critical intellectual inquiry through extensive scholarship and balanced participation in knowledge networks both within and external to the continent. FEBE's global reach and impact is evident by the number of international staff and students the faculty attracts.

8.1 Industry Partnerships

FEBE departments have worked hard to maintain strong industry networks and partnerships.

Such relationships have resulted in innovative projects, at the end, benefiting the FEBE student

and enhancing teaching and learning, and research. The 4IR Experience Lab launch a partnership

between UJ FEBE and Schneider Electric who are global specialists in energy management and

automation, took place in February 2023.



Image 17: 4IR Experience Lab launch (UJ FEBE and Schneider Electric)



Image 18: Nissan Navara Handover Ceremony

FEBE also maintains strong relationships with municipalities and industry, that is used to build student exposure to practical experience.

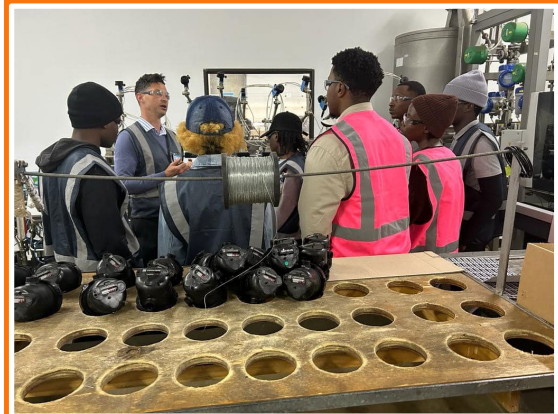


Image 19: Xylem Water Solutions and Water Technology Excursion



Image 20: Rand Water Excursion with 3rd Year Water Reticulation class

Each of the twelve departments and the one postgraduate school hosts its own Industry Advisory Board. The faculty has its own overarching industry advisory board. Maintaining relationships with industry has proven critical to ensure that not only do curricula remain relevant to the needs of industry, but that changes in the sector, new standards and qualification types leading to professional registration are communicated to employers. Industry stakeholders form a key component of the quality assurance and programme review process.

8.2 FEBE Community Development Projects

FEBE continues to positively impact the community by solving local community problems. The Faculty of Engineering and the Built Environment (FEBE) supports various community engagement activities.



Image 21: Nelson Mandela Day 2023 - Handover with CESA

FEBE's commitment towards community development is also evident in the number of community-based projects hosted by faculty such as the Gwawkwani Village project and 3D printing housing projects. Integrated food systems, implemented by the Centre for Ecological Intelligence, at various UJ campuses and sites in Gauteng, Eastern Cape and Mpumalanga, offer living laboratories and incubation hubs for relevant and practical experiential learning opportunities to undergraduate and postgraduate students from a diversity of disciplines.

One of the flagship entities driving community engagement from a technology innovation perspective is the UJ Process, Energy and Environmental Technology Station (UJ PEETS) hosted in FEBE. UJ PEETS is mandated to provide engineering services and technology development support to SMEs active in the green economy.

A number of Short Learning Programmes (SLPs), in the green economy, were developed by PEETS. These include both an introduction and Advanced SLP in Strategic Energy Planning. In this way,

FEBE engages with varying communities directly, upskilling community members with green technologies and solutions that will impact their daily lives and benefit the communities around them.

In 2023, PEETS launched the Eastern Cape Water Provision Project to harvest water from air, using advanced hydro panels. UJ PEETS supports capacity-building and policy-influencing initiatives and provides engineering and technology development assistance to SMEs. Its primary priority is the growth of the green economy. The project also involved UJ's Faculty of Health Science Water and Health Research Centre.



Image 22: PEETS Water Project

The Launch of the 3D Concrete Printing Project, which took place in January 2023, is a collaboration between UJ FEBE, the Department of Science and Innovation (DSI) and the KwaZulu-Natal Department of Human Settlements.



Image 23: The Launch of the 3D Concrete Printing Project

The smart village of Gwakani is also testament of FEBE's reach and life-changing impact on rural communities. Children who previously had never flicked a light switch are now learning English through the television at the crèche, school-going children are able to do their homework beneath

bright lights, and eight people are employed at the bakery full time. Just a few years ago, none of this technology existed. The result has been a smart, IoT village that operates without municipal infrastructure and meets the economic and social needs of its residents – not only in the short term, but on an ongoing basis.

Watch the smart village of Gwakani: <https://www.youtube.com/watch?v=k8zxBC4t73I>



Image 24: Smart village of Gwakani

8.3 FEBE Alumni and School Engagements

Engineering is a scarce skill, and it is vital to attract young people to pursue careers in engineering and the built environment, in order to equip them to address societal needs and challenges.

The TechnoLab was established in 1995 and has presented technology workshops to over 70 000 students to date. The Technolab's workshops in technology cover a wide range of courses, concentrating on the technological process where development takes place from creative thinking skills and problem-solving skills. By partnering with industry, in 2023 the TechnoLab has trained more than 600 teachers, while engaging more than 80 schools and developing 4 000 young minds on topics related to coding and robotics, the 4th industrial revolution, science and mathematics.



Image 25: A FEBE walkabout with learners from Sisekelo High School, eSwatini

FEBE maintains relationships with its current students and alumni through active student forums and affinity groups. In 2023, the Departments of Mining and Mine Surveying and Chemical Engineering Technology launched their own Student Affinity Clubs.

As a testament of the robust and invaluable engagements of student alumni fora, the UJ Civil Engineering Technology Forum was awarded the prestigious title of "2023 SAICE National Awards Student Chapter of the Year." Through the faculty's marketing office, FEBE maintains communication and reach with all its alumni, keeping them abreast of faculty events.



Image 26: Chemical Engineering Technology Alumni Affinity Group Launch



Image 27: FEBE engagement with learners from LEAP Maths and Science School

9

Resource Management

FEBE has been able to manage its resources catering for the operational costs of teaching and research activities. FEBE has been able to manage its resources catering for the operational costs of teaching and research activities. Physical space constraints remain a challenge, both on the Doornfontein and Auckland Park campuses. Timetable optimisation has proven a critical exercise in ensuring suitable class sizes for larger groups.

The Faculty has endeavoured to ensure that laboratory upgrades and equipment maintenance take place timeously. The Faculty intends prioritizing the replacement of older equipment and sourcing the funds to elevate faculty laboratories, before the next accreditation cycle. This work has already begun as evidenced by the 4IR laboratory and Atomic Layer Deposition (ALD) laboratory on APK.

FEBE HoDs have been innovative, adaptable and flexible sharing in managing resources for the benefit of the student. Resource sharing, even across campuses, is being explored within Schools and the Faculty.

10

Environmental Sustainability

FEBE has also implemented a number of Short Learning Programmes (SLPs) contributing directly towards the specific strategic objectives of Sustainable Development goals and the fourth industrial revolution.

Several projects within FEBE, such as those of PEETs and the Gwakani Project, have successfully explored the use of renewable energy. In addition, the 3D printing of houses has made use of sustainable materials.

FEBE is also home to the multi-disciplinary Centre for Ecological Intelligence. In this regard, FEBE has driven the consultation process with other faculties in the spirit of collaboration, to propose several SLPs in the agri-engineering sector.



Image 28: UJ VC Visit to FEBE' s Centre for Ecological Intelligence agri-ecological projects

11

Financial Management

The faculty has fully utilised its 2023 budget allocation. It has also had to make use of its reserve funds to cover unexpected and urgent expenses including the registration of needy students to fulfil the enrolment plan, to secure the appointment of part-time lecturers in certain departments and to appoint additional postdoctoral research fellows, in order to boost research production.

FEBE's operational budget sat at R 266 115 007, with operating expenses amounting to R1 041 190 (FEBE 2023 Budget Report, Finance Business Partner). FEBE personnel remuneration constituted R236 344 212, with temporary salaries amounting to R15 577 049.

FEBE HoDs actively engage with their Finance Business Partner and have worked hard to consistently follow up on finance related issues in the faculty. Overall, the faculty is keen to improve the financial health of the faculty.

Given the scarcity of engineering equipment suppliers in the country and other such factors that are unique to the faculty, timeous procurement and delivery of laboratory equipment, is essential for teaching and learning. The active role of Heads of Departments has, in most cases, assisted to ensure that delayed matters are effectively escalated and has minimised the impact and risk to teaching and learning.

12

The road ahead

The faculty looks forward to a challenging but exciting phase ahead. The faculty has celebrated a number of positive achievements, ranging from the success of recent accreditation visits to an astounding number of staff achievements. The faculty has however also identified a number of areas that require greater focus and expansion.

FEBE has demonstrated innovative teaching and learning with technology such as virtual mines and gaming, and it is hoped that this will be greatly expanded on in years to come. There is also a strategic awareness and plan for increased student success in the faculty, together with contextually relevant re-curriculation as required.

From the postgraduate perspective, staff development, increasing supervision capacity and improving student completion in minimum time remain a high priority. The sustainability of FEBE's high research productivity and teaching workloads remains a focus of directed support from the Deanery.

Led by the Executive Dean of the Faculty, Professor Daniel Mashao, Vice-Dean: Teaching and Learning, Professor Didier Nyembwe and Vice-Dean of Postgraduate Studies, Research and Innovation, Prof Thokozani Shongwe, FEBE has the sound leadership to ensure its future sustainability and increased contribution towards institutional and global development goals.

2023 FEBE Annual Report

Compiled by

Faculty of Engineering and the Built Environment